Appendices

EAST BRANCH EXTENSION PHASE I IMPROVEMENTS PROJECT

Draft Supplemental Environmental Impact Report No. 2
SCH No. 2007111106

Prepared for:
Department of Water Resources

March 2009

Appendices

EAST BRANCH EXTENSION PHASE I IMPROVEMENTS PROJECT

Draft Supplemental Environmental Impact Report No. 2
SCH No. 2007111106

Prepared for:
Department of Water Resources

March 2009

707 Wilshire Blvd.
Suite 1450
Los Angeles, CA 90017
213.599.4300
www.esassoc.com

Oakland

Olympia

Petaluma

Portland

Sacramento

San Diego

San Francisco

Seattle

Tampa

Woodland Hills

206008.04

ESA

Appendix A

Notice of Preparation and Scoping Report

ESA

ESA

707 Wilshire Boulevard
Suite 1450
Los Angeles, CA 90017
213.599.4300 phone
213.599.4301 fax

www.esassoc.com

Scoping Report

date January 18, 2008

to Sergio Escobar

from Tom Barnes

subject Crafton Hills Reservoir Enlargement Project Scoping Report

CRAFTON HILLS RESERVOIR ENLARGEMENT PROJECT

Scoping Report

Introduction

The Department of Water Resources (DWR) is the Lead Agency for the proposed Crafton Hills Reservoir Enlargement Project. The reservoir would be enlarged and a new dam built in the adjoining drainage to the south. In addition, a segment of pipeline approximately one half mile in length and 48 inches in diameter would be constructed to connect the existing East Branch Extension Pipeline Phase I to the San Bernardino Municipal Valley Water District's Yucaipa Pipeline. The proposed project is located south and west of the intersection of Mill Creek Road (State Route 38) and Bryant Street in the City of Yucaipa. The project is being proposed to allow DWR to fill the reservoir during off-peak periods of the day, relieving pressure on the energy grid, and lowering pumping costs.

Notice of Preparation and Notice of Availability

The Notice of Preparation (NOP) was prepared by Environmental Science Associates (ESA) pursuant to the California Environmental Quality Act (CEQA), to notify interested parties that the Department of Water Resources will be preparing a Supplemental Environmental Impact Report (SEIR) to evaluate potential environmental impacts of the Crafton Hills Reservoir Enlargement Project (see Attachment 1).

The NOP was mailed on November 26, 2007 to approximately 117 interested parties, including local, state, and federal agencies; news publications; and other groups or individuals who had previously expressed interest in the project. A Notice of Completion (NOC) was also prepared by DWR and sent to the State Clearinghouse (see Attachment 2). Copies of the NOP were made available for public review at the San Bernardino Valley Municipal Water District Office and at the following websites: www.sbvmwd.com, www.sgpwa.com, www.craftonconservancy.homestead.com, and www.dwr.water.ca.gov.

Scoping Period

The 30-day project scoping period, which began with the distribution of the NOP on November 26, 2007, remained open through January 15, 2008. During the scoping period, the Department of Water Resources held a scoping meeting. The meeting was held on December 11, 6:00 P.M. at the City of Yucaipa Community Center's Banquet Room (34900 Oak Glen Road, Yucaipa, CA 92399). The Department of Water Resources placed display ads for the scoping meetings in the Press Enterprise on December 7th, 8th, and 9th 2007.

At the scoping meeting, the DWR staff and ESA consultants gave presentations on the city's application and the proposed action (see Attachment 3). Following these presentations, meeting participants were invited to talk to staff regarding any issues they would like. Participant questions and comments were recorded on a whiteboard, and comment cards were also available for participants to fill out at the meeting or to send in at a later date. The sign-in sheet from the public scoping meeting can be found in Attachment 4.

Comments

During the scoping period, the DWR received 7 comment letters on the proposed project via mail or e-mail (see Attachment 5). The city also received comments during the scoping meeting; multiple comments were recorded (see Attachment 6). A matrix summarizing the comments received via mail or e-mail can be found in Attachment 7.

The next formal opportunity for public comments will be associated with the release of the Draft Supplemental Environmental Impact Report, expected to be available for public review Spring 2008.

Contents of this Report

This Scoping Report contains documents pertinent to the scoping process. The following items are included:

Attachment 1: Notice of Preparation
Attachment 2: Notice of Completion
Attachment 3: Scoping Meeting Presentation
Attachment 4: Scoping Meeting Sign-in Sheet
Attachment 5: Comment Letters Received by the City
Attachment 6: Scoping Meeting Comments
Attachment 7: Matrix of Comments

Attachment 1
Notice of Preparation

NOTICE OF PREPARATION
DWR Crafton Hills Reservoir Enlargement Project Supplemental EIR

To: California Office of Planning and Research Responsible and Trustee Agencies Other Interested Parties

Subject: Notice of Preparation of a Supplemental Environmental Impact Report

Project: Crafton Hills Reservoir Enlargement Project

Lead Agency: Department of Water Resources

Date: November 27, 2007

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties that the Department of Water Resources (DWR) as the Lead Agency is beginning preparation of a Supplemental Environmental Impact Report (SEIR) pursuant to the California Environmental Quality Act (CEQA) for the proposed Crafton Hills Reservoir Enlargement Project. The SEIR will supplement the 1997 East Branch Extension Phase I SEIR. The proposed project is located south and west of the intersection of Mill Creek Road (State Route 38) and Bryant Street in the City of Yucaipa. Crafton Hills Reservoir is located in the easterly section of Crafton Hills. The reservoir would be enlarged and a new dam built in the adjoining drainage to the south. In addition, a segment of pipeline approximately one half mile in length and 48 inches in diameter would be constructed connecting the existing East Branch Extension Pipeline-Phase I with the Yucaipa Pipeline. **Figure 1** (attached) provides a site plan of the proposed project.

DWR is soliciting the views of interested persons and agencies as to the scope and content of the environmental resources and topics to be studied in the SEIR. In accordance with CEQA, agencies are requested to review the project description provided in this NOP and provide comments on environmental issues related to the statutory responsibilities of the agency. The SEIR will be used by DWR when considering approval of the Crafton Hills Reservoir Enlargement Project.

CEQA sets the review and comment period for an NOP to end 30 days after publication. However, the DWR requests comments to this NOP be received no later than the close of business on January 15, 2008.

Please include a return address and contact name with your comments. Please send comments via mail or email to the address show below:

California Department of Water Resources
c/o Tom Barnes, ESA
707 Wilshire Boulevard, Ste. 1450
Los Angeles, CA 90017

Email: tbarnes@esassoc.com
Telephone: (213) 599-4300
Fax: (213) 599-4301

A scoping meeting open to the public will be held to receive public comments and suggestions on the project. The scoping meeting will be open to the public and held at the following location:

DATE: Tuesday, December 11, 2007
TIME: 6:00 PM
LOCATION: City of Yucaipa Community Center, Banquet Room
34900 Oak Glen Road
Yucaipa, CA 92399

PROJECT LOCATION

The existing Crafton Hills Reservoir is located within the easterly section of Crafton Hills in the City of Yucaipa, San Bernardino County, California at an elevation of 2,925 feet. The location of the proposed one half mile-long pipeline would parallel Mill Creek Road approximately 150 feet to the north terminating just to the west of Bryant Street.

PROJECT BACKGROUND

The Crafton Hills Reservoir is owned by DWR and operated by San Bernardino Valley Municipal Water District (SBVMWD) and is part of the East Branch Extension of the State Water Project (SWP). The reservoir was originally built as a component of DWR's East Branch Extension-Phase I. Its principal features are a zoned earthfill dam, an uncontrolled overflow spillway, a 54-inch diameter inlet pipeline, 54-inch diameter outlet pipeline, a 12-inch diameter emergency release blow-off, and access roads. The reservoir was initially evaluated in the *Supplemental EIR No. 1 for the East Branch Extension Phase I* certified by DWR in March 1998. The Phase I SEIR supplemented the 1994 Water Importation Project EIR prepared by the San Gorgonio Pass Water Agency (SGPWA).

PROJECT NEED

The existing Crafton Hills Reservoir size is insufficient for current needs, which requires DWR to run the pumps at Crafton Hills Pump Station during peak energy demand times of the day. This puts unnecessary load on the electrical grid system. Enlargement of the reservoir will allow DWR to fill the reservoir during off-peak periods of the day, relieving pressure on the energy grid, and lowering pumping costs. The reservoir expansion would not increase the conveyance capacity of the East Branch Extension; but would substantially enhance the system's operating flexibility and reliability.

PROJECT DESCRIPTION

The proposed project would enlarge the existing Crafton Hills Reservoir from the current storage capacity of 85 acre-feet to approximately 225 acre-feet. A notch in the ridge

dividing the drainages would be excavated and serve as a connecting channel between the existing and proposed reservoirs. An earthfill dam would be constructed within the drainage course adjacent to the existing reservoir. Access roads, cut slopes, and operational dam equipment would be installed. (See Figure 1)

In addition, a one half mile segment of a 48-inch diameter connector pipeline would be built to connect the East Branch Extension Pipeline-Reach 1 to the 48-inch diameter Yucaipa Pipeline owned and operated by the SBVMWD. The pipeline would allow DWR to maintain water deliveries to Reach 2 and Reach 3 segments of the East Branch Extension while the reservoir is being enlarged. After the proposed project is completed, the connector pipeline would remain in place to provide an emergency back that currently does not exist in the event of a reservoir outage.

DISCUSSION OF POTENTIAL IMPACTS

The SEIR will assess the physical changes to the environment that would likely result from construction and operation of the Crafton Hills Reservoir Enlargement, including direct, indirect and cumulative impacts. Potential impacts of the proposed project are summarized below. The SEIR will identify mitigation measures if necessary to minimize potentially significant impacts of the proposed project.

Aesthetics

Local aesthetics may be temporarily impacted during construction. Once constructed the dam could alter long range views of the Crafton Hills from surrounding land uses. The impact to the scenic character of the area could be significantly impacted. The Crafton Hills Reservoir Enlargement could add to the scenic character of the area. The SEIR will evaluate the proposed project for impacts related to aesthetic resources, including consistency of the project with the City of Yucaipa General Plan, local ordinances and state and federal regulations.

Air Quality and Global Warming / Climate Change

The proposed project is located within the South Coast Air Basin. Construction activities would consist of excavation only. No blasting will occur. Construction emissions would be generated from construction equipment exhaust, earth movement, construction workers' commute, and material hauling for the entire construction period. The project's construction emissions could adversely affect the regional air quality within the South Coast Air Basin. In addition, construction equipment would emit greenhouse gases suspected of contributing to global warming. The SEIR will estimate daily exhaust and fugitive emissions based on detailed construction activities by project phasing to assess the potential long-term and short-term air quality impact. The SEIR will identify sensitive receptors within the project area that could be adversely affected by the project construction. If necessary, measures to mitigate impacts to minimize their significance will be developed or recommended for implementation. Once constructed the expanded reservoir would not increase existing emissions of criteria pollutants or greenhouse gases.

Biological Resources

Construction would occur in areas with natural habitats. The SEIR will evaluate potential impacts of the project on sensitive habitats and species. Mitigation measures will be developed if necessary to minimize potential adverse effects of the project.

Cultural Resources

Excavation for the proposed project could encounter previously unknown archaeological resources. The SEIR will evaluate the potential impacts of the project on archaeological resources. The SEIR will identify project design alternatives, as necessary, as well as mitigation measures if necessary to minimize impacts to cultural resources.

The rock type in the reservoir area is a metagranitic rock that is non-fossiliferous and no paleontological resources are expected to be encountered. Nonetheless, cultural resources will be discussed in the SEIR.

Geology and Soils

The Crafton Hills Reservoir Enlargement will be founded on bedrock comprised of metagranitic rock, the same rock type that the existing Crafton Hills Reservoir is founded on. There is minimal soil cover overlying the bedrock except in the lower elevations of the proposed reservoir. The project area is located within a seismically active region of California. Seismic activity could cause considerable ground shaking in the project area. The proposed dam would be subject to Division of Safety of Dams (DSOD) design and construction requirements. The project would not affect access to mineral resources. The SEIR will evaluate the potential geologic hazards associated with the proposed project and identify mitigation measures, as necessary, to minimize impacts.

Hazards and Hazardous Materials

The project area is located in a previously undeveloped area. It is highly unlikely that contaminated soils would be encountered during excavation activities. Nonetheless, the EIR will evaluate known and potentially occurring hazards materials. DWR would be subject to state and federal hazardous materials handling and disposal regulations.

Hydrology, Groundwater and Water Quality

Construction of the proposed project would be subject to storm water discharge requirements. Once constructed, the facilities would not increase storm flows, degrade water quality or deplete groundwater. The SEIR will identify storm water quality protection measures required during construction activities. The SEIR will identify mitigation measures, as necessary, to minimize potential storm water runoff water quality impacts.

Land Use

The proposed project would convert open space to a raw water reservoir. Construction activities associated with the project could result in short-term disturbances to adjacent land uses. Hiking trails in the Crafton Hills could be temporarily affected by the project. Otherwise, no recreational facilities would be affected. The project would not affect agricultural lands. The SEIR will identify the project's potential effects on land uses and will evaluate the project's consistency with the General Plans for the City of Yucaipa and the County of San Bernardino. The SEIR will evaluate the proposed project's compatibility with neighboring land uses (i.e., residential, commercial, open space etc.) and will identify mitigation measures, as necessary, to minimize any significant land use impacts.

Noise and Light

Construction activities associated with the project would generate short-term noise that could affect nearby residences. Construction activity would be required to comply with local noise ordinances. The SEIR will evaluate the proximity of sensitive land uses with noise-generating activities associated with construction. The SEIR will identify mitigation measures, as necessary, to minimize impacts. Once constructed, the facility would not result in increased noise or light sources.

Traffic and Transportation

Construction activities could temporarily increase traffic on roadways, due to worker commute and material deliveries including concrete deliveries. No soil would be hauled from the dam site; however, there is potential that excavated material from the pipeline excavation work may be removed from the construction area. Additionally, engineered fill and reservoir lining may be delivered to the construction sites. The SEIR will describe the duration and extent of impacts on the roadways affected by the proposed project and will identify mitigation measures if necessary to minimize potential adverse effects.

Utilities and Public Services

Excavation could encounter underground utilities during installation of the pipeline. As part of the project, DWR would require construction contractors to identify and avoid impacts to existing utilities. Once constructed, the project would alleviate pressure on the energy grid during peak-demand periods. None of the excavated material from the dam site would require disposal at an off-site landfill as all cut and fill would remain on site. Construction activities could generate some solid waste; impacts to public services will be discussed in the SEIR.

SOURCE: GlobeXplorer, 2007; DWR, 2007.

DWR - Crafton Reservoir NOP . 206008.04

Figure 1
Proposed Crafton Hills Reservoir Expansion Project

Attachment 2

Notice of Completion

Notice of Completion & Environmental Document Transmittal

Appendix C

For U.S. Mail: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title:

Crafton Hills Reservoir Expansion Project

Lead Agency: Department of Water Resources | Contact Person: Sergio Escobar

Street Address: 1416 Ninth Street | Phone: 916-653-9469

City: Sacramento | Zip: 95814 | County: Sacramento

Project Location:

County: San Bernardino | City/Nearest Community: Yucaipa

Cross Streets: State Route 38 (Mill Creek Road), Bryant Street, Tivoli Way, Simi Drive | Zip code: 92339

Assessor's Parcel No. 302-211-05 | Section: 23,24 | Twp: 1s | Range: 2w | Base: SB

Within 2 miles: State Hwy#: 38, 30, I-215, I-10 | Waterways: Oak Glen Creek, Wilson Creek

Airports: Redlands Municipal Airport | Railways: Burlington Northern Santa Fe Railway | Schools: Park View Elementary School

Document Type:

CEQA:

- ☒ NOP
- ☐ Early Cons
- ☐ Neg Dec
- ☐ Mit Neg Dec
- ☐ Draft EIR
- ☐ Supplement to EIR
- ☐ Subsequent EIR
- ☐ Other:

NEPA:

- ☐ NOI
- ☐ EA
- ☐ Draft EIS
- ☐ FONSI

Other:

- ☐ Joint Document
- ☐ Final Document
- ☐ Other:

Local Action Type:

- ☐ General Plan Update
- ☐ General Plan Amendment
- ☐ General Plan Element
- ☐ Community Plan
- ☐ Specific Plan
- ☐ Master Plan
- ☐ Planned Unit Development
- ☐ Site Plan
- ☐ Rezone
- ☐ Prezone
- ☐ Use Permit
- ☐ Land Division (Subdivision, etc.)
- ☐ Annexation
- ☐ Redevelopment
- ☐ Coastal Permit
- ☒ Other: Water Infrastructure

Development Type:

- ☐ Residential: *Units* *Acres*
- ☐ Office: *Sq.ft.* *Acres* *Employees*
- ☐ Commercial: *Sq.ft.* *Acres* *Employees*
- ☐ Industrial: *Sq.ft.* *Acres* *Employees*
- ☐ Educational
- ☐ Recreational

Total Acres: (approx.)

- ☒ Water Facilities: *Type* Storage Reservoir and Pipeline *MGD*
- ☐ Transportation: *Type*
- ☐ Mining: *Mineral*
- ☐ Power: *Type* *MW*
- ☐ Waste Treatment: *Type* *MGD*
- ☐ Hazardous Waste: *Type*
- ☐ Other:

Project Issues That May Have A Significant Or Potentially Significant Impact:

- ☒ Aesthetic/Visual
- ☐ Agricultural Land
- ☒ Air Quality
- ☒ Archeological/Historical
- ☒ Biological Resources
- ☐ Coastal Zone
- ☒ Drainage/Absorption
- ☐ Economic/Jobs
- ☐ Fiscal
- ☒ Flood Plain/Flooding
- ☐ Forest Land/Fire Hazard
- ☒ Geologic/Seismic
- ☐ Minerals
- ☒ Noise
- ☐ Population/Housing Balance
- ☒ Public Services/Facilities
- ☒ Recreation/Parks
- ☐ Schools/Universities
- ☐ Septic Systems
- ☐ Sewer Capacity
- ☒ Soil Erosion/Compaction/Grading
- ☒ Solid Waste
- ☒ Toxic/Hazardous
- ☒ Traffic/Circulation
- ☒ Vegetation
- ☒ Water Quality
- ☒ Water Supply/Groundwater
- ☒ Wetland/Riparian
- ☒ Growth Inducement
- ☒ Land Use
- ☒ Cumulative Effects
- ☐ Other:

Present Land Use/Zoning/General Plan Designation: The existing reservoir, which is proposed to be expanded, is located within the City of Yucaipa and has a land use designation of Planned Development. The proposed pipeline is located in both the unincorporated

NOTE: Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Revised 2004

County and the City Redlands. The county land use designation and zoning is Single Residential. The City land use designation is Open Space and the zoning is Flood Control.

Project Description: (*please use a separate page if necessary*)

The proposed project would enlarge the existing Crafton Hills Reservoir from a useable storage capacity of 85 acre-feet to approximately 225 acre-feet. A notch in the ridge dividing the drainages would be excavated to enlarge the reservoir into the adjacent drainage. An earthfill dam would be constructed within the drainage course adjacent to the existing reservoir. Access roads, cut slopes, and operational dam equipment would be installed.

In addition, a 1/2 mile segment of 48-inch connector pipeline would be built to connect the East Branch Extension Pipeline Reach 1 to the 48-inch Yucaipa Pipeline owned and operated by the San Bernardino Valley Municipal Water District. The pipeline would allow DWR to maintain water deliveries to Reach 2 and Reach 3 segments of the East Branch Extension while the reservoir is being enlarged. After the proposed project is completed, the connector pipeline would remain in place to provide an emergency back up in the event of a reservoir outage.

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below.

X	Air Resources Board		Office of Emergency Services
	Boating & Waterways, Department of	X	Office of Historic Preservation
	California Highway Patrol		Parks & Recreation
X	Caltrans District # 8		Pesticide Regulation, Department of
	Caltrans Division of Aeronautics		Public Utilities Commission
X	Caltrans Planning		Reclamation Board
	Coachella Valley Mountains Conservancy	X	Regional WQCB # 8 - Santa Ana
	Coastal Commission		Resources Agency
	Colorado River Board Commission		S.F. Bay Conservation & Development
X	Conservation, Department of		San Gabriel & Lower Los Angeles Rivers & Mountains Conservancy
	Corrections, Department of		San Joaquin River Conservancy
	Delta Protection Commission		Santa Monica Mountains Conservancy
	Education, Department of		State Lands Commission
	Office of Public School Construction		SWRCB: Clean Water Grants
	Energy Commission	X	SWRCB: Water Quality
X	Fish & Game Region # 5 - South Coast		SWRCB: Water Rights
	Food & Agriculture, Department of		Tahoe Regional Planning Agency
	Forestry & Fire Protection	X	Toxic Substances Control, Department of
	General Services, Department of		Water Resources, Department of
	Health Services, Department of		
	Housing & Community Development		
	Integrated Waste Management Board		Other:
X	Native American Heritage Commission		Other:

Local Public Review Period (to be filled in by lead agency)

Starting Date November 27, 2007 Ending Date January 15, 2008

Lead Agency (Complete if applicable):

Consulting Firm: Environmental Science Associates

Address: 707 Wilshire Boulevard, Suite 1450

City/State/Zip: Los Angeles, CA 90017

Contact: Tom Barnes

Phone: (213) 599-4300

Applicant: Department of Water Resources

Address: 1416 Ninth Street

City/State/Zip: Sacramento, CA 95814

Phone: (916) 653-9469

Signature of Lead Agency Representative: _____ Date: _____

Authority cited: Sections 21083 and 21087, Public Resources Code. Reference: Section 21161, Public Resources Code.

Attachment 3

Scoping Meeting Presentation

CRAFTON HILLS RESERVOIR ENLARGEMENT PROJECT

Scoping Meeting
December 11, 2007

PURPOSE AND AGENDA

- **PURPOSE**
  Obtain Input from Public and Agencies on the Environmental Issues to Be Evaluated
- **AGENDA:**
  - CEQA Environmental Impact Report (EIR) Process
  - Project Background and Project Need
  - Project Description
  - Potential Environmental Issues
  - Questions/Comments

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

- **DISCLOSURE:**
  - Identifies and discloses potential impacts to the environment.
- **DECISION MAKING TOOL:**
  - Informs the public and decision makers about potential environmental impacts.
- **MITIGATION:**
  - Identifies ways to avoid or reduce potential impacts.

EIR PROCESS

- **NOTICE OF PREPARATION**
  - 30 Day Public Review Period (Ends January 15, 2008)
  - Public Scoping Meeting (Tonight)
- **DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT (SEIR)**
  - 45 Day Public Review Period
  - Public Hearing
- **RESPONSE TO COMMENTS/FINAL SEIR**
- **CERTIFY SEIR**

STATE WATER PROJECT

- Supplies water to 23 million Californians and 755,000 acres of farmland
- Begins near the Feather River in Northern California
- Has 21 lakes, 5.8 million acre-feet of water storage, 701 miles of canals and pipelines

State Water Project Overview

EBX Phase 1 Components

CRAFTON HILLS RESERVOIR ENLARGEMENT

- **1994** - SGPWA completed an EIR on the Water Importation Project to build facilities to import SWP water to its service area.
- **1997** – SEIR was prepared to assess alignment and facility modifications including the Crafton Hills Reservoir.
- **2003** - Phase I of East Branch Extension completed, including 85 acre-foot Crafton Hills Reservoir.

PROJECT NEED

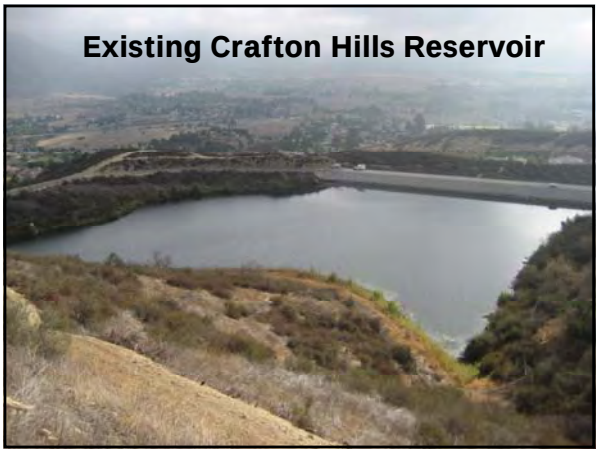
- Reduce Peak-Demand Energy Use
- Reduce Pumping Costs
- Increase Operating Flexibility
- Enhance System Reliability

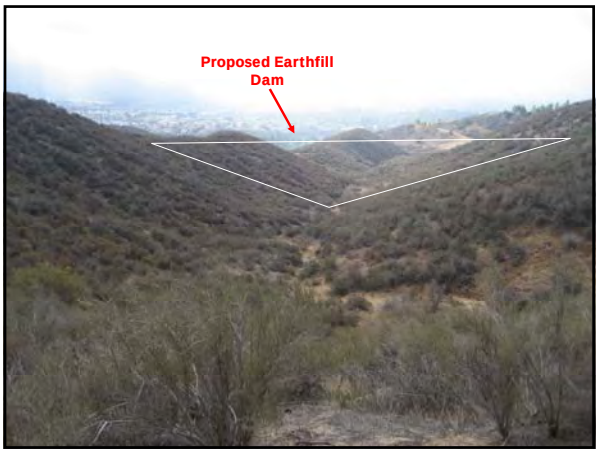
RESERVOIR ENLARGEMENT AND PIPELINE

- RESERVIOR ENLARGEMENT
  - Expand storage capacity from 85 acre-feet to 225 acre-feet
- PIPELINE
  - 1/2 mile segment of a 48" diameter connector pipeline built to connect the EBX Pipeline

PROJECT LOCATION

- The existing Crafton Hills Reservoir is located within the easterly section of Crafton Hills in the City of Yucaipa.
- Elevation of 2,925 feet.
- The location of the proposed one half mile-long pipeline would parallel Mill Creek Road approximately 150 feet to the north terminating just to the west of Bryant Street.





ENVIRONMENTAL RESOURCES TO BE EVALUATED

- Aesthetics
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use
- Population and Housing
- Noise
- Traffic and Transportation
- Utilities and Public Services

OTHER CEQA REQUIREMENTS

- Alternatives Analysis
- Cumulative Impact Assessment

KEY ISSUES

- Construction Impacts
  - Air emissions from construction equipment.
  - Noise from construction activities.
  - Storm water runoff water quality.
  - Traffic on local roads.
  - Site access.

KEY ISSUES

- Biological Resources
  - Construction of reservoir would permanently remove natural habitats in the new reservoir footprint.
  - Installation of the pipeline would temporarily remove vegetation.

KEY ISSUES

- Land Use
  - Project would convert open space to a water reservoir.
  - Construction activities associated with the project could result in short-term disturbances to adjacent land uses.

KEY ISSUES

- Aesthetics
  - Views of hillside would be altered with new dam in place.

NOP COMMENT PERIOD

- **NOP COMMENT PERIOD**
  - Ends January 15, 2008
- **SUBMIT COMMENTS TO**
  Department of Water Resources
  c/o Tom Barnes
  707 Wilshire Boulevard, Ste 1450
  Los Angeles, CA 90017
- **NOP AVAILABLE ONLINE:**
  - www.dwrmwd.com
  - www.sbmwd.com
  - www.northsanberdoy.homestead.com
  - www.dwr.water.ca.gov/
- **The NOP COPIES AVAILABLE:**
  San Bernardino Valley Municipal Water District Office
  1350 South E. Street
  San Bernardino, CA 92408
  Phone: (909) 387-9200

PUBLIC COMMENTS

Attachment 4

Scoping Meeting Sign-In Sheet

Department of Water Resources
Crafton Hills Reservoir Enlargement Project
Scoping Meeting

Meeting Location: City of Yucaipa Community Center
34900 Oak Glen Road, Yucaipa CA

Date/Time: Tuesday, December 11, 2007 at 6:00 p.m.

Name	Affiliation	Address	E mail address
Eric & Cheryl Mumpew		10850 Laterneau Rd	Bluemoonranch@verzion.net
Sam Fuller	SBVMWD	1350 South E Street San Bern	samf@sbvmwd.com
Mike Esquer	SBVMWD	"	MIKEE@SBVMWD.COM

Attachment 5

Comment Letters Received by the City

U.S. Department of Homeland Security
FEMA Region IX
1111 Broadway, Suite 1200
Oakland, CA. 94607-4052

FEMA

December 12, 2007

Tom Barnes
State of California, Department of Water Resources
707 Wilshire Boulevard, Suite 1450
Los Angeles, California 90017

Dear Mr. Barnes:

This is in response to your request for comments on the Notice of Preparation Department of Water Resources – Crafton Hills Reservoir Enlargement Project Supplemental Environmental Impact Report.

Please review the current effective Flood Insurance Rate Maps (FIRMs) for the City of Yucaipa (Community Number 060739), Map revised January 17, 1997. Please note that the City of Yucaipa, San Bernardino County, California is a participant in the National Flood Insurance Program (NFIP). The minimum, basic NFIP floodplain management building requirements are described in Vol. 44 Code of Federal Regulations (44 CFR), Sections 59 through 65.

A summary of these NFIP floodplain management building requirements are as follows:

- All buildings constructed within a riverine floodplain, (i.e., Flood Zones A, AO, AH, AE, and A1 through A30 as delineated on the FIRM), must be elevated so that the lowest floor is at or above the Base Flood Elevation level in accordance with the effective Flood Insurance Rate Map.

- If the area of construction is located within a Regulatory Floodway as delineated on the FIRM, any ***development*** must not increase base flood elevation levels. **The term *development* means any man-made change to improved or unimproved real estate, including but not limited to buildings, other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, and storage of equipment or materials.** A hydrologic and hydraulic analysis must be performed *prior* to the start of development, and must demonstrate that the development would not cause any rise in base flood levels. No rise is permitted within regulatory floodways.

- Upon completion of any development that changes existing Special Flood Hazard Areas, the NFIP directs all participating communities to submit the appropriate hydrologic and hydraulic data to FEMA for a FIRM revision. In accordance with 44 CFR, Section 65.3, as soon as practicable, but not later than six months after such data becomes available, a community shall notify FEMA of the changes by submitting technical data for a flood map revision. To obtain copies of FEMA's Flood Map Revision Application Packages, please refer to the FEMA website at http://www.fema.gov/business/nfip/forms.shtm.

Please Note:

Many NFIP participating communities have adopted floodplain management building requirements which are more restrictive than the minimum federal standards described in 44 CFR. Please contact the local community's floodplain manager for more information on local floodplain management building requirements. The City of Yucaipa floodplain manager can be reached by calling Raymond Casey, City Engineer, at (909) 797-2489. The San Bernardino County floodplain manager can be reached by calling Vana R. Olson, Director of Department of Public Works, at (909) 387-7906.

If you have any questions or concerns, please do not hesitate to call Jonathon Bartlett of the Mitigation staff at (510) 627-7246.

Sincerely,

Gregor Blackburn, CFM, Branch Chief
Floodplain Management and Insurance Branch

cc:
Raymond Casey, City Engineer, City of Yucaipa
Vana R. Olson, Director, Department of Public Works, San Bernardino County
Garret Tam Sing/Salomon Miranda, State of California, Department of Water Resources, Southern District
Jonathon Bartlett, Floodplanner, CFM, DHS/FEMA Region IX
Alessandro Amaglio, Environmental Officer, DHS/FEMA Region IX

WARREN D. WILLIAMS
General Manager-Chief Engineer

1995 MARKET STREET
RIVERSIDE, CA 92501
951.955.1200
FAX 951.788.9965
www.floodcontrol.co.riverside.ca.us

RIVERSIDE COUNTY FLOOD CONTROL
AND WATER CONSERVATION DISTRICT

December 14, 2007

Mr. Tom Barnes, ESA
California Department of Water Resources
707 Wilshire Boulevard, Suite 1450
Los Angeles, CA 90017

Dear Mr. Barnes:

Re: Notice of Preparation of a Supplemental Environmental Impact Report for the Crafton Hills Reservoir Enlargement Project

This letter is written in response to the Notice of Preparation of a Supplemental Environmental Impact Report for the Crafton Hills Reservoir Enlargement Project. The proposed project would enlarge the existing Crafton Hills Reservoir from the current storage capacity of 85 acre-feet to approximately 225 acre-feet. The proposed project is located in the city of Yucaipa, San Bernardino County.

Please be advised that the project is located outside of the Riverside County Flood Control and Water Conservation District's jurisdictional boundary, therefore, we do not have any comments.

Any further questions concerning this letter may be referred to Jason Swenson at 951.955.8082 or me at 951.955.1233.

Very truly yours,

TERESA TUNG
Senior Civil Engineer

c: TLMA
Attn: David Mares

JDS:mcv
P8\117289

SOUTHERN CALIFORNIA

ASSOCIATION of GOVERNMENTS

Main Office

818 West Seventh Street

12th Floor

Los Angeles, California

90017-3435

t (213) 236-1800

f (213) 236-1825

www.scag.ca.gov

Officers: President: Gary Ovitt, San Bernardino County First Vice President: Richard Dixon, Lake Forest Second Vice President: Harry Baldwin, San Gabriel Immediate Past President: Yvonne B. Burke, Los Angeles County

Imperial County: Victor Carrillo, Imperial County • Jon Edney, El Centro

Los Angeles County: Yvonne B. Burke, Los Angeles County • Zev Yaroslavsky, Los Angeles County • Richard Alarcón, Los Angeles • Jim Aldinger, Manhattan Beach • Harry Baldwin, San Gabriel • Tony Cardenas, Los Angeles • Stan Carroll, La Habra Heights • Margaret Clark, Rosemead • Gene Daniels, Paramount • Judy Dunlap, Inglewood • Rae Gabelich, Long Beach • David Gafin, Downey • Eric Garcetti, Los Angeles • Wendy Greuel, Los Angeles • Frank Gurulé, Cudahy • Janice Hahn, Los Angeles • Isadore Hall, Compton • Keith W. Hanks, Azusa • José Huizar, Los Angeles • Jim Jeffra, Lancaster • Tom LaBonge, Los Angeles • Paula Lantz, Pomona • Barbara Messina, Alhambra • Larry Nelson, Artesia • Paul Nowatka, Torrance • Pam O'Connor, Santa Monica • Bernard Parks, Los Angeles • Jan Perry, Los Angeles • Ed Reyes, Los Angeles • Bill Rosendahl, Los Angeles • Greig Smith, Los Angeles • Tom Sykes, Walnut • Mike Ten, South Pasadena • Tonia Reyes Uranga, Long Beach • Antonio Villaraigosa, Los Angeles • Dennis Washburn, Calabasas • Jack Weiss, Los Angeles • Herb J. Wesson, Jr., Los Angeles • Dennis Zine, Los Angeles

Orange County: Chris Norby, Orange County • Christine Barnes, La Palma • John Beauman, Brea • Lou Bone, Tustin • Debbie Cook, Huntington Beach • Leslie Daigle, Newport Beach • Richard Dixon, Lake Forest • Troy Edgar, Los Alamitos • Paul Glaab, Laguna Niguel • Robert Hernandez, Anaheim • Sharon Quirk, Fullerton

Riverside County: Jeff Stone, Riverside County • Thomas Buckley, Lake Elsinore • Bonnie Flickinger, Moreno Valley • Ron Loveridge, Riverside • Greg Pettis, Cathedral City • Ron Roberts, Temecula

San Bernardino County: Gary Ovitt, San Bernardino County • Lawrence Dale, Barstow • Paul Eaton, Montclair • Lee Ann Garcia, Grand Terrace • Tim Jasper, Town of Apple Valley • Larry McCallon, Highland • Deborah Robertson, Rialto • Alan Wapner, Ontario

Ventura County: Linda Parks, Ventura County • Glen Becerra, Simi Valley • Carl Morehouse, San Buenaventura • Toni Young, Port Hueneme

Tribal Government Representative: Andrew Masiel, Sr., Pechanga Band of Luiseño Indians

Orange County Transportation Authority: Art Brown, Buena Park

Riverside County Transportation Commission: Robin Lowe, Hemet

San Bernardino Associated Governments: Paul Leon

Ventura County Transportation Commission: Keith Millhouse, Moorpark

10/24/07

December 13, 2007

California Department of Water Resources
c/o Tom Barnes, ESA
707 Wilshire Boulevard, Ste. 1450
Los Angeles, CA 90017

RE: SCAG Clearinghouse No. I 20070717 Crafton Hills Reservoir Enlargement Project

Dear Mr. Barnes:

Thank you for submitting the **Crafton Hills Reservoir Enlargement Project** for review and comment. As areawide clearinghouse for regionally significant projects, SCAG reviews the consistency of local plans, projects and programs with regional plans. This activity is based on SCAG's responsibilities as a regional planning organization pursuant to state and federal laws and regulations. Guidance provided by these reviews is intended to assist local agencies and project sponsors to take actions that contribute to the attainment of regional goals and policies.

We have reviewed the **Crafton Hills Reservoir Enlargement Project**, and have determined that the proposed Project is not regionally significant per SCAG Intergovernmental Review (IGR) Criteria and California Environmental Quality Act (CEQA) Guidelines (Section 15206). Therefore, the proposed Project does not warrant comments at this time. Should there be a change in the scope of the proposed Project, we would appreciate the opportunity to review and comment at that time.

A description of the proposed Project was published in SCAG's **November 1-30, 2007** Intergovernmental Review Clearinghouse Report for public review and comment.

The project title and SCAG Clearinghouse number should be used in all correspondence with SCAG concerning this Project. Correspondence should be sent to the attention of the Clearinghouse Coordinator. If you have any questions, please contact me at (213) 236-1857. Thank you.

Sincerely,

LAVERNE JONES, Planning Technician
Program Development and Evaluation Division

Doc #142251

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 · www.aqmd.gov

November 30, 2007

Mr. Tom Barnes, c/o ESA
California Department of
Water Resources
707 Wilshire Boulevard, Ste. 1450
Los Angeles, CA 90017

Dear Mr. Barnes:

Notice of Preparation of a Draft Environmental Impact Report (Draft EIR) for the Crafton Hills Reservoir Enlargement Project

The South Coast Air Quality Management District (SCAQMD) appreciates the opportunity to comment on the above-mentioned document. The SCAQMD's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the draft environmental impact report (EIR). Please send the SCAQMD a copy of the Draft EIR upon its completion. **In addition, please send with the draft EIR all appendices or technical documents related to the air quality analysis and electronic versions of all air quality modeling and health risk assessment files. Without all files and supporting air quality documentation, the SCAQMD will be unable to complete its review of the air quality analysis in a timely manner. Any delays in providing all supporting air quality documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. Alternatively, the lead agency may wish to consider using the California Air Resources Board (CARB) approved URBEMIS 2007 Model. This model is available on the SCAQMD Website at: www.urbemis.com.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the analysis.

The SCAQMD has developed a methodology for calculating PM2.5 emissions from construction and operational activities and processes. In connection with developing PM2.5 calculation methodologies, the SCAQMD has also developed both regional and localized significance thresholds. The SCAQMD requests that the lead agency quantify PM2.5 emissions and compare the results to the recommended PM2.5 significance thresholds. Guidance for calculating PM2.5 emissions and PM2.5 significance thresholds can be found at the following internet address: http://www.aqmd.gov/ceqa/handbook/PM2_5/PM2_5.html.

In addition to analyzing regional air quality impacts the SCAQMD recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LST's can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore, when preparing the air quality analysis for the proposed project, it is recommended that the lead agency perform a localized significance analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at http://www.aqmd.gov/ceqa/handbook/LST/LST.html.

It is recommended that lead agencies for projects generating or attracting vehicular trips, especially heavy-duty diesel-fueled vehicles, perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis") can be found on the SCAQMD's CEQA web pages at the following internet address: http://www.aqmd.gov/ceqa/handbook/mobile_toxic/mobile_toxic.html. An analysis of all toxic air contaminant impacts due to the decommissioning or use of equipment potentially generating such air pollutants should also be included.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate significant adverse air quality impacts. To assist the Lead Agency with identifying possible mitigation measures for the project, please refer to Chapter 11 of the SCAQMD CEQA Air Quality Handbook for sample air quality mitigation measures. Additional mitigation measures can be found on the SCAQMD's CEQA web pages at the following internet address: www.aqmd.gov/ceqa/handbook/mitigation/MM_intro.html Additionally, SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook contain numerous measures for controlling construction-related emissions that should be considered for use as CEQA mitigation if not otherwise required. Other measures to reduce air quality impacts from land use projects can be found in the SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. This document can be found at the following internet address: http://www.aqmd.gov/prdas/aqguide/aqguide.html. In addition, guidance on sitting incompatible land uses can be found in the California Air Resources Board's Air Quality and Land Use Handbook: A Community Perspective, which can be found at the following internet address: http://www.arb.ca.gov/ch/handbook.pdf. Pursuant to state CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's World Wide Web Homepage (http://www.aqmd.gov).

The SCAQMD is willing to work with the Lead Agency to ensure that project-related emissions are accurately identified, categorized, and evaluated. Please call Charles Blankson, Ph.D., Air Quality Specialist, CEQA Section, at (909) 396-3304 if you have any questions regarding this letter.

Sincerely,

Steve Smith

Steve Smith, Ph.D.
Program Supervisor, CEQA Section
Planning, Rule Development and Area Sources

SS:CB:AK
SBC071127-04AK
Control Number

December 18, 2007

California Department of Water Resources
C/o Tom Barnes, ESA
707 Wilshire Blvd., Suite 1450
Los Angeles, CA 90017

Re: Notice of Preparation of SEIR
Crafton Hills Reservoir Enlargement Project

Dear Mr. Barnes:

The City of Yucaipa has reviewed the Notice of Preparation of a SEIR for the Crafton Hills Reservoir Enlargement Project dated November 27, 2007 and provides the following comments for your further consideration:

1. The SEIR should include a "Dam Innundation Study" to assess the potential downstream impacts to private and publicly owned lands and facilities within the City of Yucaipa that could arise with a dam break/failure.

2. As described under the Project Need Section of the Notice, "The reservoir expansion would not increase the conveyance capacity of the East Branch Extension, but would substantially enhance the system's operating flexibility and reliability." While the East Branch Extension is not a part of the project noticed, we would like to bring to your attention some information that could affect the performance of the line in a nearby area during high storm flow events. Approximately one mile to the south east of the proposed reservoir project, the East Branch Extension (located within Bryant Street) crosses Oak Glen Creek. This crossing is about one-half mile south of the intersection of Bryant Street and Oak Glen Road. The City has recently designed a series of the three flood control/water recharge basins along Oak Creek immediately east of Bryant Street. In the course of the design it was determined that Oak Glen Creek flows could overtop the Bryant Street road embankment in as little as a 2-year frequency storm event when certain conditions exist in the upstream watershed (i.e. a major watershed burn). Any such over topping of Bryant Street would subject the roadway embankment to potential erosion and damage along with a similar potential for damage to any underground utilities, such as the East Branch Extension. Although the project design identifies the placement of rock riprap along the road embankment to preclude or minimize erosion, at this time the City does not have adequate funding to do such rock placement work leaving the erosion potential unchanged from its present condition.

City of Yucaipa
34272 Yucaipa Boulevard, Yucaipa, CA 92399-9950
909/797-2489 ◆ FAX 909/790-9203 ◆ e-mail: city@yucaipa.org

The SEIR should also address how the construction traffic impacts to the neighborhood/community will be mitigated; including proposed access routes, temporary mitigation during construction and permanent improvements to access roadways.

Should you need additional information regarding this issue please let me know.

Sincerely,

Raymond A. Casey
Director of Public Works/City Engineer

RAC:sb

Lauren Campbell

From: Tom Barnes
Sent: Friday, January 11, 2008 3:49 PM
To: 'escobar@water.ca.gov'
Cc: Christopher Knopp; Lauren Campbell
Subject: FW: Reservior Expansion

Sergio,

This arrived today. We are saving it as a comment letter received for the Crafton Hills Reservoir Enlargement project NOP.

Lauren, please file this email with our NOP comment letters.

Tom

-----Original Message-----
From: bluemoonranch@verizon.net [mailto:bluemoonranch@verizon.net]
Sent: Friday, January 11, 2008 3:36 PM
To: Tom Barnes
Subject: Reservior Expansion

Hi Mr. Barnes,
We met at the meeting (we're the ones with the large family). We have a few questions regarding the dam project and how it will affect us. For starters, what will be the appearance of the dam from our property? Will it be a visual detriment, or will it be neutral, or even appealing? Secondly, how long, in an estimate, will it take for completeion of the expansion? Thridly, how much of our property will be in use, and for how long? Will our property be affected in any way by the geological trenching? And, will there be monetary compensation? Fouthly, has it been determined which way the access road will go? Will the access road have an outlet through our property or to Lakeview Road? And will our property be used for access to equipment to the geological equipment? Lastly, is there yet an approximate starting date for the expansion?
Thank you very much for your time.
Sincerely,
Eric & Cheryl Mumper and family

California Regional Water Quality Control Board
Santa Ana Region

Linda S. Adams
Secretary for Environmental Protection

3737 Main Street, Suite 500, Riverside, California 92501-3348
Phone (951) 782-4130 • FAX (951) 781-6288 • TDD (951) 782-3221
www.waterboards.ca.gov/santaana

Arnold Schwarzenegger
Governor

December 19, 2007

Sergio Escobar
California Department of Water Resources
1416 Ninth Street
Sacramento, CA 95814

NOTICE OF PREPARATION FOR SUPPLEMENTAL ENVIRONMENTAL IMPACT REPORT, CRAFTON HILLS RESERVOIR EXPANSION PROJECT, CALIFORNIA DEPARTMENT OF WATER RESOURCES, SCH# 2007111106

Dear Mr. Escobar:

Staff of the Regional Water Quality Control Board, Santa Ana Region (RWQCB), have reviewed the Department of Water Resources' Notice of Preparation (NOP) for a Supplemental Environmental Impact Report (SEIR) for the proposed Crafton Hills Reservoir Expansion Project (project). The SEIR will supplement the 1997 East Branch Extension Phase I Environmental Impact Report.

An earthfill dam is proposed to be constructed within the drainage south of, and adjacent to, the existing reservoir. A notch in the ridge dividing the reservoirs would be excavated to allow flow into the expansion area. An access road to the new reservoir will cross the drainage where the dam will be built. Also, a 48-inch pipeline would connect the existing EBX1 and Yucaipa Pipelines along Mill Creek Road, to the northeast of the Crafton Hills. It cannot be determined from the NOP whether there is significant potential for excavated soil from the pipeline part of the project to enter Mill Creek.

The project components would straddle a divide between the watersheds of Oak Glen Creek and Mill Creek (Spoor Creek). Beneficial uses for these streams and their tributaries, as listed in the Water Quality Control Plan for the Santa Ana River Basin (Region 8 Basin Plan), include Municipal Supply (MUN), Groundwater Recharge (GWR), Water Contact Recreation (REC1), Non-Contact Water Recreation (REC2), and Warm Freshwater Habitat (WARM). We believe that the SEIR should incorporate the following comments in order for the project to best protect water quality standards, i.e., water quality objectives and the above beneficial uses, as contained in the Region 8 Basin Plan:

1. This project appears to result in excavation of ("dredging"), and placement of fill into "waters of the United States." Therefore, the SEIR should report whether this project falls within the jurisdiction of the United States Army Corps of Engineers (contact the USACOE's Jason Lambert at 213-452-3361 for assistance) and requires their issuance of a Clean Water Act Section 404 permit. If so, the SEIR should direct the applicant to promptly apply for a 404 Permit from the USACOE and

to the Regional Board for the requisite Section 401 Water Quality Certification (Certification) that construction and operation of the project will not adversely affect water quality standards (water quality objectives and beneficial uses). Since both Section 404 permits and Certification may require mitigation, the proponent should engage in early consultation with USACOE and Regional Board staff to identify unavoidable impacts to water quality and the appropriate mitigation for them, so that mitigation obligations can be included in the SEIR. Information concerning Section 401 Certification can be found at the Regional Board's website, www.swrcb.ca.gov/rwqcb8/html/401.html. Where the USACOE finds that a water body does not fall under their jurisdiction, the Regional Board may still determine that waste discharge requirements are necessary to regulate construction activities in water courses and to protect waters of the state.

2. Best Management Practices (BMP) utilized on projects receiving a Certification must meet Best Available Technology (BAT) standards that may go beyond BMPs typically needed to comply with: 1) the State Water Resources Control Board's Water Quality Order No. 99-08-DWQ, "General Permit for Storm Water Discharges Associated with Construction Activity"[1] : and, 2) the San Bernardino County Stormwater Program's Model Water Quality Management Plan (WQMP) Guidance[2], a requirement of Regional Water Quality Control Board Order No. R8-2002-0012 (NPDES Permit No. CAS618036) Waste Discharge Requirements for San Bernardino County Flood Control District, the County of San Bernardino, and the Incorporated Cities of San Bernardino County within the Santa Ana Region Area-Wide Urban Storm Water Runoff, also known as the San Bernardino County municipal separate storm sewer system, or "San Bernardino County MS4" permit. The SEIR should reflect that the project must conform to the Water Quality Management Plan (WQMP) guidance of the San Bernardino County Stormwater Program by implementing a variety of structural and non-structural BMPs controlling pollutants from both point sources and non-point sources.

If you have any questions, please call Glenn Robertson at (951) 782-3259, or me at (951) 782-3234.

Sincerely,

Mark G. Adelson, Chief
Regional Planning Programs Section

cc: State Clearinghouse
U.S. Army Corps of Engineers, Los Angeles – Jason Lambert
DWR, Los Angeles – Tom Barnes

X:Groberts on Magnolia/Data/CEQA/CEQA Responses/ DWR – Crafton Hills Reservoir, Yucaipa

[1] http://www.swrcb.ca.gov/stormwtr/construction.html
[2] http://www.waterboards.ca.gov/santaana/sbpermit/WQMPGuide60905.pdf

Attachment 6

Scoping Meeting Comments

Crafton Hills Scoping Meeting Comments

- What is the schedule of the project?
- What are the trench and drill hole locations?
- Construction details. Type of equipment?
- Access road locations and purpose of road. Proximity to homes/private property.
- Length of time between project approval and construction/start of project.

Attachment 7

Matrix of Comments

	Date	Signee	Method of Response
Federal Agencies			
FEMA	12/12/2007	Gregor Blackburn	Mail
State/Local Agencies			
South Coast Air Quality Management District	11/30/2007	Steve Smith	Mail
Southern California Association of Governments	12/13/2007	Laverne Jones	Mail
City of Yucaipa	12/18/2007	Raymond A. Casey	Mail
Riverside County Flood Control	12/14/2007	Teresa Tung	Mail
California Regional Water Quality Control Board -Santa Ana Region	12/19/2007	Mark G. Adelson	E-mail
Individuals			
Eric and Cheryl Mumper	1/11/2008	Eric and Cherly Mumper	E-mail

Appendix B
Initial Study

ESA

ENVIRONMENTAL CHECKLIST

Initial Study

1. Project Title:	Crafton Hills Reservoir Enlargement and Pipeline Construction Project
2. Lead Agency Name and Address:	Department of Water Resources
3. Contact Person and Phone Number:	Mary Miller Department of Water Resources Division of Engineering 916-653-9469
4. Project Location:	East end of the Crafton Hills and along SR 38 near the intersection of Bryant Street. City of Yucaipa, City of Redlands, and Unincorporated San Bernardino County
5. Project Sponsor's Name and Address:	California Department of Water Resources
6. General Plan Designation(s):	Reservoir **City of Yucaipa**: Planned Development Pipeline **San Bernardino County**: Single Residential **City of Redlands**: Vacant **City of Yucaipa:** Planned Development
7. Zoning Designation(s):	Reservoir **City of Yucaipa**: Planned Development Pipeline **San Bernardino County**: Single Residential **City of Redlands**: Open Space **City of Yucaipa:** Planned Development

8. Description of Project: The proposed project has two major components; 1) the Crafton Hills Reservoir enlargement and 2) the installation of a 0.5-mile underground pipeline that would connect the Crafton Hills Pipeline to the Yucaipa Pipeline.

The existing Crafton Hills Reservoir is located at an elevation of 2,925 feet in the easterly edge of the Crafton Hills, approximately two miles north of the City of Yucaipa. The existing reservoir has a storage capacity of approximately 85 acre feet (af) and includes the following features: a zoned earthfill dam; a 54-inch diameter inlet pipeline; an uncontrolled overflow spillway; a 54-inch diameter outlet pipeline and appurtenant structures designed for reversible

flow; a 12-inch diameter emergency release blow-off; and access roads with adjacent drainage ditches.

The proposed project would enlarge the existing Crafton Hills Reservoir from the current storage operational (active) capacity of 85 acre-feet (af) to approximately 225 af. A notch in the ridge dividing the drainages would be excavated and serve as a connecting channel between the existing reservoir and the proposed enlargement area. In addition, a one-half mile segment of a 48-inch diameter pipeline would be connected to the 48-inch diameter Yucaipa Pipeline owned and operated by the San Bernardino Valley Municipal Water District (SBVMWD). The pipeline would allow DWR to maintain water deliveries to Reach 2 and Reach 3 segments of the East Branch Extension while the reservoir is being enlarged. After the proposed project is completed, the connector pipeline would remain in place to provide a currently nonexistent emergency back-up in the event of a reservoir outage.

9. **Surrounding Land Uses and Setting:** Land to the north of the proposed reservoir site is undeveloped land within the Crafton Planned Development (PD) land use district; land to the west is undeveloped county designated Rural Living (RL) land, land to the south is City of Yucaipa designated Planned Development (PD) and Rural Living (RL); and land to the east of the Reservoir is City of Yucaipa designated Planned Development (PD) and Rural Living-one acre (RL) residential land.

   Land to the north of the connector pipeline is County designated Single Residential (RS); land to the south is City of Yucaipa designated Planned Development (PD); land to the east of the pipeline is county designated Rural Living (RL); and land to the west is City of Redlands zoned Open Space (OS).

10. **Other public agencies whose approval is required:** California Regional Water Quality Control Board, California Department of Fish and Game, U.S. Army Corps of Engineers, Division of Safety of Dam, City of Yucaipa, County of San Bernardino, City of Redlands.

11. **Use of This Document:** This Initial Study is intended to be used to meet CEQA statute §21100(c) and CEQA Guidelines §15128 by stating the effects of the proposed project that are found not to be significant and consequently not discussed in the EIR.

    The EIR will be a supplemental environmental document and is herby incorporating by reference, in accordance with CEQA Guidelines §15150, the following documents:

    - **San Gorgonio Pass Water Agency Water Importation Project Final EIR** (April 1994):
    - **Supplemental Final EIR NO. 1 for the East Branch Extension – Phase I, *Covering the Redesign of Portions of the San Gorgonio Pass Water Agency Water Importation Project*** (March, 1998):

Environmental Factors Potentially Affected

The proposed project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

☒ Aesthetics	☒ Agriculture Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☒ Geology, Soils and Seismicity
☒ Hazards and Hazardous Materials	☒ Hydrology and Water Quality	☒ Land Use and Land Use Planning
☐ Mineral Resources	☒ Noise	☐ Population and Housing

☒ Public Services ☒ Recreation ☒ Transportation and Traffic
☒ Utilities and Service Systems ☒ Mandatory Findings of Significance

DETERMINATION: (To be completed by Lead Agency)

On the basis of this initial study:

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

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

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

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

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

Signature	Date
Printed Name	For

Environmental Checklist

Aesthetics

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
1. AESTHETICS—Would the project:				
a) Have a substantial adverse effect on a scenic vista?	☒	☐	☐	☐
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway corridor?	☒	☐	☐	☐
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☒	☐	☐	☐
d) Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	☒	☐	☐	☐

Discussion

a) While views of the Crafton Hills from the City of Yucaipa and portions of unincorporated San Bernardino County can be described as scenic, neither jurisdiction has designated the Crafton Hills has a scenic vista. Therefore, the proposed project is not expected to have a substantial adverse impact on a scenic vista. Nonetheless, potential aesthetic impacts will be analyzed in the EIR.

b) The proposed project sites (reservoir and pipeline) are not located within a state designated scenic highway corridor. The project would not damage any scenic resources such as trees, rock outcroppings and/or historic buildings. Nonetheless, potential aesthetic impacts will be analyzed in the EIR..

c) The proposed project's reservoir component would expand the existing reservoir within Crafton Hills. The larger reservoir is not expected to substantially degrade the existing visual character or quality of the proposed project site and its surroundings. The pipeline would be constructed underground and would not be visible once completed. However, during the construction phase, the visual character of the area would be affected. The EIR will analyze the potential impacts to the existing visual character of the project site and its surroundings.

d) Neither the reservoir nor the pipeline would generate new sources of light or glare. The pipeline, once constructed would be entirely underground with the exception of minor appurtenant facilities such as a blow-off valve, vault, flow meter, and/or air and vacuum valves, none of which would include light fixtures. The reservoir expansion would not

include any assessor buildings such as a pump station or maintenance building that would produce light. Nonetheless, potential aesthetic impacts will be analyzed in the EIR.

Agricultural Resources

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

Discussion

a) According to the maps prepared for the Farmland Mapping and Monitoring Program of the California Resource Agency, the soils at the project site are not considered prime, unique, or of statewide importance. Nonetheless, potential agricultural impacts will be analyzed in the EIR.

b) The project site is not zoned for agricultural uses. The EIR will confirm and document that the project site is not under a Williamson Act contract.

c) The project would not result in environmental changes that would result in the conversion of Farmland of Statewide Importance to non-agricultural use. There is no farmland adjacent to the project site that would be affected by the proposed project. The project would not in itself convert agricultural land or cause other agricultural land to be converted to non-agricultural use. Nonetheless, potential agricultural impacts will be analyzed in the EIR..

Air Quality

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

Discussion

a) A discussion of the projects impacts relative to the implementation of the applicable air quality plan will be addressed in the EIR.

b) A discussion of the project's construction and operational emissions relative to air quality standards and existing regional air quality violations will be discussed in the EIR. Site preparation and construction activities could generate short term temporary emissions of particulates and other criteria air pollutants that may exceed significance thresholds. Stationary and mobile source emissions associated with the project may result in project emissions that exceed air quality thresholds.

c) The potential construction and operational emissions added to the ambient air quality may result in cumulative air impacts. A discussion of the cumulative emissions will be discussed in the EIR.

d) The proposed project will result in air emissions from construction activities and vehicle trips generated. A discussion of air emissions on sensitive receptors and will be included in the EIR.

e) While the proposed project is not a typical odor-generating land use, odor impacts associated with construction and operation of the proposed project will be included in the EIR.

Biological Resources

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

Discussion

a) The reservoir and pipeline vegetation types can generally be described as Chamise Chaparral and Riversidean Alluvial Fan Sage Scrub, respectively. These vegetation communities may contain candidate, sensitive, or special-status plant and animal species. As such, the EIR will contain a discussion of biological surveys conducted in the project area and the pertinent regional and local plans.

b) A Jurisdictional Delineation Report will be prepared for the proposed project and the results of the report and associated impacts on any riparian habitats will be included in the EIR.

c) As previously stated as a response to *4b*, the Jurisdictional Delineation Report will be prepared and a discussion of potential wetland features will be included in the EIR.

d) A discussion of the projects impacts on wildlife movement corridors and wildlife nursery sites will be included in the EIR.

e) Local and regional biological policies, ordinances, and plans will be included in the EIR.

f) A discussion of any potential HCPs and or NCCP will be included in the EIR.

Cultural Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
5. CULTURAL RESOURCES— Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☒	☐	☐	☐
b) Cause a substantial adverse change in the significance of a unique archaeological resource pursuant to §15064.5?	☒	☐	☐	☐
c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐
d) Disturb any human remains, including those interred outside of formal cemeteries?	☒	☐	☐	☐

Discussion

a/b/c) The Department of Water Resources (DWR) will prepare a Cultural Resources report that will include a discussion and analysis project impacts on historical resources, unique archaeological resources, unique paleontological resources, and unique geologic features. The results of this report will be summarized and included in the EIR.

d) The EIR will discuss the potential impact of discovering unidentified buried human remains.

Geology, Soils, and Seismicity

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
6. GEOLOGY, SOILS, AND SEISMICITY— Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:				

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)	☒	☐	☐	☐
ii) Strong seismic ground shaking?	☒	☐	☐	☐
iii) Seismic-related ground failure, including liquefaction?	☒	☐	☐	☐
iv) Landslides?	☒	☐	☐	☐
b) Result in substantial soil erosion or the loss of topsoil?	☒	☐	☐	☐
c) Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	☒	☐	☐	☐
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☒	☐	☐	☐
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☒	☐	☐	☐

Discussion

a.i-iv) The proposed reservoir and pipeline project areas are located in a seismically active region of California. The project area is located near the San Andreas Fault and other regional faults that may result in rupture, which could impact the proposed project. Potential fault rupture, groundshaking, liquefaction, and landslide impacts will be analyzed in the EIR.

b) Construction activities could potentially cause erosion and soil loss due to the vegetation grubbing and earthmoving activities that would be required to implement the project. The EIR will include a discussion of this potential impact.

c) As stated above in the response to *6a.i-iv*, the EIR will discuss potential landslide, liquefaction, lateral spreading, and or subsidence impacts.

d) The EIR will discus soil types and potential impacts associated with expansion and contraction of soils.

e) The enlargement of the Crafton Hills Reservoir and construction of the associated pipeline would not necessitate the use of a septic system.

Hazards and Hazardous Materials

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

Discussion

a) Construction of the proposed project would require the use of fuels, oils, and lubricants that can be hazardous to the environment. The EIR will discuss the impacts associated with use of these materials.

b) Operation of the proposed project would not include the use or storage of hazardous materials that would potentially cause a threat to the environment or public. However, construction of the project would require the use of fuels, oils, and lubricants that could be hazardous if accidentally released into the environment. The EIR will discuss the impacts associated with use of these materials.

c) The nearest school to the project site is the Park View Elementary School, located at 34875 Tahoe Drive, approximately three-quarters of a mile from the project site. The

proposed project will not emit or release hazardous materials within 0.25 miles of a school. However, the EIR will discus the use of hazardous materials, such as fuels, oils, and lubricants, and the potential for accidental release of such materials into the environment.

d) Preliminary research has determined that the project site is not expected to be located on an existing hazardous materials site as defined by Government Code Section 65962.5. The EIR will summarize known contamination sites and will list potentially hazardous materials used and stored during construction of the proposed project.

e) The project site is located approximately 10 miles from the San Bernardino International Airport and approximately 5 miles from the Redland Municipal Airport. The project is not located within any airport safety zones and the project would not affect any flight patterns. Airport hazards will be discussed briefly in the EIR

f) The project site is not located near a private airstrip, thus there would be no aircraft safety risks for people working in the project area. Airport hazards will be discussed briefly in the EIR.

g) Construction of the proposed project could interfere with adopted emergency response plans and emergency evacuation plans. The impacts of the proposed project on emergency response and evacuation plans will be evaluated in the EIR.

h) The proposed project would not include structures that could be threatened from wildfires. However, equipment used on site during construction of the proposed project could generate sparks that could ignite a wildfire. This issue will be addressed in the EIR.

Hydrology and Water Quality

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
8. HYDROLOGY AND WATER QUALITY— Would the project:				
a) Violate any water quality standards or waste discharge requirements?	☒	☐	☐	☐
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☒	☐	☐	☐

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
c) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river, or by other means, in a manner that would result in substantial erosion or siltation on- or off-site?	☒	☐	☐	☐
d) Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river or, by other means, substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	☒	☐	☐	☐
e) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☒	☐	☐	☐
f) Otherwise substantially degrade water quality?	☒	☐	☐	☐
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map?	☒	☐	☐	☐
h) Place within a 100-year flood hazard area structures that would impede or redirect flood flows?	☒	☐	☐	☐
i) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?	☒	☐	☐	☐
j) Expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow?	☐	☐	☒	☐

Discussion

a/f) Operation of proposed project would not require waste discharge requirements. Construction of the proposed project would require implementation of a Storm Water Pollution Prevent Plan (SWPPP) as required by the State Water Resources Control Board. Implementation of the SWPPP would ensure runoff from the project site during construction would not violate water quality standards. A discussion of water quality and discharge requirements will be included in the EIR.

b) The proposed project does not involve extraction of groundwater or deliberate groundwater recharge. The proposed reservoir enlargement would not include a synthetic impermeable liner; therefore, incidental recharge could result in the basin underlying the Crafton Hills. A discussion of groundwater resources and potential project impacts will be included in the EIR.

c/d) The proposed reservoir enlargement area will impact an ephemeral drainage in the Crafton Hills and thus could affect surface runoff patterns. The EIR will analyze erosion and siltation impacts of the proposed project both onsite and offsite. The EIR also will analyze the potential project impacts on flooding both onsite and offsite.

e) The proposed project will not generate new sources of runoff that could cause storm drains to exceed capacity as the project is not located in areas where improved storm drains exist. Potential sources of polluted runoff could occur during the construction phases of the project. The EIR will discuss potential project impacts associated with runoff.

g) A portion of the proposed pipeline would be constructed within the Mill Creek 100-year flood hazard area. Impacts will be discussed in the EIR.

h) A portion of the proposed pipeline would be constructed within the Mill Creek 100-year flood hazard area. Impacts will be discussed in the EIR.

i) The proposed project includes the construction and operation of a new dam. The EIR will include a discussion and analysis of dam failure hazards.

j) Impacts from a tsunami, seiche, and or a mudflows will be discussed in the EIR.

Land Use and Land Use Planning

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

Discussion

a) The proposed project area is not located within an established residential community. A new subdivision is being developed on the south side of SR 38 and the west side of Bryant Street. The proposed pipeline would generally run parallel to SR 38 on the north side of the road. Thus, the pipeline would not impact the development of the subdivision.

The Stanley Ranch Subdivision is the closest residential development to the reservoir site. Stanley Ranch is located to the east of the existing reservoir. The proposed project would not affect the Stanley Ranch subdivision. Nonetheless, the project's impacts on residential communities will be discussed in the EIR.

b) The proposed project is subject to the goals and policies of the general plans and other planning documents developed by the City of Yucaipa and the County of San Bernardino. The EIR will summarize and analyze the project's consistency with regional plans and policies.

c) The EIR will identify any habitat conservation plans (HCPs) or natural community conservation plans (NCCPs) that may occur within the project vicinity. The EIR will analyze the project's consistency with such HCPs and NCCPs, if applicable.

Mineral Resources

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
10. MINERAL RESOURCES—Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☒	☐	☐	☐
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☒	☐	☐	☐

Discussion

a) Mineral resources will be addressed in the EIR.

b) Mineral resources will be addressed in the EIR.

Noise

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
11. NOISE—Would the project:				
a) Result in 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?	☒	☐	☐	☐
b) Result in exposure of persons to, or generation of, excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐
c) Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
d) Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☒	☐	☐	☐
e) For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project expose people residing or working in the area to excessive noise levels?	☒	☐	☐	☐
f) For a project located in the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☒	☐	☐	☐

Discussion

a) Project construction activities will potentially generate short-term noise impacts. The EIR will analyze the short-term noise levels produced relative to potential sensitive receptors and locally established noise standards.

b) Groundborne vibration could occur during construction activities associated with the pipeline, reservoir and dam construction. The EIR will include an analysis of potential groundborne vibration impacts.

c/d) The EIR will evaluate the ambient noise levels in the project area and the proposed project's contributions to the noise level. Both construction and operational impacts will be discussed in the EIR.

e) The proposed project area is not located within the boundaries of an airport land use plan. The nearest airport is located approximately 5 miles away from the proposed project site. Nonetheless, airport noise impacts will be discussed briefly in the EIR.

f) The project is not located in the vicinity of a private airstrip. Nonetheless, airport noise impacts will be discussed briefly in the EIR.

Population and Housing

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
12. POPULATION AND HOUSING— Would the project:				
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
b) Displace substantial numbers of existing housing units, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

Discussion

a) The proposed project would not directly induce population growth because the project would not create new homes or businesses. The proposed project would not create a new water supply, and therefore would not indirectly induce population growth. The reservoir enlargement would not increase the conveyance capacity of the East Branch Extension, but rather would substantially enhance the system's operating flexibility and reliability. The proposed project would provide an increased storage opportunity that would facilitate off peak pumping, effectively reducing energy use and increasing the flexibility of DWR facility operations. There would be no impact on population and housing, and therefore this resource area will not be discussed in the EIR. Any potential growth inducing effects of the proposed project will be discussed in the Growth Inducement chapter of the EIR.

b) The proposed project would not displace any housing units, necessitating the construction of additional housing elsewhere. There would be no impact to existing housing; therefore, the EIR will not include an analysis of this issue.

c) The proposed project would not displace a substantial number of people, necessitating the construction of housing elsewhere. No impacts to the current housing supply would result from the proposed project; as such, the EIR will not include a discussion of this issue.

Public Services

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
13. PUBLIC SERVICES— Would the project:				
a) Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:				
i) Fire protection?	☒	☐	☐	☐

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
ii) Police protection?	☒	☐	☐	☐
iii) Schools?	☒	☐	☐	☐
iv) Parks?	☒	☐	☐	☐
v) Other public facilities?	☒	☐	☐	☐

Discussion

a) The proposed project is not expected to affect or require the construction of new public services. Impacts of the proposed project to public services will be discussed in the EIR.

Recreation

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
14. RECREATION—Would the project:				
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	☒	☐	☐	☐
b) Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	☒	☐	☐	☐

Discussion

a) The proposed project would not result in direct or indirect growth in population or housing. Therefore, the proposed project is not expected to impact existing neighborhood or regional parks or any other recreational facilities due to increases in park usage. However, proposed project construction may impact existing trails within the limits and vicinity of the project area, and reservoir operations may impact future/planned trails. Recreational impacts will be further analyzed in the EIR.

b) The proposed project would not include recreational facilities or require the expansion of existing facilities that would cause an impact on the environment. However, proposed project construction may impact existing trails within the limits and vicinity of the project area, and reservoir operations may impact future/planned trails. Recreational impacts will be further analyzed in the EIR.

Transportation and Traffic

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

Discussion

a/b) Construction of the proposed project could affect traffic in the project vicinity. Construction-related traffic, such as material deliveries and worker commutes, could affect traffic conditions on local roadways by increasing the traffic load. Impacts of the proposed project on the existing roadway system will be evaluated in the EIR, including the potential effects on standard levels of service established for local roadways.

c) The proposed project would include surface and subsurface features that would provide flexibility in water supply delivery in the area. The proposed project is not expected to cause air traffic patterns to be adjusted or changed in a way that would increase safety risk. Nonetheless, this issue will be discussed in the EIR.

d) The proposed project would include surface and subsurface features that would provide flexibility in water supply delivery in the area. The project will not include the construction or design of any roadway infrastructure that would cause a safety risk to vehicle operations. The new access road for the enlarged reservoir would be designed to accommodate construction and maintenance vehicles. Nonetheless, this issue will be discussed in the EIR.

e) The EIR will discuss emergency access and maneuverability at the project site. The proposed project is not expected to result in inadequate emergency access.

f) The proposed project includes staging areas for construction-related vehicles. Staging areas are expected to be designed to adequate accommodate construction equipment and daily parking for construction workers. Parking impacts will be discussed in the EIR.

g) The proposed project could affect roadways in the vicinity of the proposed connector pipeline and thus could affect alternative transportation such as bus routes and bikeways. The proposed project is not expected to result in complete road closures. The impacts of the proposed project to alternative transportation will be discussed in the EIR.

Utilities and Service Systems

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
16. UTILITIES AND SERVICE SYSTEMS—Would the project:				
a) Conflict with wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☒	☐	☐	☐
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
c) Require or result in the construction of new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d) Require new or expanded water supply resources or entitlements?	☒	☐	☐	☐
e) Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☒	☐	☐	☐
f) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☒	☐	☐	☐
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☒	☐	☐	☐

Discussion

a/b) The proposed project is a water supply project. The proposed project does not include additional water treatment facilities. The proposed project would not be subject to wastewater treatment requirements from the Regional Water Quality Control Board.

Nonetheless, impacts of the proposed project associated with utilities will be included in the EIR.

c) The proposed project would not result in the need for new storm drain facilities. Precipitation and runoff in the vicinity of the reservoir enlargement area would be collected behind the dam and stored in the reservoir. The buried half mile of pipeline would not generate runoff that would need drainage facilities. Nonetheless, impacts of the proposed project associated with service systems will be included in the EIR.

d) The proposed project would not create or require a new water supply, and therefore would not require additional water entitlements. The reservoir enlargement would not increase the conveyance capacity of the East Branch Extension, but rather would substantially enhance the system's operating flexibility and reliability. Nonetheless, impacts of the proposed project associated with water utilities will be included in the EIR.

e) The proposed project is a water supply project and would not necessitate service by a wastewater treatment provides. Nonetheless, impacts of the proposed project associated with utilities and service systems will be included in the EIR.

f/g) Construction activities included excavation and grubbing may result in excess materials that require disposal at local landfills. The EIR will include a discussion of local landfill capacity and the estimated disposal requirements of the proposed project. A discussion of federal, state, and local solid waste regulation also will be included in the EIR.

Mandatory Findings of Significance

Issues (and Supporting Information Sources):	*Potentially Significant Impact*	*Less Than Significant with Mitigation Incorporation*	*Less Than Significant Impact*	*No Impact*
17. MANDATORY FINDINGS OF SIGNIFICANCE— Would the project:				
a) Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐
b) Have impacts that would be individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.)	☒	☐	☐	☐

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
c) Have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Discussion

a) The proposed project could have potentially significant impacts on biological resources and cultural resources. The EIR will discuss the project's potential effects on these resources and develop mitigation measures to minimize environmental impacts.

b) The proposed project could have impacts that are individually limited but cumulatively considerable (e.g., impacts to air quality, noise and traffic). The EIR will include a chapter dedicated to evaluating the proposed project's cumulative impacts.

c) The proposed project could have potentially significant impacts to human beings, for example, due to hazardous materials release, dam failure, or seismic conditions. The EIR will include a discussion of direct and indirect project impacts on human beings.

Energy

Issues (and Supporting Information Sources):	Potentially Significant Impact	Less Than Significant with Mitigation Incorporation	Less Than Significant Impact	No Impact
ENERGY—Would the project:				
a) Result in a substantial increase in overall per capita energy consumption?	☒	☐	☐	☐
b) Result in wasteful or unnecessary consumption of energy?	☒	☐	☐	☐
c) Require or result in the construction of new sources of energy supplies or additional energy infrastructure capacity the construction of which could cause significant environmental effects?	☒	☐	☐	☐
d) Conflict with applicable energy efficiency policies or standards?	☒	☐	☐	☐

Discussion

a-d) The proposed project would allow the DWR to fill the Crafton Hills Reservoir during off-peak energy demand periods. Therefore, the proposed project would reduce the demand on the energy grid by allowing off-peak pumping and storage. The EIR will include an analysis of the proposed project impacts on energy resources.

References

City of Redlands, General Plan and Zoning Map

City of Yucaipa, General Plan, July 2004.

County of San Bernardino 2007 General Plan, adopted March 13, 2007. URS Corporation.

California Department of Transportation Scenic Highway Designations. http://www.dot.ca.gov/hq/LandArch/scenic_highways/

State of California Department of Conservation, Farmland Mapping & Monitoring Program, 2004-2006

Appendix C

Air Quality Appendix

ESA

Appendix C-1
URBEMIS Worksheets

ESA

Construction activities for the proposed project are scheduled to be completed over an 18 month time frame. The pipeline construction is anticipated to require six to 12 months to complete. The reservoir enlargement is expected to take approximately 12 to 18 months. The pipeline alignment construction is anticipated to begin in late 2009 and be completed in late 2010. Reservoir enlargement construction is anticipated to begin in early 2010 and be completed by mid 2011. Construction of the pipeline alignment would begin first to allow for water deliveries while the reservoir is being enlarged. Nighttime construction is not anticipated.

Pipeline “soil” import

Approximately 300 cy of concrete and 400 cy of bedding would be imported for backfill.

Reservoir “soil” import

38, 400 cy rock
3,636 cy gravel

TABLE 2-1
CONSTRUCTION EQUIPMENT ESTIMATES

Equipment	Pipeline Alignment	Crafton Hills Reservoir Enlargement
10-wheel Dump Truck	2	4
Backhoe	2	2
Bulldozer	1	2
Compactor	1	3
Concrete Truck	1	1
Crane	1	0
Earth Mover	1	0
Excavator	2	2
Flat Bed Truck	5	5
Front-end Loader	2	2
Jack hammer	1	0
Pavement Saw	1	0
Paver	1	0
Road Grader	1	2
Scraper	1	4
Side Boom Pipe Handler Tractor	1	0
Sweeper	1	0
Trench Shield	1	0
Tunnel Boring Machine	0	0
Water Truck	1	2
Welding Truck	2	0

PM10 rule 403 mitigation included in urbemis

9/3/2008 2:39:05 PM

Urbemis 2007 Version 9.2.4

Detail Report for Annual Construction Unmitigated Emissions (Tons/Year)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\crafton hills reservoir expansion.urb9

Project Name: crafton hills reservoir expansion

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Annual Tons Per Year, Unmitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
2009	0.61	4.86	2.56	0.00	6.28	0.26	6.53	1.31	0.24	1.55	471.47
Fine Grading 10/01/2009-10/01/2010	0.11	0.88	0.47	0.00	3.16	0.04	3.21	0.66	0.04	0.70	78.27
Fine Grading Dust	0.00	0.00	0.00	0.00	3.16	0.00	3.16	0.66	0.00	0.66	0.00
Fine Grading Off Road Diesel	0.10	0.87	0.43	0.00	0.00	0.04	0.04	0.00	0.04	0.04	74.16
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11
Trenching 10/01/2009-10/01/2010	0.07	0.63	0.31	0.00	0.00	0.03	0.03	0.00	0.03	0.03	60.69
Trenching Off Road Diesel	0.07	0.62	0.27	0.00	0.00	0.03	0.03	0.00	0.03	0.03	56.58
Trenching Worker Trips	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.11
Mass Grading 10/02/2009-10/02/2010	0.43	3.36	1.78	0.00	3.11	0.18	3.30	0.65	0.17	0.82	332.51
Mass Grading Dust	0.00	0.00	0.00	0.00	3.11	0.00	3.11	0.65	0.00	0.65	0.00
Mass Grading Off Road Diesel	0.42	3.35	1.60	0.00	0.00	0.18	0.18	0.00	0.17	0.17	312.14
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.15
Mass Grading Worker Trips	0.01	0.01	0.18	0.00	0.00	0.00	0.00	0.00	0.00	0.00	20.22
2010	4.31	36.22	18.73	0.00	41.73	1.77	43.50	8.72	1.63	10.34	3,650.40

9/3/2008 2:39:05 PM

Fine Grading 10/01/2009-10/01/2010	0.30	2.45	1.32	0.00	9.39	0.12	9.51	1.96	0.11	2.07	232.43
Fine Grading Dust	0.00	0.00	0.00	0.00	9.39	0.00	9.39	1.96	0.00	1.96	0.00
Fine Grading Off Road Diesel	0.29	2.45	1.22	0.00	0.00	0.12	0.12	0.00	0.11	0.11	220.24
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.19
Mass Grading 10/02/2009-10/02/2010	1.22	9.55	5.15	0.00	9.39	0.51	9.90	1.96	0.47	2.43	1,002.63
Mass Grading Dust	0.00	0.00	0.00	0.00	9.39	0.00	9.39	1.96	0.00	1.96	0.00
Mass Grading Off Road Diesel	1.21	9.51	4.63	0.00	0.00	0.51	0.51	0.00	0.47	0.47	941.23
Mass Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.45
Mass Grading Worker Trips	0.02	0.03	0.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	60.95
Trenching 10/01/2009-10/01/2010	0.21	1.74	0.91	0.00	0.00	0.09	0.09	0.00	0.08	0.08	180.23
Trenching Off Road Diesel	0.20	1.73	0.81	0.00	0.00	0.09	0.09	0.00	0.08	0.08	168.03
Trenching Worker Trips	0.00	0.01	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.19
Fine Grading 02/01/2010-08/01/2011	0.36	3.01	1.62	0.00	11.50	0.15	11.65	2.40	0.14	2.54	284.61
Fine Grading Dust	0.00	0.00	0.00	0.00	11.50	0.00	11.50	2.40	0.00	2.40	0.00
Fine Grading Off Road Diesel	0.36	3.00	1.50	0.00	0.00	0.15	0.15	0.00	0.14	0.14	269.68
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.01	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	14.93
Mass Grading 02/02/2010-08/01/2011	2.22	19.47	9.73	0.00	11.45	0.90	12.35	2.39	0.83	3.22	1,950.51
Mass Grading Dust	0.00	0.00	0.00	0.00	11.45	0.00	11.45	2.39	0.00	2.39	0.00
Mass Grading Off Road Diesel	2.19	19.27	9.04	0.00	0.00	0.89	0.89	0.00	0.82	0.82	1,854.34
Mass Grading On Road Diesel	0.01	0.16	0.06	0.00	0.00	0.01	0.01	0.00	0.01	0.01	21.84
Mass Grading Worker Trips	0.02	0.04	0.63	0.00	0.00	0.00	0.01	0.00	0.00	0.00	74.33

9/3/2008 2:39:05 PM

2011	1.53	13.28	6.80	0.00	14.47	0.61	15.08	3.02	0.56	3.58	1,411.38
Fine Grading 02/01/2010-08/01/2011	0.22	1.77	0.98	0.00	7.23	0.09	7.32	1.51	0.08	1.59	179.06
Fine Grading Dust	0.00	0.00	0.00	0.00	7.23	0.00	7.23	1.51	0.00	1.51	0.00
Fine Grading Off Road Diesel	0.21	1.77	0.90	0.00	0.00	0.09	0.09	0.00	0.08	0.08	169.67
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.39
Mass Grading 02/02/2010-08/01/2011	1.31	11.51	5.82	0.00	7.24	0.52	7.76	1.51	0.48	1.99	1,232.32
Mass Grading Dust	0.00	0.00	0.00	0.00	7.23	0.00	7.23	1.51	0.00	1.51	0.00
Mass Grading Off Road Diesel	1.29	11.40	5.42	0.00	0.00	0.52	0.52	0.00	0.47	0.47	1,171.57
Mass Grading On Road Diesel	0.01	0.09	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	13.80
Mass Grading Worker Trips	0.01	0.02	0.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	46.95

Phase Assumptions

Phase: Fine Grading 10/1/2009 - 10/1/2010 - pipeline grading

Total Acres Disturbed: 19.17

Maximum Daily Acreage Disturbed: 4.79

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

Off-Road Equipment:

1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Fine Grading 2/1/2010 - 8/1/2011 - reservoir grading

Total Acres Disturbed: 19.17

Maximum Daily Acreage Disturbed: 4.79

Fugitive Dust Level of Detail: Default

20 lbs per acre-day

On Road Truck Travel (VMT): 0

9/3/2008 2:39:05 PM

Off-Road Equipment:
1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 2/2/2010 - 8/1/2011 - reservoir grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 43.11
Off-Road Equipment:
1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day
2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
2 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
3 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
4 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day
4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 10/2/2009 - 10/2/2010 - pipeline grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 1.07
Off-Road Equipment:
1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day
2 Concrete/Industrial Saws (10 hp) operating at a 0.73 load factor for 8 hours per day
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
3 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day

9/3/2008 2:39:05 PM

1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day

1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day

1 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day

1 Sweepers/Scrubbers (91 hp) operating at a 0.68 load factor for 8 hours per day

3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

2 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 10/1/2009 - 10/1/2010 - pipeline trenching

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

9/3/2008 2:37:57 PM

Urbemis 2007 Version 9.2.4

Detail Report for Summer Construction Mitigated Emissions (Pounds/Day)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\crafton hills reservoir expansion.urb9

Project Name: crafton hills reservoir expansion

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES (Summer Pounds Per Day, Mitigated)

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10 Total	PM2.5 Dust	PM2.5 Exhaust	PM2.5 Total	CO2
Time Slice 10/1/2009-10/1/2009 Active Days: 1	5.44	45.49	23.55	0.00	95.81	2.27	98.09	20.01	2.09	22.10	4,210.82
Fine Grading 10/01/2009-10/01/2010	3.22	26.52	14.10	0.00	95.81	1.34	97.14	20.01	1.23	21.24	2,371.75
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.18	26.46	12.98	0.00	0.00	1.33	1.33	0.00	1.23	1.23	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.13	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.43
Trenching 10/01/2009-10/01/2010	2.22	18.96	9.45	0.00	0.01	0.93	0.94	0.00	0.86	0.86	1,839.07
Trenching Off Road Diesel	2.18	18.90	8.32	0.00	0.00	0.93	0.93	0.00	0.86	0.86	1,714.64
Trenching Worker Trips	0.04	0.07	1.13	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.43

9/3/2008 2:37:57 PM

Time Slice 10/2/2009-12/31/2009 Active Days: 65	18.65	148.93	78.47	0.01	191.64	7.87	199.51	40.03	7.24	47.26	14,441.94
Fine Grading 10/01/2009-10/01/2010	3.22	26.52	14.10	0.00	95.81	1.34	97.14	20.01	1.23	21.24	2,371.75
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.18	26.46	12.98	0.00	0.00	1.33	1.33	0.00	1.23	1.23	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.04	0.07	1.13	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.43
Mass Grading 10/02/2009-10/02/2010	13.21	103.45	54.92	0.01	95.83	5.59	101.42	20.02	5.15	25.16	10,231.12
Mass Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Mass Grading Off Road Diesel	13.03	103.07	49.27	0.00	0.00	5.58	5.58	0.00	5.13	5.13	9,604.42
Mass Grading On Road Diesel	0.00	0.04	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55
Mass Grading Worker Trips	0.18	0.34	5.64	0.01	0.03	0.02	0.05	0.01	0.01	0.02	622.15
Trenching 10/01/2009-10/01/2010	2.22	18.96	9.45	0.00	0.01	0.93	0.94	0.00	0.86	0.86	1,839.07
Trenching Off Road Diesel	2.18	18.90	8.32	0.00	0.00	0.93	0.93	0.00	0.86	0.86	1,714.64
Trenching Worker Trips	0.04	0.07	1.13	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.43

9/3/2008 2:37:57 PM

Time Slice 1/1/2010-1/29/2010 Active Days: 21	17.61	140.23	75.30	0.01	191.64	7.35	198.99	40.03	6.76	46.79	14,441.69
Fine Grading 10/01/2009-10/01/2010	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Mass Grading 10/02/2009-10/02/2010	12.48	97.43	52.53	0.01	95.83	5.22	101.05	20.02	4.80	24.82	10,230.94
Mass Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Mass Grading Off Road Diesel	12.31	97.08	47.27	0.00	0.00	5.20	5.20	0.00	4.78	4.78	9,604.42
Mass Grading On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55
Mass Grading Worker Trips	0.16	0.31	5.24	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.97
Trenching 10/01/2009-10/01/2010	2.09	17.75	9.26	0.00	0.01	0.88	0.89	0.00	0.81	0.81	1,839.03
Trenching Off Road Diesel	2.06	17.69	8.22	0.00	0.00	0.88	0.88	0.00	0.81	0.81	1,714.64
Trenching Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39

9/3/2008 2:37:57 PM

Time Slice 2/1/2010-2/1/2010 Active Days: 1	20.64	165.28	88.81	0.01	287.45	8.60	296.05	60.04	7.91	67.95	16,813.40
Fine Grading 02/01/2010-08/01/2011	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Fine Grading 10/01/2009-10/01/2010	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Mass Grading 10/02/2009-10/02/2010	12.48	97.43	52.53	0.01	95.83	5.22	101.05	20.02	4.80	24.82	10,230.94
Mass Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Mass Grading Off Road Diesel	12.31	97.08	47.27	0.00	0.00	5.20	5.20	0.00	4.78	4.78	9,604.42
Mass Grading On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55
Mass Grading Worker Trips	0.16	0.31	5.24	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.97
Trenching 10/01/2009-10/01/2010	2.09	17.75	9.26	0.00	0.01	0.88	0.89	0.00	0.81	0.81	1,839.03
Trenching Off Road Diesel	2.06	17.69	8.22	0.00	0.00	0.88	0.88	0.00	0.81	0.81	1,714.64
Trenching Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39

9/3/2008 2:37:57 PM

Time Slice 2/2/2010-10/1/2010 Active Days: 174	39.20	328.22	170.23	0.02	294.16	16.13	310.29	61.44	14.84	76.28	33,135.63
Fine Grading 02/01/2010-08/01/2011	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Fine Grading 10/01/2009-10/01/2010	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Mass Grading 02/02/2010-08/01/2011	18.55	162.95	81.42	0.01	6.71	7.53	14.24	1.41	6.93	8.33	16,322.23
Mass Grading Dust	0.00	0.00	0.00	0.00	6.67	0.00	6.67	1.39	0.00	1.39	0.00
Mass Grading Off Road Diesel	18.29	161.29	75.66	0.00	0.00	7.46	7.46	0.00	6.86	6.86	15,517.52
Mass Grading On Road Diesel	0.10	1.34	0.52	0.00	0.01	0.05	0.06	0.00	0.05	0.05	182.73
Mass Grading Worker Trips	0.16	0.31	5.24	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.97
Mass Grading 10/02/2009-10/02/2010	12.48	97.43	52.53	0.01	95.83	5.22	101.05	20.02	4.80	24.82	10,230.94
Mass Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Mass Grading Off Road Diesel	12.31	97.08	47.27	0.00	0.00	5.20	5.20	0.00	4.78	4.78	9,604.42
Mass Grading On Road Diesel	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.55
Mass Grading Worker Trips	0.16	0.31	5.24	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.97
Trenching 10/01/2009-10/01/2010	2.09	17.75	9.26	0.00	0.01	0.88	0.89	0.00	0.81	0.81	1,839.03
Trenching Off Road Diesel	2.06	17.69	8.22	0.00	0.00	0.88	0.88	0.00	0.81	0.81	1,714.64
Trenching Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39

9/3/2008 2:37:57 PM

Time Slice 10/4/2010-12/31/2010 Active Days: 65	21.59	187.99	94.93	0.01	102.52	8.78	111.30	21.42	8.08	29.49	18,693.94
Fine Grading 02/01/2010-08/01/2011	3.04	25.05	13.51	0.00	95.81	1.25	97.06	20.01	1.15	21.16	2,371.71
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	3.00	24.99	12.46	0.00	0.00	1.25	1.25	0.00	1.15	1.15	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	1.05	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.39
Mass Grading 02/02/2010-08/01/2011	18.55	162.95	81.42	0.01	6.71	7.53	14.24	1.41	6.93	8.33	16,322.23
Mass Grading Dust	0.00	0.00	0.00	0.00	6.67	0.00	6.67	1.39	0.00	1.39	0.00
Mass Grading Off Road Diesel	18.29	161.29	75.66	0.00	0.00	7.46	7.46	0.00	6.86	6.86	15,517.52
Mass Grading On Road Diesel	0.10	1.34	0.52	0.00	0.01	0.05	0.06	0.00	0.05	0.05	182.73
Mass Grading Worker Trips	0.16	0.31	5.24	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.97
Time Slice 1/3/2011-8/1/2011 Active Days: 151	20.24	175.95	90.05	0.01	102.52	8.07	110.59	21.42	7.43	28.84	18,693.78
Fine Grading 02/01/2010-08/01/2011	2.86	23.49	12.93	0.00	95.81	1.18	96.98	20.01	1.08	21.09	2,371.69
Fine Grading Dust	0.00	0.00	0.00	0.00	95.80	0.00	95.80	20.01	0.00	20.01	0.00
Fine Grading Off Road Diesel	2.83	23.44	11.96	0.00	0.00	1.17	1.17	0.00	1.08	1.08	2,247.32
Fine Grading On Road Diesel	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fine Grading Worker Trips	0.03	0.06	0.98	0.00	0.01	0.00	0.01	0.00	0.00	0.00	124.37
Mass Grading 02/02/2010-08/01/2011	17.38	152.46	77.11	0.01	6.71	6.90	13.61	1.41	6.34	7.75	16,322.09
Mass Grading Dust	0.00	0.00	0.00	0.00	6.67	0.00	6.67	1.39	0.00	1.39	0.00
Mass Grading Off Road Diesel	17.13	150.97	71.77	0.00	0.00	6.83	6.83	0.00	6.29	6.29	15,517.52
Mass Grading On Road Diesel	0.09	1.21	0.46	0.00	0.01	0.05	0.05	0.00	0.04	0.05	182.73
Mass Grading Worker Trips	0.15	0.28	4.88	0.01	0.03	0.02	0.05	0.01	0.01	0.02	621.84

Construction Related Mitigation Measures

The following mitigation measures apply to Phase: Mass Grading 2/2/2010 - 8/1/2011 - reservoir grading

For Soil Stablizing Measures, the Apply soil stabilizers to inactive areas mitigation reduces emissions by:

PM10: 84% PM25: 84%

9/3/2008 2:37:58 PM

For Soil Stablizing Measures, the Replace ground cover in disturbed areas quickly mitigation reduces emissions by:
PM10: 5% PM25: 5%
For Soil Stablizing Measures, the Water exposed surfaces 2x daily watering mitigation reduces emissions by:
PM10: 55% PM25: 55%
For Soil Stablizing Measures, the Equipment loading/unloading mitigation reduces emissions by:
PM10: 69% PM25: 69%
For Unpaved Roads Measures, the Reduce speed on unpaved roads to less than 15 mph mitigation reduces emissions by:
PM10: 44% PM25: 44%
For Unpaved Roads Measures, the Manage haul road dust 2x daily watering mitigation reduces emissions by:
PM10: 55% PM25: 55%

Phase Assumptions

Phase: Fine Grading 10/1/2009 - 10/1/2010 - pipeline grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Fine Grading 2/1/2010 - 8/1/2011 - reservoir grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 0
Off-Road Equipment:
1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

9/3/2008 2:37:58 PM

Phase: Mass Grading 2/2/2010 - 8/1/2011 - reservoir grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 43.11
Off-Road Equipment:
1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day
2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
2 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
3 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
2 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 8 hours per day
4 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day
4 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day
2 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Mass Grading 10/2/2009 - 10/2/2010 - pipeline grading
Total Acres Disturbed: 19.17
Maximum Daily Acreage Disturbed: 4.79
Fugitive Dust Level of Detail: Default
20 lbs per acre-day
On Road Truck Travel (VMT): 1.07
Off-Road Equipment:
1 Cement and Mortar Mixers (10 hp) operating at a 0.56 load factor for 8 hours per day
2 Concrete/Industrial Saws (10 hp) operating at a 0.73 load factor for 8 hours per day
1 Cranes (399 hp) operating at a 0.43 load factor for 8 hours per day
2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day
1 Graders (174 hp) operating at a 0.61 load factor for 6 hours per day
3 Other Equipment (190 hp) operating at a 0.62 load factor for 8 hours per day
1 Pavers (100 hp) operating at a 0.62 load factor for 8 hours per day
1 Rubber Tired Dozers (357 hp) operating at a 0.59 load factor for 6 hours per day
1 Scrapers (313 hp) operating at a 0.72 load factor for 8 hours per day
1 Sweepers/Scrubbers (91 hp) operating at a 0.68 load factor for 8 hours per day
3 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 7 hours per day

9/3/2008 2:37:58 PM

2 Welders (45 hp) operating at a 0.45 load factor for 8 hours per day

1 Water Trucks (189 hp) operating at a 0.5 load factor for 8 hours per day

Phase: Trenching 10/1/2009 - 10/1/2010 - pipeline trenching

Off-Road Equipment:

2 Excavators (168 hp) operating at a 0.57 load factor for 8 hours per day

1 Other General Industrial Equipment (238 hp) operating at a 0.51 load factor for 8 hours per day

1 Tractors/Loaders/Backhoes (108 hp) operating at a 0.55 load factor for 0 hours per day

9/3/2008 2:38:44 PM

Urbemis 2007 Version 9.2.4

Summary Report for Annual Emissions (Tons/Year)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\crafton hills reservoir expansion.urb9

Project Name: crafton hills reservoir expansion

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (tons/year unmitigated)	0.61	4.86	2.56	0.00	6.28	0.26	6.53	1.31	0.24	1.55	471.47
2009 TOTALS (tons/year mitigated)	0.61	4.86	2.56	0.00	6.28	0.26	6.53	1.31	0.24	1.55	471.47
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2010 TOTALS (tons/year unmitigated)	4.31	36.22	18.73	0.00	41.73	1.77	43.50	8.72	1.63	10.34	3,650.40
2010 TOTALS (tons/year mitigated)	4.31	36.22	18.73	0.00	31.08	1.77	32.85	6.49	1.63	8.12	3,650.40
Percent Reduction	0.00	0.00	0.00	0.00	25.52	0.00	24.48	25.52	0.00	21.50	0.00
2011 TOTALS (tons/year unmitigated)	1.53	13.28	6.80	0.00	14.47	0.61	15.08	3.02	0.56	3.58	1,411.38
2011 TOTALS (tons/year mitigated)	1.53	13.28	6.80	0.00	7.74	0.61	8.35	1.62	0.56	2.18	1,411.38
Percent Reduction	0.00	0.00	0.00	0.00	46.51	0.00	44.63	46.50	0.00	39.22	0.00

9/3/2008 2:38:44 PM

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.51	0.17	0.73	0.00	0.00	0.00	197.22

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (tons/year, unmitigated)	0.51	0.17	0.73	0.00	0.00	0.00	197.22

9/3/2008 2:37:16 PM

Urbemis 2007 Version 9.2.4

Summary Report for Summer Emissions (Pounds/Day)

File Name: C:\Documents and Settings\dsa\Application Data\Urbemis\Version9a\Projects\crafton hills reservoir expansion.urb9

Project Name: crafton hills reservoir expansion

Project Location: South Coast AQMD

On-Road Vehicle Emissions Based on: Version : Emfac2007 V2.3 Nov 1 2006

Off-Road Vehicle Emissions Based on: OFFROAD2007

CONSTRUCTION EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10 Dust	PM10 Exhaust	PM10	PM2.5 Dust	PM2.5 Exhaust	PM2.5	CO2
2009 TOTALS (lbs/day unmitigated)	18.65	148.93	78.47	0.01	191.64	7.87	199.51	40.03	7.24	47.26	14,441.94
2009 TOTALS (lbs/day mitigated)	18.65	148.93	78.47	0.01	191.64	7.87	199.51	40.03	7.24	47.26	14,441.94
2010 TOTALS (lbs/day unmitigated)	39.20	328.22	170.23	0.02	383.28	16.13	399.41	80.06	14.84	94.89	33,135.63
2010 TOTALS (lbs/day mitigated)	39.20	328.22	170.23	0.02	294.16	16.13	310.29	61.44	14.84	76.28	33,135.63
2011 TOTALS (lbs/day unmitigated)	20.24	175.95	90.05	0.01	191.64	8.07	199.71	40.03	7.43	47.45	18,693.78
2011 TOTALS (lbs/day mitigated)	20.24	175.95	90.05	0.01	102.52	8.07	110.59	21.42	7.43	28.84	18,693.78

AREA SOURCE EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	2.77	0.94	3.96	0.00	0.01	0.01	1,080.70

9/3/2008 2:37:16 PM

SUM OF AREA SOURCE AND OPERATIONAL EMISSION ESTIMATES

	ROG	NOx	CO	SO2	PM10	PM2.5	CO2
TOTALS (lbs/day, unmitigated)	2.77	0.94	3.96	0.00	0.01	0.01	1,080.70

Appendix C-2
Health Risk Assessment

ESA

EAST BRANCH EXTENSION PHASE 1 IMPROVEMENTS

Health Risk Assessment

Recent air pollution studies have shown that emissions from trucks, locomotives, ships and other sources of diesel exhaust are responsible for much of the overall cancer risks from airborne toxics in California. In January 2008, the South Coast Air Quality Management District (SCAQMD) published a draft study that investigates carcinogenic risks from air toxics in the South Coast Air Basin (Basin). According to this study, population weighted cancer risk from existing concentrations of diesel particulate matter (DPM) in the Basin is approximately 682 in one million (SCAQMD, 2008). The SCAQMD has established the CEQA significance threshold for individuals exposed to new toxic air contaminant (TAC) sources as the increased incremental cancer risk of 10 in one million or greater (SCAQMD, 2007). This report analyzes the potential incremental cancer risks to residents in the project vicinity of the proposed construction activities.

The sources of DPM analyzed in this study include emissions from equipment used to construct the proposed Yucaipa connector pipeline and equipment used to construct the Crafton Hills Reservoir Enlargement and Dam. Emissions from these activities were input to the United States Environmental Protection Agency (USEPA) approved dispersion model AERMOD to calculate ambient air concentrations at receptors in the project vicinity. Meteorological data representative of the project site were used along with estimated DPM emissions to calculate pollutant concentrations at various receptor locations. The meteorological station nearest to the project site that would represent wind conditions at the project site and that has data reduced for model input is located in Redlands, approximately 6 miles west of the Crafton Hills Reservoir. The data from this station were supplemented with opaque cloud cover data from the Los Angeles International Airport for use in the meteorological preprocessor, AERMET, to prepare hourly surface meteorological data files for use in AERMOD.

Emission Rates

Emission rates from construction activities were estimated using the URBEMIS 2007 model. This model incorporates emission factors from the California Air Resources Board's (ARB's) OFFROAD and EMFAC2007 models to estimate construction emissions. The URBEMIS estimates for annual off road exhaust emissions of particulate matter less than 2.5 microns in diameter (PM2.5) were used to represent DPM emission rates. It was assumed that all off road equipment would be diesel fueled, and therefore all PM2.5 exhaust emissions would be DPM. This represents a conservative worst case analysis.

Model Inputs and Results

Geographic information systems (GIS) were used to determine the geographic locations of the emissions sources and sensitive receptors for the proposed project. To determine the worst case exposure, receptors were modeled at three breathing heights: ground level (0 meters), 1 meter (approximately 3 feet 2 inches), and 1.8 meters (approximately 5 feet 9 inches).

As discussed previously, meteorological data from the Redlands meteorological station was used with opaque cloud cover data from the Los Angeles International Airport to prepare hourly surface meteorological files for use in AERMOD. Figure 1 shows a wind rose of the area, and it represents the data used in the model.

Source and receptor elevations were derived from the Yucaipa 7.5 minute digital elevation model. These elevations were processed and imported using AERMAP, an accessory program to AERMOD. Construction equipment emissions were modeled as a series of volume sources. A release height of 5 meters was assumed in accordance with methods recommended by the SCAQMD. This release height is representative of the mid-range of expected plume rise of exhaust emissions from typical construction equipment during daytime atmospheric conditions (SCAQMD, 2003).

Based on the modeling results, the maximum exposed receptor would be exposed to an annual average DPM concentration of 0.45 $\mu g/m^3$.

Health Risks from Exposure to DPM

The maximum incremental cancer risk from exposure to DPM was calculated following the guidelines established by California Office of Environmental Health Hazard Assessment (OEHHA, 2003). The equation used to determine exposure to DPM through inhalation is demonstrated below:

$$\text{Dose-inh} = \frac{C_{air} * \{DBR\} * A * EF * ED * 10^{-6}}{AT}$$

Where:

Dose-inh	= Dose of the toxic substance through inhalation in milligrams per kilogram of body weight per day (mg/kg-day)
10^{-6}	= Micrograms to milligrams conversion, Liters to cubic meters conversion
C_{air}	= Concentration in air ($\mu g/m^3$)
{DBR}	= Daily breathing rate (L/kg body weight – day)
A	= Inhalation absorption factor
EF	= Exposure frequency (days/year)
ED	= Exposure duration (years)
AT	= Averaging time period over which exposure is averaged in days (25,550 days for a 70 year cancer risk)

Since the exposure duration for construction emissions would be less than a 70 year lifetime, the 95th percentile child breathing rate of 581 L/kg-day was used in the equation, rather than the 80th percentile adult breathing rate of 302 L/kg-day. The exposure frequency and duration were assumed to be 365 days per year and two years respectively. The modeled concentration of 0.45 $\mu g/m^3$ was used to represent the concentration of DPM in the air. The inhalation absorption factor was assumed to be 1.

To determine incremental cancer risk the estimated dose through inhalation was multiplied by cancer potency slope factor for DPM, 1.1 $(mg/kg\text{-}day)^{-1}$. It should be noted that the cancer potency slopes established by OEHHA were determined based on a minimum exposure duration of 9 years. There is a large degree of uncertainty regarding cancer risk from short term high exposures versus long term lower exposures (OEHHA, 2003). Since cancer risk was evaluated for a two year period there is some uncertainty in the actual cancer risk that would result from DPM emissions generated during construction of the proposed project. As shown below, the maximum incremental cancer risk to sensitive receptors in the project area would be 8.2 in one million:

$$\text{Dose-inhalation} = \frac{0.45\ \mu g/m^3 * 581\ L/kg\text{-}day * 1 * 365\ days/year * 2\ years * 10^{-6}}{(25{,}550\ days)}$$

$$= 7.47 * 10^{-6}$$

$$\text{Cancer Risk} = 7.47 * 10^{-6}\ mg/kg\text{-}day * 1.1\ (mg/kg\text{-}day)^{-1}$$

$$= 8.2 * 10^{-6}$$

~ *8.2 in one million*

Figure 2 shows cancer risk isopleths to children at existing residences and residences that are currently under construction. As demonstrated in the figure and in the equation above, risk to children at residential receptors from DPM emissions generated by construction of the proposed project would be below the SCAQMD significance threshold of 10 in one million.

References

Jones and Stokes Associates, 2007. *Software User's Guide: URBEMIS2007 for Windows Version 9.2 Emissions Estimate for Land Use Development Projects*, November 2007.

Office of Environmental Health Hazards Assessment (OEHHA), 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*, available online at: http://www.oehha.org/air/hot_spots/pdf/HRAguidefinal.pdf, accessed April 29, 2008.

South Coast Air Quality Management District (SCAQMD), 2003. *Localized Significance Threshold Methodology*, June 2003.

SCAQMD, 2007. *Air Quality Significance Thresholds*, revised December 2007, available online at: http://www.aqmd.gov/ceqa/handbook/signthres.pdf, accessed May 6, 2008.

SCAQMD, 2008. *Multiple Air Toxics Exposure Study in the South Coast Air Basin – Draft Report*, January 2008, available online at: http://www.aqmd.gov/prdas/matesIII/matesIII.html, accessed May 6, 2008.

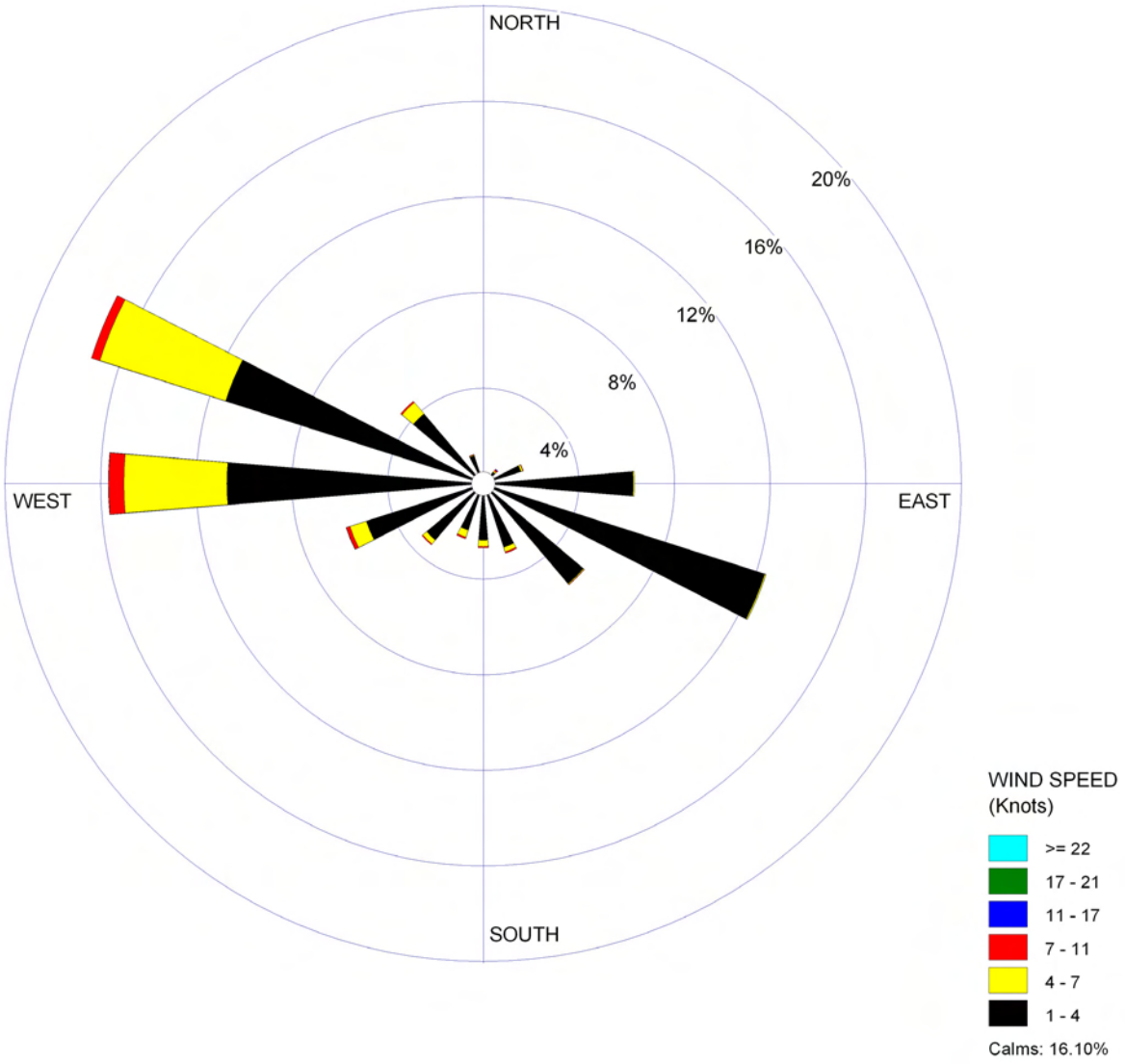
United States Environmental Protection Agency (USEPA), 2004. *Users Guide for the AMS/EPA Regulatory Model – AERMOD*, EPA-454/B-003-01, September 2004.

WIND ROSE PLOT:

Figure 1
SCAQMD Station #54161 Redlands, CA

DISPLAY:

Wind Speed
Direction (blowing from)

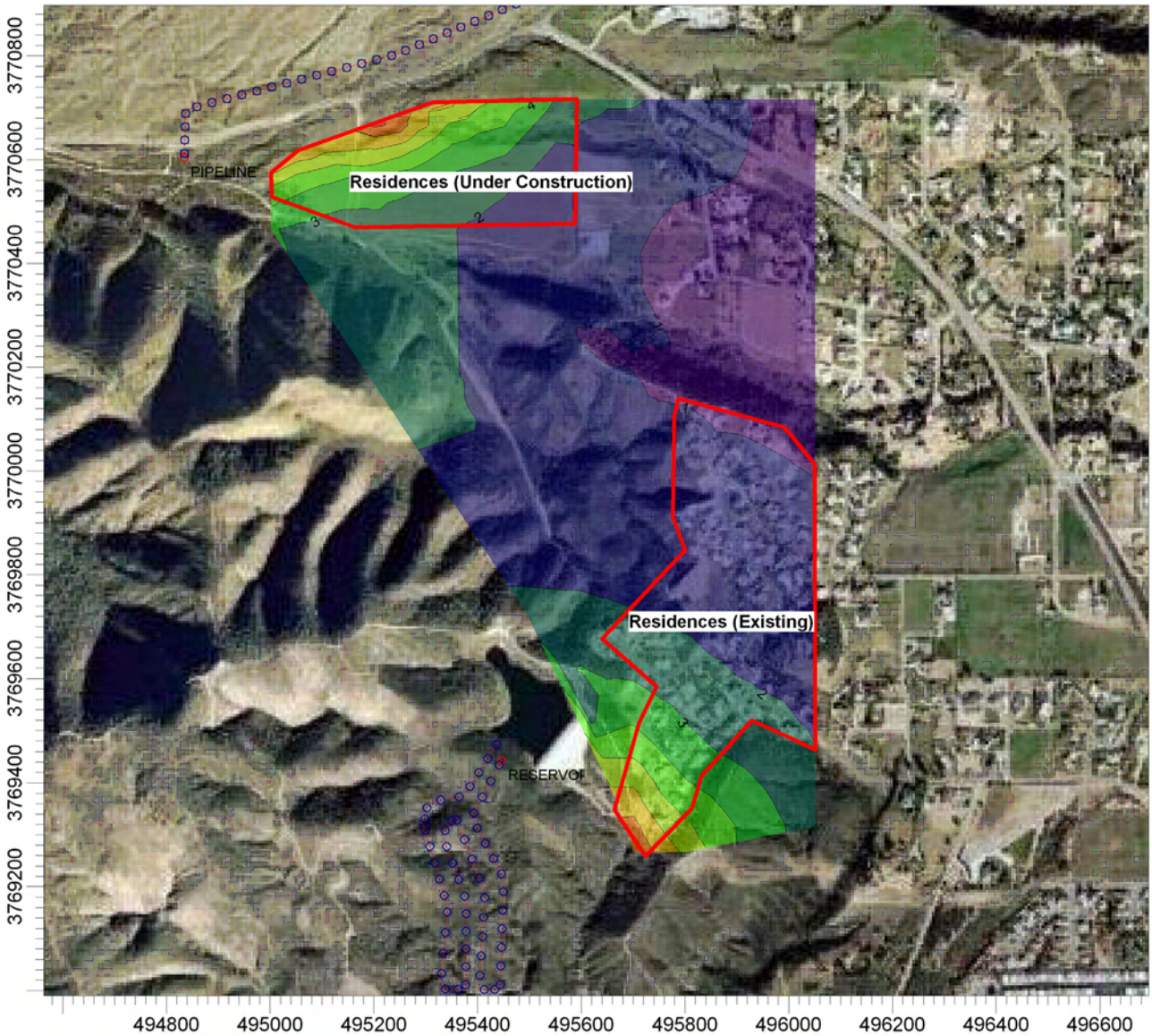


COMMENTS:	DATA PERIOD:		
	1981 **Jan 1 - Dec 31** **00:00 - 23:00**		
	CALM WINDS:	TOTAL COUNT:	
	16.10%	**8760 hrs.**	
	AVG. WIND SPEED:	DATE:	PROJECT NO.:
	2.81 Knots	**9/12/2008**	**206008.04**

WRPLOT View - Lakes Environmental Software

PROJECT TITLE:

Figure 2
Cancer Risk



CANCER RISK EXPRESSED IN CHANCES PER MILLION

Cancer Risk

0.000 1.000 2.000 3.000 4.000 5.000 6.000 7.000 8.000

COMMENTS:	SOURCES:	COMPANY NAME:	
Cancer risk expresed in chances per million. The high end (95th percentile) breathing rate for children was used to determine worst case cancer risks at nearby receptors.	**2**	**Environmental Science Associates**	
	RECEPTORS: **343**		
		SCALE: 1:13,000 — 0 — 0.4 km	
	MAX: **8.24152 Cancer Risk**	DATE: **9/15/2008**	**206008.04**

ISC-AERMOD View - Lakes Environmental Software

Appendix D

Draft Biological Technical Report

ESA

DRAFT
BIOLOGICAL TECHNICAL REPORT
AND FOCUSED PLANT SURVEY REPORT

DEPARTMENT OF WATER RESOURCES
CRAFTON HILLS RESERVOIR EXPANSION AND PIPELINE PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA

Prepared for:

ENVIRONMENTAL SCIENCE ASSOCIATES
707 Wilshire Boulevard, Suite 1450
Los Angeles, CA 90017

Prepared by:
CHAMBERS GROUP, INC.
17671 Cowan Avenue, Suite 100
Irvine, CA 92614

March 5, 2008

TABLE OF CONTENTS

Page

EXECUTIVE SUMMARY ES-1

SECTION 1.0 – INTRODUCTION 1-1
1.1 PROJECT LOCATION 1-1
1.1.1 Proposed Pipeline Site 1-1
1.1.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Sites 1-1

SECTION 2.0 – METHODS 2-1
2.1 LITERATURE REVIEW METHODS 2-1
2.2 SENSITIVE SPECIES 2-1
2.2.1 Reconnaissance Survey 2-2
2.2.2 Focused Plant Survey 2-2

SECTION 3.0 – RESULTS 3-1
3.1 SOILS 3-1
3.1.1 Proposed Pipeline Site 3-1
3.1.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Sites 3-1
3.2 VEGETATION 3-1
3.2.1 Proposed Pipeline Site 3-2
3.2.2 Crafton Hills Reservoir Site 3-4
3.2.3 Proposed Reservoir Expansion Site 3-6
3.2.2 Sensitive Habitats 3-8
3.2.3 Sensitive Plants 3-8
3.3 WILDLIFE 3-17
3.3.1 Sensitive Wildlife 3-18

SECTION 4.0 – DISCUSSION 4-1
4.1 WILDLIFE MOVEMENT CORRIDORS 4-1
4.2 JURISDICTIONAL WATERS 4-2
4.2.1 Proposed Pipeline Site 4-2
4.2.2 Crafton Hills Reservoir and the Proposed Reservoir Expansion Site 4-2
4.3 GENERAL ANALYSIS AND RECOMMENDATIONS 4-3
4.3.1 Proposed Pipeline Site 4-3
4.3.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Site 4-3

SECTION 5.0 – REFERENCES 5-1

APPENDIX A – PLANT SPECIES OBSERVED
APPENDIX B – WILDLIFE SPECIES DETECTED

LIST OF FIGURES

Figure		Page
1	Project Vicinity Map	1-2
2	Project Location Map	1-3
3a	Crafton Hills Pipeline Vegetation Communities	3-2
3b	Crafton Hills Reservoir Vegetation Communities	3-3
4	Crafton Hills Reservoir Sensitive Species Map	4-4

LIST OF TABLES

Table		Page
1	Criteria for Evaluating Potential for Occurrence (PFO) of Sensitive Species	2-1
2	Approximate Vegetative Cover for Dominant Plant Species Onsite	3-5
3	CNDDB, CNPSEI, Literature Review Results for Sensitive Plant Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Proposed Reservoir Expansion Sites	3-11
4	CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Proposed Reservoir Expansion Sites	3-22

EXECUTIVE SUMMARY

Chambers Group, Inc. (Chambers Group) was retained by Environmental Science Associates (ESA) to conduct a literature review, reconnaissance-level biological surveys, and focused plant surveys along a proposed water pipeline right-of-way (ROW) and a proposed reservoir expansion site for the State Department of Water Resources (DWR). The project consists of three distinct project sites: the proposed pipeline site (with a 400-foot wide total study area surrounding the pipeline centerline), the existing Crafton Hills Reservoir (defined by its fenced area), and the proposed reservoir expansion site, situated in a natural canyon immediately west of Crafton Hills Reservoir. All three project sites are located within the *Yucaipa* U.S. Geological Survey (USGS) quadrangle map (quad) in Township 1S, Range 2W. The pipeline ROW project site is in Sections 13, 14, and 23 and is within the elevation range of 2,540 to 2,660 feet above mean sea level (amsl). The existing reservoir and reservoir expansion sites are in Section 24 and are within the elevation range of 2,800 to 2,990 feet amsl.

Reconnaissance-level surveys and focused plant surveys were conducted along the proposed pipeline, existing reservoir, and proposed reservoir expansion sites. The surveys were conducted within and adjacent to the proposed project sites to document existing biological resources, identify sensitive habitats, assess the site for its potential to support sensitive plant and wildlife species, and to confirm the presence/absence of several sensitive plant species, including Santa Ana River woollystar (*Eriastrum densiflorum* ssp. *sanctorum*), slender-horned spineflower (*Dodecahema leptoceras*), Nevin's barberry (*Berberis nevinii*), and Parish's checkerbloom (*Sidalcea hickmanii* ssp. *parishii*). Prior to performing the surveys, available databases and documentation relevant to the project sites were reviewed for known occurrences of sensitive species in the area. The most recent versions of the California Natural Diversity Database (CNDDB) and California Native Plant Society Electronic Inventory (CNPSEI) databases were searched for sensitive species data on the *Redlands*, *Yucaipa*, *Harrison Mountain*, and *Keller Peak* USGS quads. These databases contain records of reported occurrences of state and federally listed species or otherwise sensitive species and habitats that may occur within the vicinity of the project site.

The purpose of this report is to document the results obtained during Chambers Group literature reviews, reconnaissance-level surveys, and focused plant surveys. Significant findings include the following:

- The focused plant survey conducted along the Crafton Hills Reservoir, proposed expansion site, and the proposed pipeline site was negative for threatened and/or endangered plant species. One sensitive plant species with a California Native Plant Society (CNPS) 1B.2 ranking status, Plummer's mariposa lily (*Calochortus plummerae*), was identified at the reservoir expansion site. This CNPS ranking carries no formal regulatory protection, but means that the species is rare, threatened or endangered in California and more common elsewhere in its range. Nine individual plants were observed during the reconnaissance-level biological surveys, which were conducted at the end of the blooming period for this species. Also, because the surveys were conducted after a second dry year, more Plummer's mariposa lily populations and individuals are expected to occur onsite but may have not been observed due to the conditions stated above.

- Sensitive wildlife species identified within Crafton Hills Reservoir and/or the reservoir expansion site, their listing statuses, and the locations and numbers of their occurrences, are described below:

    - The Cooper's hawk (*Accipiter cooperii*) is a California Special Concern Species (CSC - nesting) that was observed at the Crafton Hills Reservoir. One individual was observed flying low over the surrounding hills and foraging for prey on July 16, 2007. Due to a lack of suitable nesting trees, this species is assumed absent for nesting onsite.

    - The southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*) is a CSC that was observed at the proposed reservoir expansion site. One location that may represent a permanent resident pair was noted at the south end of the proposed reservoir expansion site on June 15, 2007. This species likely nests onsite.

- Lawrence's goldfinch (*Carduelis lawrencei*) is a United States Fish and Wildlife Service (USFWS) Birds of Conservation Concern species (BCC - nesting) that was observed at Crafton Hills Reservoir. Small flocks of up to twelve individuals were recorded on July 16 and 17, 2007. The onsite nesting status is uncertain for this species.

- The osprey (*Pandion haliaetus*) is a CSC (nesting) that was observed foraging at the Crafton Hills Reservoir. One individual was seen on July 16, 2007. Due to a lack of suitable nesting trees and no known nesting occurrences in the project vicinity, this species is assumed absent for nesting onsite.

- The double-crested cormorant (*Phalacrocorax auritus*) is a CSC (rookery sites) that was observed at the Crafton Hills Reservoir. One individual was seen resting on a dam structure at Crafton Hills Reservoir on July 16, 2007. Due to a lack of suitable nesting sites, no observed rookeries onsite, and no known rookery sites in the project vicinity, this species is assumed absent for nesting onsite.

➢ One sensitive wildlife species, the northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), a CSC, was recorded at the proposed pipeline site, but the potential for threatened and endangered plants and animals to occur there is absent to low.

- A focused trapping survey conducted by USFWS-permitted small mammal expert Steve Montgomery along the proposed pipeline site resulted in no federally or state-listed sensitive species, including San Bernardino kangaroo rat (*Dipodomys merriami parvus*), Stephens' kangaroo rat (*Dipodomys stephensii*). The Los Angeles pocket mouse (*Perognathus longimembris brevinasus*), a CSC, was also not trapped along the proposed pipeline route.

➢ The Crafton Hills Reservoir and the proposed reservoir expansion sites were assessed by Steve Montgomery for their potentials to harbor the two kangaroo rat species listed above as well as the Los Angeles pocket mouse. These three species were determined to be absent from these sites based on the following criteria:

- The steep terrain, dominant chaparral vegetation, and dense grasslands that characterize the sites are not the alluvial sage scrub habitats associated with the San Bernardino kangaroo rat and the Los Angeles pocket mouse. In addition, the upland locations of the sites are well above the alluvial plains where these species typically occur, and sandy soils suitable for burrowing of these species were not found on the reservoir sites.

- The nearest known location for Stephens' kangaroo rat is approximately 8-9 miles south of Crafton Hills Reservoir, to the west of Beaumont and south of California State Route 60. In addition, the steep terrain, dominant chaparral vegetation, and dense annual grasslands that characterize the sites are not the open grasslands or sparse shrublands preferred by this species.

- While the northwestern San Diego pocket mouse was found present at the proposed pipeline site, the potential for this species to occur in the reservoir sites is low. The steep terrain, dominant chaparral vegetation, dense annual grasslands, and granitic soils preclude substantial populations on the proposed expansion or existing reservoir sites. There is a low potential for this species to occur in the relatively level areas of the dry wash at the proposed expansion site.

SECTION 1.0 – INTRODUCTION

Chambers Group, Inc. (Chambers Group) was retained by Environmental Science Associates (ESA) to conduct a literature review, reconnaissance-level biological surveys, and focused plant surveys along a proposed water pipeline right-of-way (ROW), a proposed reservoir expansion site, and Crafton Hills Reservoir for the State Department of Water Resources (DWR) proposed Crafton Hills Reservoir Enlargement Project.

The purpose of the surveys and this report were to document existing biological resources, identify any sensitive habitats, assess the sites for their potentials to support sensitive plant and wildlife species, and to confirm the presence/absence of sensitive plant species.

1.1 PROJECT LOCATION

The project consists of three distinct project sites: the proposed pipeline site (with a 400-foot wide total study area surrounding the pipeline centerline), the existing Crafton Hills Reservoir (defined by its fenced area), and the proposed reservoir expansion site, situated in a natural canyon immediately west of Crafton Hills Reservoir. All three project sites are located within the *Yucaipa* U.S. Geological Survey (USGS) quadrangle map (quad) in Township 1S, Range 2W. The pipeline ROW project site is in Sections 13, 14, and 23 and is within the elevation range of 2,540 to 2,660 feet above mean sea level (amsl). The existing reservoir and reservoir expansion sites are in Section 24 and are within the elevation range of 2,800 to 2,990 feet amsl.

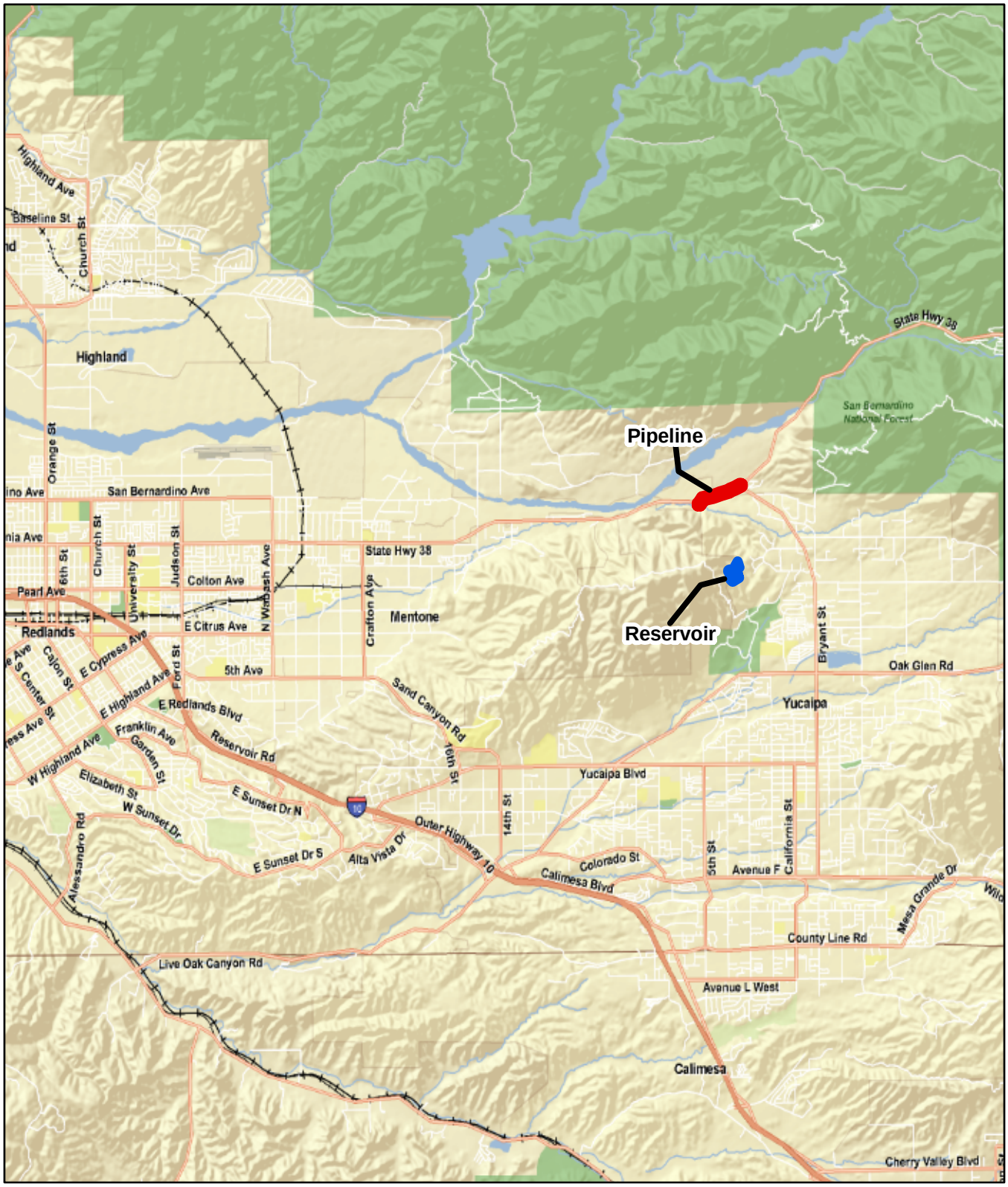
1.1.1 Proposed Pipeline Site

The proposed pipeline and study area would cover approximately 20.3 acres and would be constructed parallel to and north of Mill Creek Road (California State Route 38) for a total distance of approximately ½ mile through fire-recovering Disturbed Mature Riversidean Alluvial Fan Sage Scrub habitat (Figure 2). This pipeline would be connected to existing underground pipelines and served by the Crafton Hills Pump Station.

1.1.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Sites

Crafton Hills Reservoir was constructed as a component of the East Branch Extension Phase I DWR project. Environmental documentation for construction of the reservoir was addressed in the *Supplemental Environmental Impact Report (EIR) No. 1 for the East Branch Extension Phase I* prepared by P&D Consultants in November 1997. The approximately 7.8 acre, 90 acre-foot (a.f.) reservoir was constructed with the following features: a zoned earthfill dam, an uncontrolled overpour spillway, a 54-inch diameter outlet conduit and appurtenant structures designed for reversible flow, a 12-inch diameter emergency release blow-off, and access roads with adjacent drainage ditches.

DWR proposes expansion of the Crafton Hills Reservoir to approximately 18.3 acres and 225 a.f. The purpose of the expansion is to allow for off-peak pumping to meet daytime water deliveries. The project includes the construction of a larger earthfill dam along with access roads, drainage ditches, cut slopes, and all operational equipment for the dam to be constructed in the adjacent valley to the west of the existing reservoir. The existing habitat at the expansion site lies within 26 acres of primarily chaparral and grassland habitats.

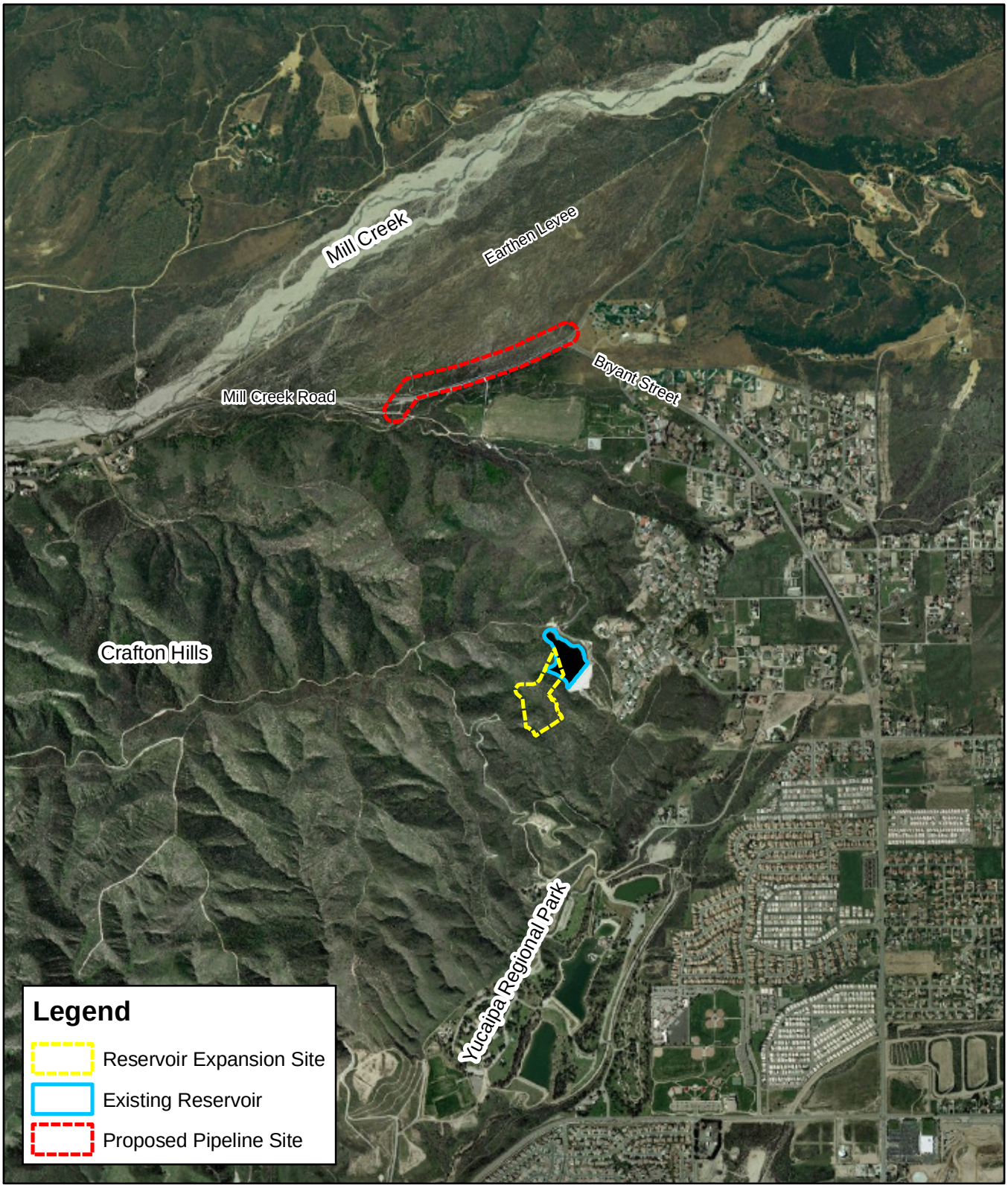


Chambers Group Inc.

N
W E
S

0 0.5 1 1.5 2
Miles

DWR - Crafton Hills Reservoir
Location Map
Figure 1



Chambers Group Inc.

N
W E
S

0 400 800 1,600 2,400 3,200
Feet

DWR - Crafton Hills Reservoir
Location Map
Figure 2

SECTION 2.0 – METHODS

This biological resources report is based on the results of a reconnaissance-level survey and focused plant survey performed by Chambers Group biologists and botanists at the proposed pipeline, existing reservoir, and proposed reservoir expansion sites. This report also incorporates the results of the small mammal trapping survey conducted by USFWS-permitted small mammal expert Steve Montgomery at the proposed pipeline site and the small mammal habitat assessment conducted by Mr. Montgomery at the reservoir sites. Chambers Group surveys were conducted within and adjacent to the project sites to document existing biological resources, identify sensitive habitats, assess the sites for their potentials to support sensitive plant and wildlife species, and identify any sensitive plant species.

2.1 LITERATURE REVIEW METHODS

Prior to performing the surveys, available databases, soil maps, and documentation relevant to the project sites were reviewed for soil data and known occurrences of sensitive plant and wildlife species in the area. The most recent versions of the California Natural Diversity Database (CNDDB) and California Native Plant Society Electronic Inventory (CNPSEI) databases were searched for sensitive species data in the *Redlands*, *Yucaipa*, *Harrison Mountain*, and *Keller Peak* USGS quads. These databases contain records of reported occurrences of state and federally listed species or otherwise sensitive species and habitats that may occur within the vicinity of the project sites.

2.2 SENSITIVE SPECIES

Sensitive plant and wildlife species include endangered, threatened, proposed threatened or endangered, and rare species of the U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG), California Special Concern Species (CSC), CNPS-listed plants, and otherwise sensitive species.

A sensitive species is considered to potentially occur in the project area if its known geographic range includes part of the project area or adjacent parcels and/or if the general habitat requirements or environmental conditions (e.g., soil type, available water, etc.) required for the species are present within the proposed project site at the time of the survey. The potentials for sensitive species to occur were evaluated for the project sites (Tables 1, 2, and 3). Tables 2 and 3 list each species with its potential for occurrence and incorporate the results of the reconnaissance-level survey and the focused plant survey conducted by Chambers Group in 2007 and the results of the small mammal trapping survey conducted by Steve Montgomery.

Table 1
Criteria for Evaluating Potential for Occurrence (PFO) of Sensitive Species

PFO	Criteria
Absent:	Species was not observed during focused surveys conducted at an appropriate time for identification of the species or species is restricted to habitats or environmental conditions that do not occur within the site.
Assumed Absent:	Species was not found during field surveys and none or very low quality habitat exists onsite.
Low:	Historical records for this species do not exist within the immediate vicinity (approximately 5 miles) of the site and/or habitats or environmental conditions needed to support the species are of poor quality.
Moderate:	Either a historical record exists of the species within the immediate vicinity of the site (approximately 5 miles) and marginal habitat exists on the site, or the habitat requirements or environmental conditions associated with the species occur within the site, but no historical records exist within the vicinity
High:	Both a historical record exists of the species within the site or its immediate vicinity (approximately 5 miles) and the habitat requirements or environmental conditions associated with the species occur within the site.
Present:	Species was detected within the site at the time of the survey.

2.2.1 Reconnaissance Survey

The reconnaissance survey was conducted on June 15, 2007 by Chambers Group botanist Heather Clayton and biologist/botanist Kris Alberts. Incidental observations were also collected by Kris Alberts on July 16 and 17, 2007. Chambers Group personnel walked along the proposed pipeline route and its associated study area, existing reservoir, and proposed reservoir expansion sites. Vegetation communities on the property were identified, qualitatively described, and mapped onto high-resolution aerial maps. These aerial representations were then transferred to Global Information Systems (GIS) software for the production of vegetation maps (Figures 3a and 3b). Biological resources on the property were inventoried, and the potential for the occurrences of sensitive plant and wildlife species and sensitive habitats were assessed, focusing on those species listed as threatened or endangered by the USFWS and/or the CDFG. Field data was collected on general vegetation types, plant and wildlife species observed, and sensitive habitats existing on the site. Global Positioning System (GPS) coordinates of any sensitive plant or wildlife species were recorded on handheld GPS units or directly onto high-resolution aerial photos for the production of a sensitive species map using GIS software (Figure 4).

Plant communities were determined in accordance with the categories set forth in Holland (1986) and Sawyer and Keeler-Wolf (1995). Plant communities on the site were identified and qualitatively described. Plants of uncertain identity were collected and subsequently identified from keys, descriptions, and illustrations in Hickman (1993) and Munz (1974). Plant nomenclature follows that of *The Jepson Manual: Higher Plants of California* (Hickman 1993).

Wildlife species were determined in accordance with current taxonomic descriptions recognized by the USFWS, CDFG, and American Ornithologist's Union (AOU). In some cases, sub-specific determinations were based on current known ranges and existing conditions of the project site.

2.2.2 Focused Plant Survey

Due to the presence of suitable environmental conditions for several plant species, including four federal and/or state-listed plant species, a focused plant survey was conducted shortly after the reconnaissance-level survey on July 16 and 17, 2007. Chambers Group botanists Kris Alberts, Nicole Cervin, and

Rebecca Alvidrez conducted the survey. During the focused plant survey, additional wildlife observations were documented by Kris Alberts. The survey consisted of walking all suitable areas within the limits of construction, noting all species observed, and recording GPS location information for any sensitive species found.

Federal and/or state-listed endangered, threatened, candidate or rare plant species with potentials for occurrence onsite targeted during the survey included Nevin's barberry (*Berberis nevinii*), slender-horned spineflower (*Dodecahema leptoceras*), Santa Ana River woollystar (*Eriastrum densiflorum* ssp. *sanctorum*), Parish's checkerbloom (*Sidalcea hickmanii* ssp. *parishii*), and bird-foot checkerbloom (*Sidalcea pedata*). Other special status species with potentials for occurrence onsite included Plummer's mariposa lily (*Calochortus plummerae*), San Bernardino Mountains owl's clover (*Castilleja lasiorhyncha*), smooth tarplant (*Centromadia pungens* ssp. *laevis*), Parry's spineflower (*Chorizanthe parryi* var. *parryi*), Parish's alumroot (*Heuchera parishii*), California satintail (*Imperata brevifolia*), silver-haired ivesia (*Ivesia argyrocoma*), Robinson's pepper-grass (*Lepidium virginicum* var. *robinsoni*), lemon lily (*Lilium parryi*), Parish's bush mallow (*Malacothamnus parishii*), Hall's monardella (*Monardella macrantha* ssp. *hallii)*, Parish's yampah (*Perideridia parishii* ssp. *parishii*), Parish's gooseberry (*Ribes divaricatum* var. *parishii*), southern jewel-flower (*Streptanthus campestris*), and Sonoran maiden fern (*Thelypteris puberula* var. *sonorensis*).

To ensure the detection of rare plants and 100 percent coverage, the survey members were organized into a single line and spaced approximately 15 to 30 feet apart to form adjacent belt transects. The edge of each transect abutted the adjacent transect, leaving no gaps between each belt. Each crewmember then walked in the direction of the agreed upon endpoint within the appointed transect. Meandering patterns were used when topography or vegetation dictated an alteration to the transect; however, return transects still allowed for 100 percent coverage. When suitable microhabitats were encountered, the team member would stop and carefully scan the immediate area for the extent of the microhabitat. If a microhabitat was large (i.e., greater than 10 ft in radius), another team member would mark their own location and then assist in the survey of the microhabitat before returning to the point at the transect where he/she left off. Handheld Garmin GPS units were used to record survey coverage and to document the location of any target sensitive species found.

Although unprecedented drought conditions during 2006/2007 winter season preceded the focused plant survey, a wide variety of plant types were easily identified during the survey. Since the timing of the survey was later than the blooming period of most of the sensitive plant species, a modified protocol was used to identify potentially sensitive plant species. The modified protocol typically involved first visually identifying the persistent vegetation in the project areas; this was sufficient to identify nearly all of the plant species onsite. Certain characteristics were occasionally analyzed onsite with hand lenses or samples were collected for later identification. Several morphological characteristics were suitable to identify federal and/or state-listed endangered, threatened, and/or other sensitive plants species during the time of the survey.

Four of the five plant species (Nevin's barberry, Santa Ana River woollystar, Parish's checkerbloom, and bird-foot checkerbloom) are perennial and easily identified despite blooming periods or seasonal conditions. The fifth listed plant species, slender-horned spineflower, is similar to other spineflower species known to occur in the area of the project site. These species include Parry's spineflower and leather spineflower (*Lastarriaea* coriacea).

These three spineflower species were successfully distinguished from each other based on differences in flower perianth structure. Differences in perianth structure were discerned from identification keys provided in the *Jepson Manual* combined with field observations of each species (Hickman 1993). Based on these two sources, it was determined that the spineflowers could be distinguished from each other based on the number of perianth bracts present on the specimen. For example, Parry's spineflower has three bracts, leather spineflower has five, and slender-horned spineflower has six. Furthermore, Parry's spineflower and the leather spineflower have hooked perianth bracts, whereas, the perianth bracts of the slender-horned spineflower are straight. Leather spineflower is also segmented at the nodes, while the other two species are not.

SECTION 3.0 – RESULTS

The reconnaissance-level survey was conducted on June 15, 2007 by Chambers Group biologists Heather Clayton and Kris Alberts between the hours of 9:00 a.m. and 3:00 p.m. Weather conditions during the survey included clear to 20 percent cloudy skies, temperatures ranging from 80° to 96° Fahrenheit (F), and wind speeds between 0 to 4 miles per hour (mph). During the focused plant surveys on July 16 and 17, 2007, additional wildlife observations were documented by Kris Alberts between the hours of 7:20 a.m. and 3:00 p.m. Conditions on these two dates included clear to 3 percent cloudy skies, temperatures from 77° to 92°F, and wind speeds between 0 to 4 mph.

Descriptions of soils, vegetation, and wildlife found on the three project sites are provided in Sections 3.1, 3.2, and 3.3, respectively.

3.1 SOILS

Prior to conducting the surveys, soil maps were referenced for San Bernardino County Southwestern Part to determine the types of soil found at each project site. Soils were determined in accordance with categories set forth by the U.S. Department of Agriculture (USDA) Soil Conservation Service and by referencing the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey (USDA 1979). The following soils were found to occur in the project sites:

3.1.1 Proposed Pipeline Site

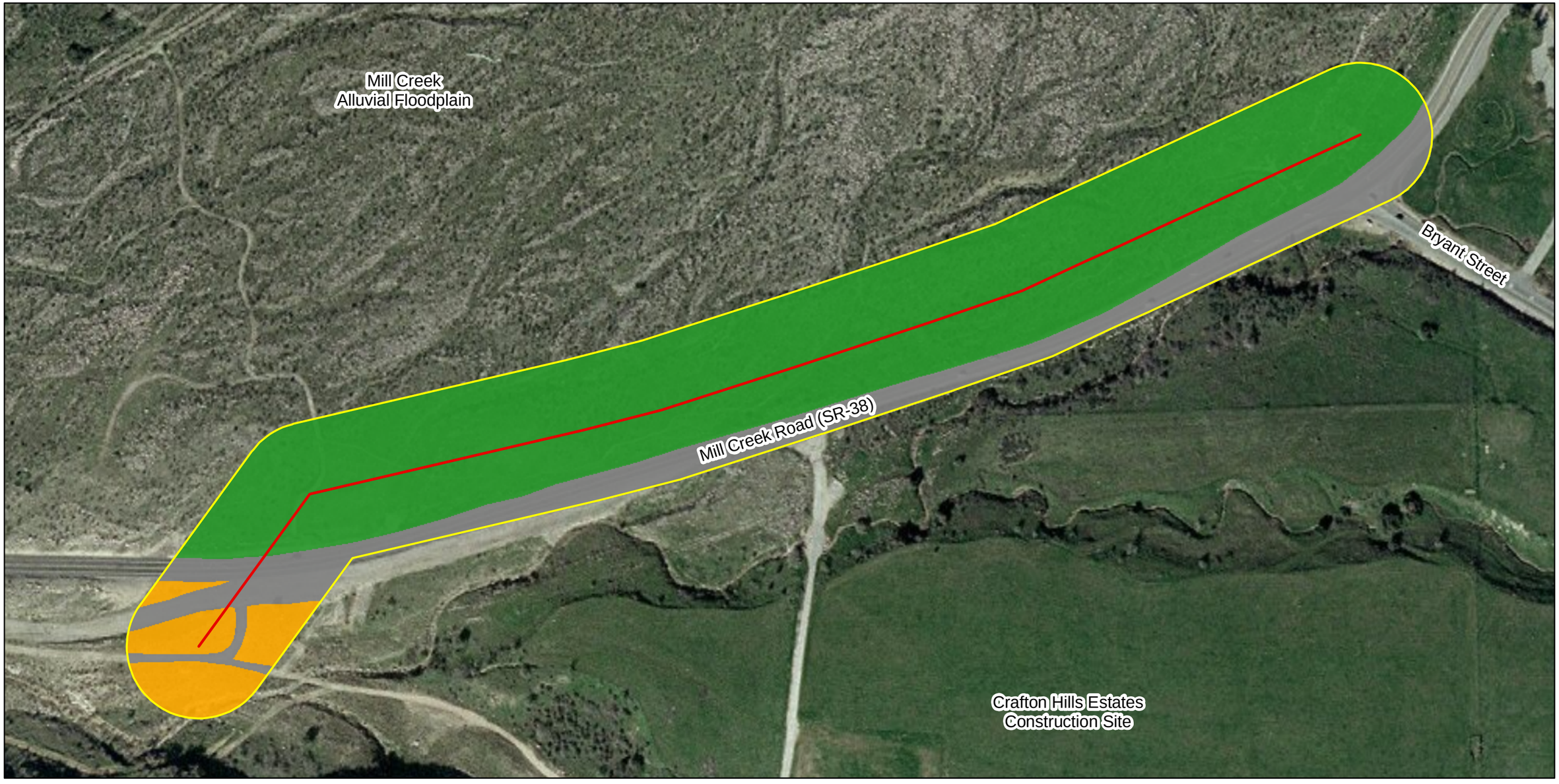
Soboba Stony Loamy Sand (SpC), 2 to 9 percent slopes, is a gently sloping to moderately sloping soil that is located on long, broad, smooth alluvial fans. The surface of this soil is covered with 0.1 percent stones and boulders. The surface texture rating for this soil is “very stony loamy sand”. The parent material is alluvium derived from granite. Runoff on this soil is slow, and the hazard of erosion is slight. Depth to a root restrictive layer is greater than 60 inches. Organic matter content in the surface horizon is about 1 percent. This soil is rarely flooded; it is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria. Soboba stony loamy sand is used for dry farmed seeded pasture and citrus groves (USDA 1979, NRCS 2008).

3.1.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Sites

Cieneba-Rock Outcrop Complex (Cr), 30 to 50 percent slopes, is a steep to very steep soil type occurring on hillsides or mountainsides. The surface texture rating for this soil is “sandy loam”. These soils are excessively drained and formed in material weathered from granite. If the soil is bare, runoff is rapid and erosion is high. Available water capacity is very low (approximately 1.4 inches). Depth to a root restrictive layer, bedrock, is 14 to 18 inches. This soil is not flooded; it is not ponded. Available water to a depth of 60 inches is very low. This soil does not meet hydric criteria. Historic land uses are range, watershed, and wildlife habitat (Wachtell 1978, NRCS 2008).

3.2 VEGETATION

Within the proposed pipeline, existing reservoir, and reservoir expansion project sites, 149 plant species were documented during Chambers Group surveys. Appendix A contains a list of all plant species observed during the Chambers Group reconnaissance-level and focused plant surveys. Vegetation communities observed along the proposed pipeline are illustrated on Figure 3a. Vegetation communities for the existing reservoir and reservoir expansion site are illustrated on Figure 3b.



Legend

Vegetation Communities

- California Buckwheat Alluvial Fan Scrub
- Disturbed Mature RAFSS
- Disturbed/Developed
- Proposed Pipeline Centerline
- Study Area

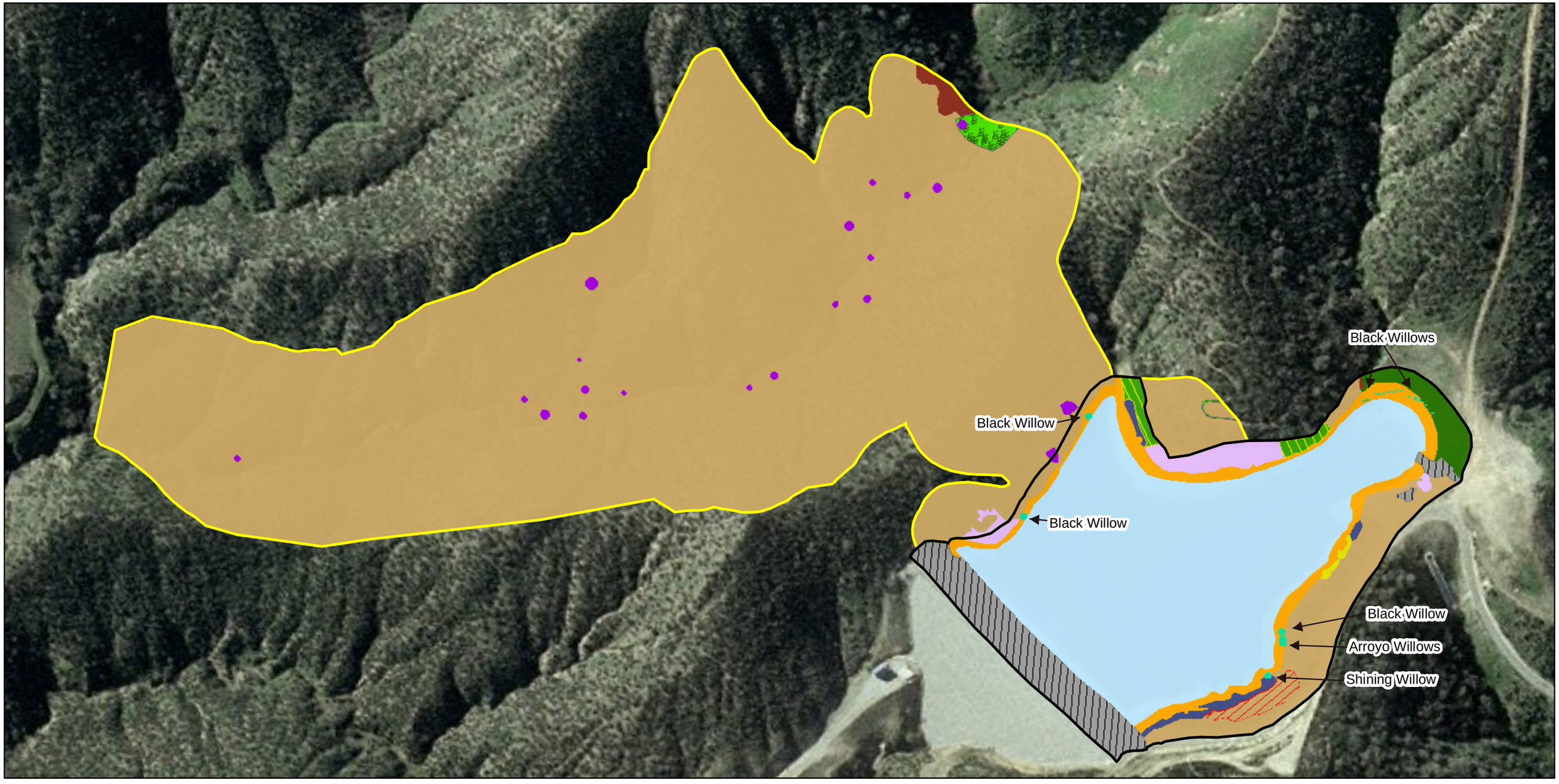
N

0 150 300 450 600 Feet

1:2,500

DWR - Crafton Hills Reservoir
Vegetation Communities
Figure 3a

Chambers Group Inc.



Legend

Vegetation Communities

- Scrub Oak Chaparral
- Chamise Chaparral
- Disturbed Chamise Chaparral
- Restored CSS
- Disturbed CSS
- CA Annual Grassland

Individual Species

- Mexican Elderberry
- Willow

- Mule Fat
- Tamarisk

Other Areas

- Ruderal
- Disturbed
- Developed
- Open Water (Reservoir)
- Existing Reservoir Boundary
- Proposed Reservoir Expansion Footprint

N

0 150 300 450 Feet

1:2,000

DWR - Crafton Hills Reservoir
Vegetation Communities
Figure 3b

Chambers Group Inc.

3.2.1 Proposed Pipeline Site

Two vegetation communities, California Buckwheat Alluvial Fan Association and Disturbed Mature Riversidean Alluvial Fan Sage Scrub (RAFSS), were mapped in the approximately 20.3 acre proposed pipeline project site (the pipeline centerline with a 200-foot wide surrounding buffer). In addition, portions of the site were classified as Disturbed/Developed where vegetation was minimal to non-existent.

California Buckwheat Alluvial Fan Association

The California Buckwheat Alluvial Fan Association comprises approximately 1.4 acres of the proposed pipeline site on the south side of Mill Creek Road. California buckwheat (*Eriogonum fasciculatum*) dominates the shrub layer in this community. Other species associated with this community observed onsite include chamise (*Adenostoma fasciculatum*), chaparral whitethorn (*Ceanothus leucodermis*), deerweed (*Lotus scoparius*), white sage (*Salvia apiana*), and our Lord's candle (*Yucca whipplei*). The California Buckwheat Alluvial Fan Association described by Gordon and White (1994) is a type of RAFSS in which California buckwheat is dominant. Similar to what Sawyer and Keeler-Wolf (1995) refer to as the California Buckwheat Series, this community was made up almost entirely of shrubs less than 3 feet in height and consists of a continuous to intermittent canopy. Vegetative cover was moderate with cover ranging from 20 to 50 percent.

Developed/Disturbed

Developed and Disturbed areas compose 4.1 acres of the proposed pipeline project site. Disturbed areas are those areas that are either devoid of vegetation (i.e., cleared or graded), such as dirt roads, or those areas that are dominated by a sparse cover of ruderal vegetation as a result of human disturbance. Developed areas are areas that have been altered by human activity and now display man-made structures, such as houses, paved roads, buildings, parks, and other maintained areas. Developed and disturbed areas within the proposed pipeline site include a portion of Mill Creek Road and other dirt roads that split from Mill Creek Road within the study area. These areas are maintained and typically clear of vegetation.

Disturbed Mature Riversidean Alluvial Fan Sage Scrub

The majority of the proposed pipeline site is composed of Disturbed Mature Riversidean Alluvial Fan Sage Scrub. This community type occupies approximately 14.8 acres in the alluvial plain along the north side of Mill Creek Road. Dominant plant species found onsite include chamise, California buckwheat, brittlebush (*Encelia farinosa*), deerweed, and non-native grasses and forbs. These non-native grasses and forbs include wild oat (*Avena fatua*), ripgut grass (*Bromus diandrus*), cheatgrass (*Bromus tectorum*), fescue (*Vulpia myuros*), and short-podded mustard (*Hirschfeldia incana*). Other common shrubs in this community include chaparral whitethorn, scalebroom (*Lepidospartum squamatum*), spiny redberry (*Rhamnus crocea*), and white sage.

Mature Riversidean Alluvial Fan Sage Scrub is a late seral stage of RAFSS that is rarely subject to flooding due to the distance from active floodplains (Smith 1980). RAFSS vegetation communities are considered to be rare or threatened plant communities that are highly fragmented due to urbanization and the extensive alteration of natural stream hydrology in southern California. RAFSS communities occur on alluvial outwash fans along the base of the San Gabriel, San Bernardino, and San Jacinto mountains. RAFSS communities are generally associated with infrequently scoured areas on floodplains and outwash fans in the Transverse and Peninsular ranges (Holland 1986).

Three seral stages (i.e., pioneer, intermediate, and mature) of RAFSS have been described based on the frequency and intensity of these flooding events (Smith 1980, Hanes et al. 1989). Mature phases of RAFSS are rarely affected by flooding and support the highest plant density (Smith 1980). Scalebroom is

considered to be an indicator species of pioneer and intermediate alluvial scrubs and is usually described as a dominant or subdominant shrub in alluvial community descriptions, including the scalebroom series of Sawyer and Keeler-Wolf (1995) and the *Lepidospartum-Eriodictyon-Yucca* Association described by Kirkpatrick and Hutchinson (1977).

The community mapped onsite north of Mill Creek Road has scalebroom present as an uncommon species and is defined as a disturbed mature RAFSS community recovering from post-fire succession, with approximately 20 percent of the site composed of native woody shrubs. This community is defined as disturbed because of the high percentage (greater than 20 percent) of non-native weedy species present onsite as a result of a recent fire. Although non-native annual grasses form an important component of the onsite community, the community is not limited to grasses and species less than 3 feet in height, as is typical of California Annual Grassland (Sawyer and Keeler-Wolf 1995). Sawyer and Keeler-Wolf (1995) characterize a California Annual Grassland as a community composed of many alien and native annual species and one in which shrubs are not identified as common species within the community. Many of the shrub species within this community onsite would be more characteristic of a chaparral-type community, which is a shrubland dominated by species having evergreen, leathery leaves such as chamise or scrub oaks (*Quercus* spp.) (Sawyer and Keeler-Wolf 1995), than that of an annual grassland. In summary, because of the proximity to Mill Creek, its occurrence on the alluvial plain, RAFSS indicator shrubs, and sandy soil, the onsite community is a type of RAFSS. These mature terraces and upland areas adjacent to them can provide important refugia for San Bernardino kangaroo rats during flood events (Department of the Interior, Fish and Wildlife Service 2000). Although mature areas are generally used less frequently or occupied at lower densities than those areas supporting earlier phases of RAFSS, mature areas are critical to the long-term survival of the San Bernardino kangaroo rat by providing habitat for re-colonization following catastrophic flooding events in which kangaroo rats inhabiting lower areas of the flood plain drown (Department of the Interior, Fish and Wildlife Service 2000).

The proposed pipeline site burned in July 2006 when the Emerald Fire moved through approximately 2,000 acres in the Mentone-Highland flood basin. The fire burned many of the shrubs within the proposed pipeline site; however, because various chaparral species are adapted to fire and have underground root burls, most of the large shrubs onsite are recovering. Similar to flooding events, fire can reset community succession, typically leaving the canopy open and available for colonization by early successional species, such as annual grasses and forbs. Many of these annual grasses are non-native to California, and although many have become naturalized, these weeds are highly competitive with native annuals. The post-fire weed invasion at the proposed pipeline footprint has altered the understory herbaceous layer of this site, but has had little long-term effect on the shrub layer. Vegetative percent cover values were estimated for the most abundant shrub and herb species within the project site north of Mill Creek Road (Table 2).

Table 2
Approximate Vegetative Cover for Dominant Plant Species Onsite

Shrub Layer		Herbaceous Layer	
Species (Average Height)	**Approximate Cover (%)**	**Species**	**Approximate Cover (%)**
chamise (4 feet)	≤15	soft chess*	80
deerweed (1.5 feet)	≤3	branching phacelia	15
buckwheat (2 feet)	≤3	wild oat*	10
spiny redberry (4 feet)	≤2	red-stemmed filaree*	4
brittlebush (2 feet)	≤2	short-podded mustard*	3
cudweed aster (1.5 feet)	≤1	ripgut grass*	3
horsebush (1.5 feet)	≤1	annual buckwheat	2
skunk bush (3 feet)	≤1	common fiddleneck	2
sugar bush (6 feet)	≤1	lupine	1
*** Indicates a non-native species.**			

3.2.2 Crafton Hills Reservoir Site

Six vegetation communities, including Chamise Chaparral, Disturbed Chamise Chaparral, Scrub Oak Chaparral, Restored Coastal Sage Scrub, Disturbed Coastal Sage Scrub, and Ruderal, and scattered individuals of mule fat (*Baccharis salicifolia*), willow (*Salix* spp.), Mexican elderberry (*Sambucus mexicana*), and Mediterranean tamarisk (*Tamarix ramosissima*) not representative of a community per se were also present onsite. Other areas, including developed and disturbed areas and open water, were also mapped within the approximately 7.77 acre existing reservoir area, as confined within its fenced area.

Chamise Chaparral and Disturbed Chamise Chaparral

Chamise Chaparral and Disturbed Chamise Chaparral vegetation communities occupy approximately 0.95 acre on the northern and eastern edges of the existing reservoir site. Chamise Chaparral, as described by Holland (1986), is dominated by chamise, forming a continuous canopy of shrubs less than 10 feet in height. The floristic composition of this vegetation community also matches the Chamise Series, described by Sawyer and Keeler-Wolf (1995). In addition to chamise, this community typically consists of woody, evergreen, fire-adapted chaparral vegetation, with plants exhibiting crown-sprouting following a burn. Mature stands are usually densely interwoven, with little herbaceous understory or litter (Holland 1986). Prior to installation of the reservoir, the Chamise Chaparral areas within the existing reservoir site would likely have been continuous with the undisturbed Chamise Chaparral vegetation upslope and beyond the current project limits.

Plant species typical of this vegetation community observed onsite include chamise, woolly-leaved ceanothus (*Ceanothus tomentosus)*, soap plant (*Chlorogalum pomeridianum*), golden yarrow (*Eriophyllum confertiflorum*), chaparral beard-tongue (*Keckiella antirrhinoides*), heart leaved keckiella (*Keckiella cordifolia*), and spiny redberry. The Disturbed Chamise Chaparral area along the eastern edge of the reservoir is of lower quality than the surrounding Chamise Chaparral areas, with chamise, woolly-leaved ceanothus, and approximately 20 percent cover of Italian thistle (*Carduus pycnocephalus*) and common chickweed (*Stellaria media*). Disturbed Chamise Chaparral occupies approximately 0.11 acre of the existing reservoir site.

Scrub Oak Chaparral

One scrub oak (*Quercus berberidifolia*) tree was found within the existing reservoir site along the northwestern edge of the reservoir, comprising less than 0.01 acre onsite, and is continuous with the Scrub Oak Chaparral community offsite to the west of the property. Scrub Oak Chaparral is described in Holland (1986) as a dense evergreen chaparral community up to 20 feet tall, dominated by scrub oak. This community is more mesic than other chaparrals and often occurs at higher elevations up to 5,000 feet. Scrub Oak Chaparral can also recover from fires quicker than other chaparral communities.

Restored Coastal Sage Scrub

The northwest corner of the existing reservoir site appears to have been restored with Coastal Sage Scrub (CSS) species and native grasses. CSS, or Riversidean Sage Scrub as described by Holland (1986), occurs at elevations below 3,000 feet. This community type is typically found on dry, steep, rocky or gravelly slopes that have not been subjected to scouring floods or heavy sediment deposition in many years. Most species occupying this vegetation community are less than six feet tall. This restored area onsite occupies approximately 0.21 acre within the fenced area. The dominant planted species present in this area include deerweed, purple needlegrass (*Nassella pulchra*), California buckwheat, white sage, and mule fat (*Baccharis salicifolia*). Other shrubs present include California sagebrush, brittlebush, and black sage (*Salvia mellifera*). Lesser amounts of common fiddleneck, red maids (*Calandrinia ciliata*), henbit

(*Lamium amplexicaule*), miniature lupine (*Lupinus bicolor*), and slender pectocarya (*Pectocarya linearis*) were observed in the herbaceous layer.

Disturbed Coastal Sage Scrub

Two patches of Disturbed CSS were mapped immediately south of the Restored CSS area along the western edge of the reservoir. They do not appear to have been planted as part of a restoration effort, and together, these areas comprise 0.10 acre of the existing reservoir site. With shrub species characteristic of a CSS community, but with a high percentage (i.e., greater than 20 percent of the species cover) of non-native weedy species also present in the understory, these areas were classified as disturbed CSS. Dominant shrub species present within these areas as part of the disturbed CSS community include white sage, black sage, and orange bush monkey-flower (*Mimulus aurantiacus*). Other species present in lower densities include California sagebrush, California buckwheat, California everlasting (*Gnaphalium californicum*), deerweed, and California peony (*Peonia californica*). Non-native weedy species present within this community include wild oat, ripgut grass, foxtail chess, cheatgrass, and horehound (*Marrubium vulgare*).

Ruderal

Several areas within the existing reservoir site were composed of ruderal vegetation for a total of 0.22 acre, present mainly along the western edge of the reservoir. Ruderal areas are typically dominated by pioneering herbaceous plants that readily colonize disturbed ground. The vegetation in these areas is adapted to living in compact soils where water does not readily penetrate the soil. Vegetation observed in Ruderal areas onsite consisted of weedy herbaceous species, such as Italian thistle, tocalote (*Centaurea melitensis*), red-stemmed filaree (*Erodium cicutarium*), cheatgrass, white cudweed (*Gnaphalium luteo-album*), and short-podded mustard. Early-colonizing native species were also present in this community, including horseweed (*Conyza canadensis*), California cottonweed (*Epilobium ciliatum*), and telegraph weed (*Heterotheca grandiflora*).

Mule Fat Shrubs

Mule fat shrubs occupy 0.02 acre along the waterline of the northern portion of the existing reservoir. As a community, Mule Fat Scrub can be a tall, herbaceous riparian scrub community dominated by mule fat that typically occurs in intermittent streambeds and seeps. Mule fat can also be found in coastal sage scrub communities, particularly at the base of slopes where more moisture may accumulate for longer periods of time, or in disturbed areas. Mule Fat Scrub is an early seral stage that forms in damp sandy soils and is maintained by frequent flooding. When such flooding is absent, this community may transition into a Cottonwood-Sycamore Riparian Forest or a Woodland (Holland 1986), although the transition into a different community at this site is unlikely. The occurrence of these shrubs at the reservoir is a result of seed germination and growth due to the permanent or nearly permanent presence of water within the reservoir. Due to an absence of natural scouring or flooding, transition to later stages of riparian communities is not expected to occur onsite.

Willow Trees

A small strip of 21 black willow (*Salix gooddingii*) were planted from cuttings along the northwestern portion of the reservoir. These trees ranged from 5 to 8 feet in height, and together, occupied a combined total of less than 0.02 acre onsite. Other willow trees around the reservoir were mapped as individuals as well. There were an additional three black willow trees, one shining willow (*Salix lucida*), and two arroyo willows (*Salix lasiolepis*) scattered around the reservoir. None of these trees were very large, and based on the generally small sizes and thin trunk diameters, all appeared to be less than ten years old. Except for the strip of 21 planted black willow trees, the other willow trees were present at this site as a result of

seed germination and growth due to the permanent or nearly permanent presence of water within the reservoir, as was the case for the mulefat shrubs.

Mexican Elderberry Shrubs

Two Mexican elderberry shrubs were observed within the existing reservoir site and occupy less than 0.01 acre on the upper southwestern edges of the reservoir. These large shrubs/small trees were approximately 15 feet in height.

Mediterranean Tamarisk Trees

Non-native Mediterranean tamarisk trees occupy 0.10 acre around the reservoir. Typically, tamarisk trees occur in riparian and/or wetland habitats that are occasionally flooded, such as ditches, washes, or watercourses (Sawyer and Keeler-Wolf 1995). Just like the mulefat and willow, the presence of these trees is a result of seed germination and growth due to the permanent or nearly permanent presence of water within the reservoir. It should be noted that if these highly invasive trees are allowed to keep growing onsite, they can eventually outcompete native vegetation.

Other Areas

Developed and Disturbed areas together occupy 1.37 acres of the existing reservoir site and include all concrete reservoir structures and high water mark areas. The minimal vegetation observed in these areas onsite consists of ruderal weedy herbaceous species, such as Italian thistle, tocalote, and short-podded mustard. Open water occupies 4.67 acres of the existing reservoir site. Although it provides habitat for various wildlife species, open water is not associated with any specific vegetation communities. The vegetation along the banks of the reservoir onsite is composed of several herbaceous riparian and non-riparian plant species. Open water is the primary component of the existing reservoir project site.

3.2.3 Proposed Reservoir Expansion Site

Three vegetation communities were observed in the approximately 18.57-acre reservoir expansion site. These communities include Chamise Chaparral, Scrub Oak Chaparral, and California Annual Grassland. Mexican Elderberry shrubs were also scattered along the ephemeral wash that runs through the center of the proposed expansion site. Disturbed habitats, although not expressly mapped, were found in several areas of the proposed expansion site in the form of compacted equestrian and walking trails, cut slopes, and dirt roads.

Chamise Chaparral

The majority of the proposed reservoir expansion site consists of Chamise Chaparral, covering approximately 18.32 acres of the site. Project site factors that contribute to the presence of Chamise Chaparral include shallow soils found at low elevations, on xeric slopes and ridges. This community matches the description provided in Holland (1986) and the Chamise Series described by Sawyer and Keeler-Wolf (1995) in which chamise and other fire-adapted chaparral shrubs were dominant. Common species present onsite within this community include chamise, bigberry manzanita (*Arctostaphylos glauca*), hoaryleaf ceanothus (*Ceanothus crassifolius*), wooly-leaved ceanothus, birch-leaf mountain-mahogany (*Cercocarpus betuloides*), holly-leaved cherry (*Prunus ilicifolia*), sugar bush (*Rhus ovata*), and black sage. Additional, less common species observed include California sagebrush, brittlebush, California buckwheat, deerweed, spiny redberry, and skunk bush (*Rhus trilobata*).

Scattered chaparral openings were also noted in the Chamise Chaparral with wildflower species such as cryptantha (*Cryptantha* sp.), common goldenstar (*Bloomeria crocea*), and small-flowered needlegrass (*Nassella lepida*) present. Rocky outcrops and exposed sandstone areas near the base of the canyon supported species such as Plummer's mariposa lily (*Calochortus plummerae*), lance-leaved dudleya (*Dudleya lanceolata*), narrow-leaved bedstraw (*Galium angustifolium*), bird's-foot fern (*Pellaea mucronata*), goldenback fern (*Pentagramma triangularis*), Malpais bluegrass (*Poa secunda*), and Bigelow's spike-moss (*Selaginella bigelovii*).

The base of the canyon was dominated by foxtail chess (*Bromus madritensis* ssp. *rubens*), with royal penstemon (*Penstemon spectabilis*), California peony, and scattered large Mexican elderberry shrubs also present. Because this area is at the bottom of two steep slopes, natural runoff collects in a shallow channel and directs water downhill. This extra soil moisture allows for the persistence of Mexican elderberry trees, which are not growing elsewhere on the Chamise Chaparral hillsides, and generally precludes chamise from growing in the wash itself.

Mexican Elderberry Shrubs

Large Mexican elderberry shrubs were observed mainly at the base of the Chamise Chaparral hillsides and concentrated toward the northern end of the proposed expansion site. The Mexican Elderberry Series described by Sawyer and Keeler-Wolf (1995) is a community in which Mexican elderberry is the sole or dominant shrub in the canopy. Typically, shrubs are less than 26 feet in height, the canopy is continuous, intermittent, or open and the ground layer is grassy. Soils may be intermittently flooded or seasonally saturated (Sawyer and Keeler-Wolf 1995). To determine the overall acreage of Mexican elderberry onsite, individual points were taken with a GPS unit and the diameter of each shrub was measured and plotted as a buffer around each point. This was translated into an area using GIS software, in which approximately 0.06 acre of Mexican elderberry was mapped within the proposed expansion site.

Scrub Oak Chaparral

Scrub Oak Chaparral covers approximately 0.07 acre on the slopes of the western edge of the proposed reservoir expansion site. This community type is dominated by scrub oak and matches the description in Holland (1986) and of a Scrub Oak Series by Sawyer and Keeler-Wolf (1995). Other shrubs within this community typical of Scrub Oak Chaparral that were observed onsite include chamise, birch-leaf mountain-mahogany, toyon (*Heteromeles arbutifolia*), holly-leafed cherry, and skunkbrush. A grassy understory of non-native brome grasses (*Bromus* spp.) was characteristic of this community onsite.

California Annual Grassland

California Annual Grassland covers approximately 0.09 acre of the proposed reservoir expansion area. This community type is located on the northwestern side of the site and is bordered by Chamise Chaparral. Brome grasses, such as ripgut grass, soft chess, foxtail chess, cheatgrass, and wild oat, dominate this community. Other species observed onsite include common goldenstar, tocalote, red-stemmed filaree, short-podded mustard, henbit, royal penstemon, California peony, and branching phacelia (*Phacelia ramosissima*). A California Annual Grassland as described by Sawyer and Keeler-Wolf (1995) is composed of many alien and native annual species with the species composition variable among stands. Fall temperatures and precipitation are major factors determining grassland composition, along with light intensity affected by shading from plants and litter, and differences in microtopography (Evans and Young 1989). This community corresponds to a Non-Native Annual Grassland, characterized by Holland (1986), as a dense to sparse cover of non-native weedy annual grasses with flowering culms up to 3 feet in height. This community is often associated with numerous species of native annual forbs or "wildflowers". Germination occurs with the onset of the late fall rains, where growth, flowering, and seed-set occur from winter into spring. By summer/fall, plants are dead persisting with seeds. Soils are

typically fine-textured, usually clay soils, moist during the winter rainy season and very dry during the summer and fall (Holland 1986).

3.2.2 Sensitive Habitats

The RAFSS community is considered to be a rare or threatened plant community that is highly fragmented due to urbanization and the extensive alteration of natural stream hydrology in southern California. Database and literature searches determined RAFSS to be the only sensitive vegetation community known to occur in the immediate region of the proposed pipeline, existing reservoir, and reservoir expansion sites. RAFSS, in the form of Disturbed Mature Riversidean Alluvial Fan Sage Scrub and California Buckwheat Alluvial Fan Association, was only found in the proposed pipeline project area. Mitigation measures may be required for impacts to this habitat where it occurs along the proposed pipeline. No other sensitive habitats were found on or adjacent to the project sites during the surveys.

3.2.3 Sensitive Plants

The potentials for occurrence for each sensitive plant species within the project sites are listed in Table 3. These potentials include the results of the focused plant survey. The paragraphs following Table 3 describe sensitive plant species that are known to occur or could potentially occur within the project sites.

Table 3
CNDDB, CNPSEI, Literature Review, and Survey Results for Sensitive Plant Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**		**Flowering Period**	**Potential for Occurrence**
Federal- and State-Listed Species				
Berberis nevinii Nevin's barberry	USFWS: CDFG: CNPS: S-Rank: G-Rank:	**FE** **SE** 1B.1 S2.2 G2	Mar – Apr	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Dodecahema leptoceras slender-horned spineflower	USFWS: CDFG: CNPS: S-Rank: G-Rank:	**FE** **SE** 1B.1 S1.1 G2	Apr – Jun	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Eriastrum densiflorum* ssp. *sanctorum Santa Ana River woollystar	USFWS: CDFG: CNPS: S-Rank: G-Rank:	**FE** **SE** 1B.1 S1.1 G4T1	Jun – Sep	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Sidalcea hickmanii* ssp. *parishii Parish's checkerbloom	USFWS: CDFG: CNPS: S-Rank: G-Rank	**FC** **Rare** 1B.2 S1.2 G3T1	Jun – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Sidalcea pedata bird-foot checkerbloom	USFWS: CDFG: CNPS: S-Rank: G-Rank:	**FE** **SE** 1B.1 S1.1 G1	May – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Other Sensitive Species				
Calochortus plummerae Plummer's mariposa lily	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.2 S3.2 G3	May – Jul	Proposed Pipeline HIGH Existing Reservoir HIGH Proposed Reservoir Exp. **PRESENT**

Table 3 (continued)
CNDDB, CNPSEI, Literature Review, and Survey Results for Sensitive Plant Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**		**Flowering Period**	**Potential for Occurrence**
Castilleja lasiorhyncha San Bernardino Mountains owl's clover	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.2 S2.2 G3	Jun – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Centromadia pungens* ssp. *laevis smooth tarplant	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.1 S2.1 G3G4T2	Apr – Sep	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Chorizanthe parryi* var. *parryi Parry's spineflower	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 3.2 S2.1 G2T2	Apr – Jun	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Heuchera parishii Parish's alumroot	USFWS: CDFG: CNPS: S-Rank: G-Rank	None None 1B.3 S2.3 G2	June – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Imperata brevifolia California satintail	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 2.1 S2.1 G2	Sept – May	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Ivesia argyrocoma silver-haired ivesia	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.2 S2.2 G2	Jun – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Lepidium virginicum* var. *robinsoni Robinson's pepper-grass	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.2 S2.2 G5T2	Jan – Jul	Proposed Pipeline MODERATE Proposed Reservoir MODERATE Existing Reservoir Exp. MODERATE

Table 3 (continued)
CNDDB, CNPSEI, Literature Review, and Survey Results for Sensitive Plant Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**		**Flowering Period**	**Potential for Occurrence**
Lilium parryi lemon lily	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.2 S2.1 G3	Jul – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Malacothamnus parishii Parish's bush mallow	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1A SH GHQ	Jun – Jul	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Monardella macrantha* ssp. *hallii Hall's monardella	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.3 S3.3 G5T3	Jun – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Perideridia parishii* ssp. *parishii Parish's yampah	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 2.2 S2.2 G4T3T4	Jun – Aug	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Ribes divaricatum* var. *parishii Parish's gooseberry	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1A SH G4TH	Feb – Apr	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT
Streptanthus campestris southern jewel-flower	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 1B.3 S2.3 G2	May – Jul	Proposed Pipeline ABSENT Existing Reservoir MODERATE Proposed Reservoir Exp MODERATE
Thelypteris puberula* var. *sonorensis Sonoran maiden fern	USFWS: CDFG: CNPS: S-Rank: G-Rank:	None None 2.2 S2.2 G5T3	Jan – Sep	Proposed Pipeline ABSENT Existing Reservoir ABSENT Proposed Reservoir Exp. ABSENT

Table 3 (continued)
CNDDB, CNPSEI, Literature Review, and Survey Results for Sensitive Plant Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Federal designations: (Federal Endangered Species Act, USFWS):	
FE:	Federal-listed, endangered.
FT:	Federal-listed, threatened.
PTH:	Federal-listed, proposed-threatened
FC:	Candidate species.
State designations: (California Endangered Species Act, CDFG)	
SE:	State-listed, endangered.
ST:	State-listed, threatened.
Rare:	State-listed as rare (Listed "Rare" animals have been re-designated as Threatened, but Rare plants have retained the Rare designation.)
California Native Plant Society (CNPS) designations: (Note: According to CNPS [Skinner and Pavlik 1994], plants on Lists 1B and 2 meet definitions for listing as threatened or endangered under Section 1901, Chapter 10 of the California Fish and Game Code. This interpretation is inconsistent with other definitions.	
List 1A:	Plants presumed extinct in California.
List 1B:	Plants rare and endangered in California and throughout their range.
List 2:	Plants rare, threatened or endangered in California but more common elsewhere in their range.
List 3:	Plants about which we need more information; a review list.
List 4:	Plants of limited distribution; a watch list.
List Extension 0.1:	Seriously endangered in California (over 80% of occurrences threatened/ high degree and immediacy of threat)
List Extension 0.2:	Fairly endangered in California (20-80% occurrences threatened)
List Extension 0.3:	Not very endangered in California (<20% of occurrences threatened)
California Natural Diversity Database (CNDDB) Global (G) and State (S) ranking designations:	
G1:	Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals OR less than 2,000 acres.
G2:	6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres.
G3:	21-80 EOs OR 3,000-10,000 individuals OR 10,000-50,000 acres.
G4:	Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; (i.e., there is some threat, or somewhat narrow habitat).
G5:	Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
GH:	All sites are historical; the element has not been seen for at least 20 years, but suitable habitat still exists (SH = All California sites are historical).
GX:	All sites are extirpated; this element is extinct in the wild (SX = All California sites are extirpated).
GXC:	Extinct in the wild; exists in cultivation.
G1Q:	The element is very rare, but there are taxonomic questions associated with it.
T:	Applies to a subspecies or variety.
S1:	Less than 6 EOs OR less than 1,000 individuals OR less than 2,000 acres
S2:	6-20 EOs OR 1,000-3,000 individuals OR 2,000-10,000 acres
S3:	21-80 EOs or 3,000-10,000 individuals OR 10,000-50,000 acres
S4:	Apparently secure within California; this rank is clearly lower than S3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat. NO THREAT RANK.
S5:	Demonstrably secure to ineradicable in California. NO THREAT RANK.
Extension 0.1:	Very threatened
Extension 0.2:	Threatened
Extension 0.3:	No current threats known
Source: California Natural Diversity Data Base (CNDDB) and California Native Plant Society Electronic Inventory (CNPSEI) for Redlands, Yucaipa, Harrison Mountain, and Keller Peak USGS 7.5 minute USGS quadrangles, 2007.	

3.2.3.1 Sensitive Plant Species Descriptions and Onsite Occurrences

Nevin's Barberry (*Berberis nevinii*)

This federal- and state-listed endangered species is an evergreen shrub that occurs in chaparral, cismontane woodlands, coastal scrub, and riparian scrub in sandy or gravelly soils at elevations between 970 and 2,703 feet above mean sea level (amsl). The flowering period for this species is between March and April.

Suitable habitat for this species is present within the proposed pipeline site, the existing reservoir site, and the reservoir expansion site; however, the proposed pipeline site is well below its elevation range. Although the focused survey occurred after the flowering period for this species, it is a large perennial shrub identifiable year-round; therefore, the species is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Slender-Horned Spineflower (*Dodecahema leptoceras*)

This federal- and state-listed endangered species is an annual herb that occurs in chaparral, cismontane woodlands, and coastal sage scrub with sandy soils at elevations between 660 and 2,500 feet amsl. The flowering period for this species is between April and June.

The existing reservoir and the proposed reservoir expansion area are well above the elevation range for this species. Since the focused plant survey occurred immediately after the flowering period of this species, the modified survey protocol for this species involved onsite identification of dried perianths rather than flowers. Using this methodology, this species was not observed during the focused plant surveys; therefore, the species is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Santa Ana River Woollystar (*Eriastrum densiflorum* ssp. *sanctorum*)

This federal- and state-listed endangered species is a perennial herb that occurs in open washes and early successional RAFSS or on open slopes above main watercourses with regular flooding and scouring events at elevations ranging from 490 to 2,000 feet amsl. The flowering period for this species is between June and September.

The existing reservoir and the proposed reservoir expansion area are well above the elevation range for this species. However, suitable habitat for this species is present within the proposed pipeline area. This species is identifiable year-round and was not observed during the focused plant surveys; therefore, it is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Parish's Checkerbloom (*Sidalcea hickmanii ssp. parishii*)

This federal candidate and state-listed rare species is a perennial herb that occurs in chaparral, cismontane woodlands, and lower montane coniferous forests on serpentine soils at elevations between 3,280 and 7,020 feet amsl. The flowering period for this species is between June and August.

All three project areas are well below the elevation range for this species, and suitable habitat within the project areas is lacking. In addition, this species was not observed during the focused plant surveys; therefore, this species is confirmed absent from the project areas.

Bird-Foot Checkerbloom (*Sidalcea pedata*)

This federal- and state-listed endangered species is a perennial herb that occurs in meadows, seeps, and pebble plains in mesic soils at elevations between 5,249 and 8,200 feet amsl. The flowering period for this species is between May and August.

All three project areas are well below the elevation range for this species, and suitable habitat within the project areas is lacking. In addition, this species was not observed during the focused plant surveys; therefore, this species is confirmed absent from the project areas.

Plummer's Mariposa Lily (*Calochortus plummerae*)

This CNPS list 1B.2 species is an annual bulbiferous herb that occurs in chaparral, cismontane woodlands, coastal sage scrub, lower montane coniferous forest, and valley and foothill grasslands on granitic or rocky soils at elevations between 330 and 5,560 feet amsl. The flowering period for this species is between May and July.

This species was identified during the reconnaissance survey at six locations within the reservoir expansion site (Figure 4); each location contained one to three plants in flower. While the species was not observed during the focused plant survey, the focused plant survey was performed late in its flowering period following a record drought in southern California; persistent vegetation of mariposa lilies is not generally identifiable to species level. Since this species was found after two successive drought years and other locations are known within two miles, there is a high potential for this species to occur within the existing reservoir site and the proposed pipeline location.

San Bernardino Mountains Owl's Clover (*Castilleja lasiorhyncha*)

This CNPS list 1B.2 species is an annual hemiparasitic herb that occurs in chaparral, meadows, seeps pebble plains, and mesic upper montane coniferous forest on mesic soils at elevations between 4,200 and 7850 feet amsl. The flowering period for this species is between June and August.

The project sites are well below the elevation range for this species and suitable habitat is lacking. It was not observed during the focused plant survey. Therefore, it is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Smooth Tarplant (*Centromadia pungens* ssp. *laevis*)

This CNPS list 1B.1 species is an annual herb that occurs in chenopod scrub, meadows and seeps, playas, riparian woodlands, and valley and foothill grassland on alkaline soils at elevations between 0 and 1,575 feet amsl. The flowering period for this species is between April and September.

The existing reservoir and the proposed reservoir expansion area are well above the elevation range for this species and suitable habitat within the proposed pipeline area is lacking. In addition, this species was not observed during the focused plant surveys; therefore, it is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Parry's Spineflower (*Chorizanthe parryi* var. *parryi*)

This CNPS list 3.2 species is an annual herb that occurs in open chaparral and coastal scrub habitats on sandy or rocky soils at elevations between 130 and 5,600 feet amsl. The flowering period for this species is between April and June.

Suitable habitat for this species is present within the proposed pipeline site and only in small areas of the existing reservoir and the reservoir expansion sites. Since the focused plant survey occurred after the flowering period for this species, the modified survey protocol for this species involved onsite identification of dried perianths rather than flowers. Using this methodology, this species was not observed during the focused plant surveys; therefore, it is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion site.

Parish's Alumroot (*Heuchera parishii*)

This CNPS list 1B.3 species is an annual rhizomatous herb that occurs in alpine boulder and rock fields, lower montane coniferous forests, subalpine coniferous forests, and upper montane coniferous forests on rocky and sometimes carbonate soils at elevations between 4,930 and 12,500 feet amsl. The flowering period for this species is between June and August.

All three project areas are well below the elevation range for this species, and suitable habitat within the project areas is lacking. In addition, this species was not observed during the focused plant surveys; therefore, this species is confirmed absent from the project areas.

California Satintail (*Imperata brevifolia*)

This CNPS list 2.1 species is an perennial rhizomatous herb that occurs in chaparral, coastal scrub, Mojave desert scrub, meadows and seeps, and riparian scrub on mesic alkaline soils at elevations between 0 and 1,640 feet amsl. The flowering period for this species is between September and May.

All three project areas are well above the elevation range for this species, and this species was not observed during the focused plant surveys. Therefore, this species is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion sites.

Silver-haired Ivesia (*Ivesia argyrocoma*)

This CNPS list 1B.2 species is a perennial rhizomatous herb that occurs in meadows and seeps, pebble plains, and upper montane coniferous forests on mesic alkaline soils at elevations between 4,900 and 8,800 feet amsl. The flowering period for this species is between June and August.

All three project areas are well below the elevation range for this species and suitable habitat within the project areas is lacking. In addition, this species was not observed during the focused plant surveys; therefore, this species is confirmed absent from the project areas.

Robinson's Pepper-Grass (*Lepidium virginicum* var. *robinsoni*)

This CNPS list 1B.2 species is an annual herb that occurs in chaparral and coastal sage scrub communities in dry, open areas at elevations between 3 and 2,800 feet amsl. The flowering period for this species is between January and July.

Suitable habitat for this species is present within the proposed pipeline, existing reservoir area, and the reservoir expansion site. While this plant was not observed during the focused surveys, the survey took place immediately after the flowering period of this species; therefore, the potential for occurrence of this species within the three proposed project areas is moderate.

Lemon Lily (*Lilium parryi*)

This CNPS list 1B.2 species is an annual herb that occurs in lower montane coniferous forests, meadows and seeps, riparian forests, and upper montane coniferous forests in mesic soils at elevations between 4,265 and 8,530 feet amsl. The flowering period for this species is between July and August.

All three project areas are well below the elevation range for this species and suitable habitat within the project areas is lacking. In addition, this species was not observed during the focused plant surveys; therefore, this species is confirmed absent from the project areas.

Parish's Bush Mallow (*Malacothamnus parishii*)

This CNPS list 1A species is a deciduous shrub that occurs in chaparral and sage scrub communities at elevations between 1,000 and 1,500 feet amsl. The flowering period for this species is between June and July.

Suitable habitat for this species is present within the proposed pipeline, existing reservoir area, and the reservoir expansion site. However, the elevations at the project sites are above the range for this species. In addition, this plant was not observed during the focused surveys; therefore, the species is confirmed absent from all three project sites.

Hall's Monardella (*Monardella macrantha* ssp. *hallii*)

This CNPS list 1B.3 species is a perennial rhizomatous herb that occurs in broadleafed upland forests, chaparral, cismontane woodlands, lower montane coniferous forests, and valley and foothill grasslands at elevations between 2,395 and 7,200 feet amsl. The flowering period for this species is between June and August.

Suitable habitat for this species is present within the proposed pipeline, existing reservoir area, and the reservoir expansion sites. However, the proposed pipeline site is below the elevation range for this species. This species was not observed during the focused surveys, and therefore, is considered absent from the project areas.

Parish's Yampah (*Perideridia parishii* ssp. *parishii*)

This CNPS list 2.2 species is a perennial herb that occurs in lower montane coniferous forests, meadows and seeps, and upper montane coniferous forests in mesic soils at elevations between 4,806 and 9,842 feet amsl. The flowering period for this species is between June and August.

All three project areas are well below the elevation range for this species, and suitable habitat within the project areas is lacking. In addition, this species was not observed during focused plant surveys; therefore, this species is confirmed absent from the project areas.

Parish's Gooseberry (*Ribes divaricatum* var. *parishii*)

This CNPS list 1A species is a deciduous shrub that occurs in riparian woodlands at elevations between 213 and 984 feet amsl. The flowering period for this species is between February and April, and it is identifiable year-round.

Suitable habitat for this species is present within the proposed pipeline, existing reservoir area, and the reservoir expansion site. However, the elevations of the project areas are well above the range for this

species. Although the focused plant survey was conducted after the flowering period, this species was not observed in these areas; therefore, it is considered absent from the project sites.

Southern Jewel-Flower (*Streptanthus campestris*)

This CNPS list 1B.3 species is a perennial herb that occurs in chaparral, lower montane coniferous forests, and pinyon and juniper woodland on rocky soils at elevations between 2,952 and 7,550 feet amsl. The flowering period for this species is between May and July.

While marginally suitable habitat for this species is present within the proposed pipeline, existing reservoir area, and the reservoir expansion site, the proposed pipeline site is slightly below the elevation range for this species, and is therefore considered absent from the proposed pipeline. While this plant was not observed during the focused surveys, the survey took place late in the flowering period of this species; therefore, the potential for occurrence of this species within the two reservoir project areas is moderate.

Sonoran Maiden Fern (*Thelypteris puberula* var. *sonorensis*)

This CNPS list 2.2 species is a perennial herb that occurs in meadows and seeps in mesic soils at elevations between 164 and 2,000 feet amsl. The flowering period for this species is between January and September.

All three project areas are well above the elevation range for this species, and this species was not observed during the focused plant surveys. Therefore, this species is confirmed absent from the proposed pipeline, existing reservoir area, and the reservoir expansion sites.

3.3 WILDLIFE

Chambers Group detected a total of 47 wildlife species along the three project sites, including 34 at the reservoir expansion site, 33 at the existing reservoir site, and 15 at the proposed pipeline site. Results included one species of fish, three species of reptile, 34 species of bird, and nine species of mammal (Appendix B). Steve Montgomery recorded an additional three mammal species at the proposed pipeline site, for a total of 50 wildlife species over all three sites. In addition to those species found along the three project sites, a variety of other animals are expected to occur, including common amphibians, reptiles, foraging bats, wintering and migratory waterfowl, and small mammals.

Notable observations in the reservoir sites included the prevalence of small and medium-sized mammal burrows, diggings, and sign. Most small mammal burrows were concentrated in grassland openings along the more level portions of the dry wash at the north end of the proposed expansion site and to the north of the site. In some of these grassy areas, two-inch diameter burrows were found in concentrations of over 100 per 20 x 20-foot plot, and the ground was uneven and clumpy. These findings are consistent with pocket gopher (*Thomomys bottae*) activity. In addition, pocket gopher mounds were found in several areas of the ephemeral wash that runs generally through the center of the reservoir expansion site. Small mammal activity was noticeably less in the shrublands onsite.

Larger coyote diggings and potential dens were observed further up the hillsides at the expansion area. Most of these burrows, diggings, and potential dens were found in the grassland slopes north of the proposed expansion area. Upon examination of the larger "burrows", many were collapsed or were apparent coyote diggings, dug to a depth of only about one foot. Dens and diggings that superficially resembled badger (*Taxidea taxus*) dens or activity on the hillsides were found unoccupied, collapsed, or did not exhibit the telltale claw-scraped sides characteristic of badger dens. In addition, badgers were not seen onsite, and no positive badger sign was found anywhere on the three project sites. Potential den inhabitants of the three project sites include striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), gray fox (*Urocyon cinereoargenteus*), coyote (*Canis latrans*), bobcat (*Lynx rufus*), and badger.

Several bobcat and coyote scat aggregations were found along the ridgeline between the existing and proposed reservoir sites and in the dry washes of the proposed reservoir site. The scat concentrations and the large number of diggings on the reservoir sites indicate that that there is an abundant prey base and the area is inhabited frequently by predators.

While a focused trapping survey was not conducted in the reservoir sites, Steve Montgomery reported that several small mammal species could be expected, including common species known to the region, such as Dulzura kangaroo rat (*Dipodomys simulans*), deer mouse (*Peromyscus maniculatus*), California mouse (*Peromyscus californicus*), harvest mouse (*Reithrodontomys megalotis*), pocket gopher, California ground squirrel (*Spermophilus beecheyi*), and woodrats (*Neotoma* spp.), among others. Small areas of the reservoir sites also have a low potential to contain northwestern San Diego pocket mouse, primarily in relatively level portions of the dry washes.

3.3.1 Sensitive Wildlife

Occurrence potentials for sensitive wildlife species within the three project sites are listed in Table 4. The paragraphs that follow Table 4 describe all sensitive wildlife species detected along the proposed pipeline, existing reservoir, and proposed reservoir expansion sites, as well as all sensitive wildlife species that could potentially occur along the project sites. These results incorporate the findings of the Chambers Group surveys and the focused trapping survey/habitat assessment conducted by Steve Montgomery.

Four sensitive species were detected at the existing reservoir, including the double-crested cormorant (*Phalacrocorax auritus*) (one resting individual seen on July 16, 2007), osprey (*Pandion haliaetus*) (one foraging individual seen on July 16, 2007), Cooper's hawk (*Accipiter cooperii*) (one foraging individual seen on July 16, 2007), and Lawrence's goldfinch (*Carduelis lawrencei*) (seen in flocks of up to twelve on July 16 and 17, 2007) (Figure 4). Although Lawrence's goldfinch could potentially nest onsite, none of these species are expected to nest onsite.

One sensitive species, the southern California rufous-crowned sparrow, was detected at the reservoir expansion site (one location on June 15, 2007), downstream of the proposed earthfill dam (Figure 4). This location may represent a breeding pair, and this species likely breeds onsite.

No sensitive wildlife species were detected along the proposed pipeline site during Chambers Group surveys; however, the northwestern San Diego pocket mouse (*Chaetodipus fallax fallax*), a CSC, was identified during the focused trapping survey conducted by Steve Montgomery.

The Crafton Hills Reservoir and the reservoir expansion sites were assessed by Steve Montgomery for their potentials to harbor populations of San Bernardino kangaroo rat, Stephens' kangaroo rat, Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) (CSC), and northwestern San Diego pocket mouse. Based on the following criteria, three species were determined to be absent, and one species has a low potential to occur in limited areas of these sites:

- The steep terrain, dominant chaparral vegetation, and dense grasslands that characterize the sites are not the alluvial sage scrub habitats associated with the San Bernardino kangaroo rat and the Los Angeles pocket mouse. In addition, the upland locations of the sites are well above the alluvial plains where these species typically occur, and sandy soils suitable for burrowing of these species were not found on the reservoir sites.

- The nearest known location for Stephens' kangaroo rat is approximately 8-9 miles south of Crafton Hills Reservoir, to the west of Beaumont and south of California State Route 60. In addition, the steep terrain, dominant chaparral vegetation, and dense annual grasslands that characterize the sites are not the open grasslands or sparse shrublands preferred by this species.

- While the northwestern San Diego pocket mouse was identified at the proposed pipeline site, the potential for this species to occur in the reservoir sites is low due to the steep terrain, granitic soils, dominant chaparral vegetation, and dense grasslands onsite. There is only a small chance that this species occurs in the more level portions of the dry washes at the proposed expansion site.

Table 4
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Federal and State-Listed Species		
Fish		
Catostomus santaanae Santa Ana sucker	USFWS: **FT** CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Amphibians		
Rana aurora draytonii California red-legged frog	USFWS: **FT** CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Rana muscosa mountain yellow-legged frog	USFWS: **FE** CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Reptiles		
Charina bottae umbratica southern rubber boa	USFWS: None CDFG: **ST**	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Birds		
Coccyzus americanus occidentalis western yellow-billed cuckoo (nesting)	USFWS: **FC** CDFG: **SE**	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Empidonax traillii extimus southwestern willow flycatcher	USFWS: **FE** CDFG: **SE**	*Proposed Pipeline* LOW (migrating) ABSENT (nesting) *Existing Reservoir* LOW (migrating) ABSENT (nesting) *Proposed Reservoir Expansion* LOW (migrating) ABSENT (nesting)
Polioptila californica californica coastal California gnatcatcher	USFWS: **FT** CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* ASSUMED ABSENT *Proposed Reservoir Expansion* ASSUMED ABSENT
Vireo bellii pusillus least Bell's vireo (nesting)	USFWS: **FE** CDFG: **SE**	*Proposed Pipeline* ABSENT (nesting) *Existing Reservoir* ABSENT (nesting) *Proposed Reservoir Expansion* ABSENT (nesting)
Mammals		
Dipodomys merriami parvus San Bernardino kangaroo rat	USFWS: **FE** CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Dipodomys stephensi Stephens' kangaroo rat	USFWS: **FE** CDFG: **ST**	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Status**	**Potential for Occurrence**
Other Sensitive Species		
Fish		
Rhinichthys osculus* ssp. *3 Santa Ana speckled dace	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Reptiles		
Anniella pulchra pulchra silvery legless lizard	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Aspidoscelis hyperythra orange-throated whiptail	USFWS: None CDFG: CSC	*Proposed Pipeline* MODERATE *Existing Reservoir* MODERATE *Proposed Reservoir Expansion* MODERATE
Lampropeltis zonata parvirubra San Bernardino mountain kingsnake	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Phrynosoma coronatum blainvillii coast (=San Diego) horned lizard	USFWS: None CDFG: CSC	*Proposed Pipeline* MODERATE *Existing Reservoir* MODERATE *Proposed Reservoir Expansion* MODERATE

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Thamnophis hammondii two-striped garter snake	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ASSUMED ABSENT *Proposed Reservoir Expansion* ABSENT
Birds		
Accipiter cooperii Cooper's hawk (nesting)	USFWS: None CDFG: CSC	*Proposed Pipeline* HIGH (foraging) ASSUMED ABSENT (nesting) *Existing Reservoir* **PRESENT** (foraging) ASSUMED ABSENT (nesting) *Proposed Reservoir Expansion* HIGH (foraging) ASSUMED ABSENT (nesting)
Aimophila ruficeps canescens southern California rufous-crowned sparrow	USFWS: None CDFG: CSC	*Proposed Pipeline* HIGH *Existing Reservoir* HIGH *Proposed Reservoir Expansion* **PRESENT**
Athene cunicularia burrowing owl	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Carduelis lawrencei Lawrence's goldfinch (nesting)	USFWS: None CDFG: None	*Proposed Pipeline* MODERATE (foraging/migrating) ASSUMED ABSENT (nesting) *Existing Reservoir* **PRESENT** (foraging/migrating) LOW (nesting) *Proposed Reservoir Expansion* MODERATE (foraging/migrating) ASSUMED ABSENT (nesting)

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Dendroica petechia brewsteri yellow warbler (nesting)	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW (migrating) ABSENT (nesting) *Existing Reservoir* LOW (migrating) ABSENT (nesting) *Proposed Reservoir Expansion* LOW (migrating) ABSENT (nesting)
Eremophila alpestris actia California horned lark	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Icteria virens yellow-breasted chat (nesting)	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW (migrating) ABSENT (nesting) *Existing Reservoir* LOW (migrating) ABSENT (nesting) *Proposed Reservoir Expansion* LOW (migrating) ABSENT (nesting)
Lanius ludovicianus loggerhead shrike (nesting)	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Pandion haliaetus osprey	USFWS: None CDFG: CSC	*Proposed Pipeline* ASSUMED ABSENT (foraging) ABSENT (nesting) *Existing Reservoir* **PRESENT** (foraging) ABSENT (nesting) *Proposed Reservoir Expansion* ASSUMED ABSENT (foraging) ABSENT (nesting)

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Status**	**Potential for Occurrence**
Phalacrocorax auritus double-crested cormorant (rookery site)	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT (rookery site) MODERATE (flying over) *Existing Reservoir* ABSENT (rookery site) **PRESENT** (resting) *Proposed Reservoir Expansion* ABSENT (rookery site) MODERATE (flying over)
Mammals		
Antrozous pallidus pallid bat	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW (foraging) ASSUMED ABSENT (roosting) *Existing Reservoir* MODERATE (foraging) ASSUMED ABSENT (roosting) *Proposed Reservoir Expansion* LOW (foraging) ASSUMED ABSENT (roosting)
Chaetodipus (=Perognathus) fallax fallax northwestern San Diego pocket mouse	USFWS: None CDFG: CSC	*Proposed Pipeline* **PRESENT** *Existing Reservoir* LOW *Proposed Reservoir Expansion* LOW
Eumops perotis californicus California western mastiff bat	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW (foraging) ASSUMED ABSENT (roosting) *Existing Reservoir* MODERATE (foraging) ASSUMED ABSENT (roosting) *Proposed Reservoir Expansion* LOW (foraging) ASSUMED ABSENT (roosting)

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Glaucomys sabrinus californicus San Bernardino flying squirrel	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Nyctinopmops ferorosaccus pocketed free-tailed bat	USFWS: None CDFG: CSC	*Proposed Pipeline* LOW (foraging) ASSUMED ABSENT (roosting) *Existing Reservoir* LOW (foraging) ASSUMED ABSENT (roosting) *Proposed Reservoir Expansion* LOW (foraging) ASSUMED ABSENT (roosting)
Perognathus alticolus alticolus white-eared pocket-mouse	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT
Perognathus longimembris brevinasus Los Angeles pocket mouse	USFWS: None CDFG: CSC	*Proposed Pipeline* ABSENT *Existing Reservoir* ABSENT *Proposed Reservoir Expansion* ABSENT

Table 4 (continued)
CNDDB Results for Sensitive Wildlife Species in the Vicinity of the Proposed Pipeline, Existing Reservoir, and Reservoir Expansion Sites

Scientific Name **Common Name**	**Listing Status**	**Potential for Occurrence**
Taxidea taxus American badger	USFWS: None CDFG: CSC	*Proposed Pipeline* MODERATE *Existing Reservoir* MODERATE *Proposed Reservoir Expansion* MODERATE
Federal Designations (Federal Endangered Species Act, USFWS) **FE Federal listed, endangered** **FT Federal listed, threatened** **FC Federal candidate for listing** **State Designations (California Endangered Species Act, CDFG)** **SE State listed, endangered** **ST State listed, threatened** **CSC California Special Concern Species**		
Source: CNDDB for Redlands, Yucaipa, Harrison Mountain, and Keller Peak 7.5 minute USGS quadrangles, 2007.		

3.3.1.1 Sensitive Wildlife Species Descriptions and Onsite Occurrences

Santa Ana Sucker (*Catostomus santaanae*)

The Santa Ana sucker is a federally threatened species and a California Species of Concern. This species is endemic to the Los Angeles, San Gabriel and Santa Ana River drainages of Southern California. It prefers sand/rubble/boulder bottom streams with cool, clear water and algal growth. It feeds primarily on algae and detritus, although adults have been known to feed on larval insects as well. It is usually less than seven inches in length and is dark gray on top and whitish below. The sides have a faint pattern of dark blotches and indistinct stripes. Many individuals are known to occur within the San Gabriel River system. In fact, the West, East, and North forks of the San Gabriel River may be the only drainages within the range of the species where it is still fairly common. These forks are designated as southern California arroyo chub/Santa Ana sucker streams in the CNDDB (CDFG 2004). Santa Ana sucker populations are in decline due to deteriorating environmental conditions associated with urbanization, water diversions, dams, pollution, recreational use, and gravel extraction leading to loss of habitat. Competition and predation by non-native species is also suspected in the decline in abundance and distribution of the Santa Ana sucker. This species has been extirpated from the upper Santa Ana River drainage where it was once present in Fish and Santiago Canyons and in Cajon and City Creeks. It survives now only in the lower portions, mainly in reaches with flows enhanced by waste water (Mt. Rubidoux downstream to a few kilometers below Imperial Highway).

Although water is present in the Crafton Hills Reservoir, it is hydrologically isolated from source populations, and does not provide the proper flowing aquatic habitat that this species occurs in. There are no regularly flowing creeks or river areas suitable for the presence of the Santa Ana sucker anywhere on the existing or proposed project sites. Therefore, this species is absent from the proposed project sites.

California Red-Legged Frog (*Rana aurora draytonii*)

The California red-legged frog is a federally threatened species and a California Species of Concern. It is found from Mendocino County in California south to northwestern Baja Mexico. It may occur in a variety of habitats from near sea level to 8,000 feet in elevation and is strongly associated with permanent sources of water, including cattail and tule marshes, reservoirs, ponds, and streamsides. It prefers deep, still, or slow moving water with low salinity levels and shallow margins or riffle zones. This species may disperse far from water (up to one mile) during and after significant rain events, and other habitats may include moist woodlands and grasslands from the lowlands through the foothills. It may make seasonal movements into riparian thickets and upland habitats for foraging, and where it may seek small mammal burrows, leaf litter, or other moist areas of refuge for shelter or hibernation. The metamorphosis of this species is slower than most large frog species, requiring 11-20 weeks of permanent water for larval development. Most individuals have a dark mask bordered by a whitish jaw stripe, a reddish-orange venter, and coarse red, yellow, black, and/or gray mottling in the groin. This subspecies of the red-legged frog has experienced dramatic population declines since the late 19th century; some estimates claim a 75 percent rate of disappearance from its former range. Threats to this species include habitat loss and predation by non-native species, such as bullfrogs and non-native fishes. In addition, this species was historically exploited as a source of frog legs for human consumption.

Permanent surface water is present at the existing Crafton Hills Reservoir, but the nearest known occurrences are greater than ten miles from the project sites. Since no known locations are in the project vicinity and the reservoir is situated in an isolated area that provides no connectivity for this species from source populations, this species is assumed absent at the Crafton Hills Reservoir. In addition, due to a lack of permanent surface water, it is considered absent from the remainder of the project site.

Mountain Yellow-Legged Frog (*Rana muscosa*)

The mountain yellow-legged frog is a federally endangered species in the southern part of its range, which includes the San Bernardino, San Jacinto, and San Gabriel Mountains, a federal candidate to the north, and a California Species of Concern throughout the State. It was formerly much more common in southern California, with a historic elevation range that extended from 1,214 feet in Eaton Canyon, Los Angeles County, to over 7,546 feet near Bluff Lake in San Bernardino County; it has since been extirpated from over 99 percent of its former range in southern California. Populations may be close to extirpation from the San Bernardino Mountains and Palomar Mountain. Current known populations occur in four small tributaries of the upper reaches of the San Jacinto River system in the San Jacinto Mountains and four small streams in the San Gabriel Mountains; fewer than 100 adult individuals may remain in these areas. In addition, a population was documented in 2006 at City Creek in San Bernardino County. It seems to prefer gently sloping banks with rocks and/or vegetation up to the edge of the water (Stebbins 2003) and is most always found within several meters of water, including streams, ponds, lakes, reservoirs, and riparian woodlands at moderate to high elevations. Microhabitats include gently sloping shorelines of riverbanks, meadow pools, stream edges, isolated pools, and lake borders in the Sierra Nevada range and rocky stream courses of southern California. In southern California, it is typically found in steep gradient streams along the chaparral belt, but may range into small meadow streams at higher elevations (Zweifel 1955). According to the USFWS, the southern California distinct population segment requires the following habitat elements: (1) streams or stream reaches between 1,214 feet and 7,546 feet in elevation, containing perennial flowing water with pools connected by riffles and runs that have year-round water (in at least some portion of the occupied stream or stream reaches), and (2) riparian and upland vegetation extending about 866 feet from each side of the stream, with an open canopy that allows sunlight to reach the stream. In contrast, Sierran frogs are most abundant in high elevation lakes and slow-moving portions of streams. Although seldom found away from water, it may cross upland areas between summer and winter habitats (Matthews and Pope 1999). Wintering sites include areas nearshore under ledges and in deep underwater crevices (Matthews and Pope 1999). Its edgewater microhabitats are important for breeding activities, including mating, egg deposition, and the growth and metamorphosis of larvae and postmetamorphs; tadpoles may require up to two years to complete aquatic development. Additionally, if predatory fish occur in deeper pools, this kind of shoreline

configuration may provide a refuge from predation. The mountain yellow-legged frog is relatively small in size, ranging from two to three inches in length. It is typically drab yellowish to reddish in color with black or brown spots or blotches on the dorsum and yellow along the leg margins. It may emit a garlic-like odor when handled. Steep population declines have been attributed to many factors, including habitat loss, pollution, cattle grazing, ozone depletion, mining activities and tailings pollution, off road vehicle disturbance, public dumping, chytrid fungus outbreaks, fires, excessive flooding, and non-native species predation. Predators include non-native bullfrogs, turtles, trout and other fish; it seems to be most successful where predatory fish are absent (Bradford 1989, Bradford et al. 1993).

Although permanent surface water is present at the existing Crafton Hills Reservoir and the nearest known occurrences are within five miles of the project sites, this species is considered absent from the three project sites. This determination was based on the historic locations resulting from the database search and the lack of recent records within ten miles of the project sites. Another factor in this assessment is the extremely low relative abundance of this species in southern California.

Southern Rubber Boa (*Charina bottae umbratica*)

The southern rubber boa is a state-listed threatened species. It is only found in a few disconnected montane areas of the San Bernardino, San Jacinto, and Tehachapi mountains of Southern California. It inhabits grasslands, broken chaparral, oak-conifer, mixed-conifer, and other woodlands at elevations from around 5,000 to 10,000 feet, often near streams or wet meadows. It tends to occur in loose, moist soils suitable for burrowing where rocks, logs, bark, and other debris offer ample shelter opportunities. The southern rubber boa is a small constrictor up to three feet long with a stout body, and a blunt head and tail that lend to its rubbery appearance. With coloration ranging from pinkish tan to olive green to shades of brown above, it is generally uniform in color on its dorsal side and lighter on its ventral side. The southern rubber boa is a good swimmer, burrower and climber that takes a variety of prey items, including mice, shrews, gophers, birds, salamanders, lizards, and other snakes (Stebbins 2003). Although it is fairly common in its range, the southern rubber boa is considered a threatened species primarily due to the continued development and habitat degradation within its limited range.

Suitable habitat to support this species was not present on the project sites, the elevation range is well below that which the species requires, and there are no known occurrences within ten miles of the project sites; therefore, it is considered absent.

Western Yellow-Billed Cuckoo (*Coccyzus americanus occidentalis*)

The western yellow-billed cuckoo (nesting) is a federal candidate for listing and a state-listed endangered species. The yellow-billed cuckoo is found primarily in the eastern United States, but this subspecies is an extremely rare and localized summer resident of the southwestern U.S. Historically, it was found commonly throughout the Central Valley and California coastline until the early 20th century. This subspecies primarily inhabits mature, open riparian woodlands along the broad, lower flood-bottoms of larger river systems. Habitat features usually include some relatively open patches and intermixed low, dense, scrubby vegetation typical of these watercourses. In the southwestern U.S., the western yellow-billed cuckoo also occupies desert riparian woodlands composed of willows (*Salix* spp.), Fremont cottonwoods, and dense mesquite (*Prosopis* spp.). It typically nests in willows and forages more so among the cottonwoods and other trees. Its diet includes caterpillars, grasshoppers, other large insects, frogs, and some small lizards. It is a medium-sized bird with a brown back, a yellow, decurved bill, and a long grey-brown tail with distinctive white spots on the outer retrices. Populations of the western yellow-billed cuckoo in California were decimated before the mid-20th century by the extensive loss of riparian habitat to agriculture and development as well as by heavy pesticide use, and have not rebounded since that time (Hughes 1999).

Riparian areas suitable for the nesting of this species were not present along the project sites at the time of the survey, and there are no known occurrences of this species within ten miles of the project sites; therefore, this species is considered absent.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*)

The southwestern willow flycatcher (nesting) is a federally endangered and state endangered subspecies of willow flycatcher whose summer breeding range includes southern California (from the Santa Ynez River south), Arizona, New Mexico, extreme southern portions of Nevada and Utah, extreme southwest Colorado, and western Texas (USFWS 1995). Records of probable breeding southwestern willow flycatchers in Mexico are rare and restricted to extreme northern Baja California del Norte and Sonora (USGS 2007). The largest California populations occur along the Santa Margarita, San Luis Rey, and South Fork Kern River systems. It is known to breed in a variety of riparian habitats with multi-tiered canopies and surface water and/or saturated soils, whether along streams in broad valleys, in canyon bottoms, around mountain-side seepages, or at the margins of ponds and lakes (Grinnell and Miller 1944). Where willow species dominate, high foliage-volume willow cover is preferred, but with willow clumps separated by openings (Harris et al. 1988). Habitat types may include a variety of willow (*Salix* spp.), cottonwood (*Populus* spp.), coast live oak (*Quercus agrifolia*), alder (*Alnus* spp.), and tamarisk (*Tamarix* spp.) woodlands. It is safely distinguished from other members of its genus only by its characteristic "*fitzbew"* song and breeding area. It is a relatively non-descript flycatcher with a dark back, two faint wing bars, yellow lower mandible, faint wash of yellow on the belly, and little to no eye ring. It forages for insects on the wing, and embarks on short flights from favorite perches to catch flying insects. While perched, it characteristically flicks its tail upwards on occasion. This species is in decline primarily due to extensive habitat loss and brood parasitism by the brown-headed cowbird (*Molothrus ater*). In the early 1980s, the southwestern willow flycatcher population in California was estimated to be less than 80 pairs (Unitt 1987). Current annual population estimates are between 300 and 500 known breeding locations.

Although this species is known to occur within ten miles of the project sites, riparian habitats suitable for the nesting of this species were not present during the reconnaissance and focused plant surveys; therefore, this species is considered absent as a nesting species from all project areas. However, since this species migrates through a wide assortment of habitats, it has a low potential to occur as a migrant.

Coastal California Gnatcatcher (*Polioptila californica californica*)

The coastal California gnatcatcher is a federally threatened species and a California Species of Concern. The historic range of this species extended from the coast and foothills of Ventura County, south through Los Angeles, southwestern San Bernardino, western Riverside, Orange, and San Diego Counties of California into northwestern Baja California, Mexico. Populations have since become increasingly fragmented. It is a permanent resident of Diegan, Riversidean, and Venturan sage scrub sub-associations found from sea level to 2,500 feet in elevation. Within its range, it associates strongly with California sagebrush dominant habitats and also occurs in mixed scrub habitats with lesser percentages of this favored shrub. Other plant species important for the nesting and foraging of this species include California buckwheat, white sage, black sage, and chaparral broom (*Baccharis sarothroides*). Chamise habitats may also support breeding pairs, especially where coastal sage scrub may occur nearby or form a component. The coastal California gnatcatcher is a small, secretive songbird with grayish coloration and faint white outer tail margins. Males of this species exhibit a black cap during the breeding season. This insectivorous bird nests and forages in moderately dense stands along gentle slopes, arid hillsides, mesas, foothills, and alluvial washes. It gleans a variety of insects within its territory, including caterpillars and other larval insects. It builds a cup nest in suitably dense shrubs and lays four eggs on average. Both parents participate in all stages of nest-building and rearing of the young. Most studies with large numbers of individually marked gnatcatchers have found home range sizes in excess of ten acres (Mock et al. 1990). Non-breeding season home ranges may be about 80 percent larger than breeding season home ranges (Preston et al. 1998, Bontrager 1991). Contributing factors in the decline of this species

include overly frequent fire cycles, non-native plant invasions, brown-headed cowbird nest parasitism, predation, and widespread habitat loss to urbanization and agriculture. Rangewide habitat loss is estimated at 75 to 90 percent (Westman 1981) and the populations that remain are under increasing pressure from development. In 1990, the population of California gnatcatchers was estimated at less than 2,000 pairs (Atwood 1990). Current estimates range between 3,000 and 5,000 breeding pairs, which are largely dependent upon rainfall cycles.

Since this species is known to occur within five miles of the project vicinity and a small area of suitable habitat exists on the south side of Mill Creek Road, this species has a low potential to occur at the proposed pipeline site. It is assumed absent from the rest of the project areas due to a lack of suitable habitat.

Least Bell's Vireo (*Vireo bellii pusillus*)

The least Bell's vireo (nesting) is a federally and state-listed endangered subspecies of the Bell's vireo. The breeding range of the species extends from North Dakota to Indiana, south through Arkansas and Texas, and west to southern New Mexico, Arizona, California, and northern Mexico. However, the least Bell's vireo subspecies is restricted to coastal California and Baja California, Mexico, and a few inland populations. Its winter range extends along the Pacific coast from northern Mexico south to northern Nicaragua. It is a small gray songbird with two faint wingbars and a faint eyering, and is whiter below. This species prefers to nest in low, dense, scrubby vegetation in early successional areas and is particularly dependent on corridors of habitat along rivers and streams. Habitats may include willow woodlands and dense mule fat, scrub oak, coastal chaparral, and mesquite patches with dense early successional understories. It builds a suspended cup nest about 0.5 to 2.0 meters above the ground and, on average, lays four eggs. It may produce two broods per season. On the breeding grounds, the least Bell's vireo feeds primarily on insects and small spiders that it gleans from twigs and leaves. The two major factors in the decline of least Bell's vireo populations are loss of habitat and nest parasitism by the brown-headed cowbird. Habitat loss and degradation, especially along streams and rivers due to development, agriculture, flood control projects, logging operations, and intensive cattle grazing practices, are the greatest threats to the continued existence of the least Bell's vireo. Overgrazing has been estimated to reduce nesting sites by 50 percent in some areas, and it has contributed to an increase in non-native invasive plant species that do not typically support the breeding of this species. Cowbird nest parasitism is also an important factor in population declines; the cowbird lays its egg in an unsuspecting vireo nest, which the vireo then may raise as its own. The cowbird egg hatches earlier than the vireo eggs, the chick then grows much larger in less time, eventually out-competing the vireo chicks and causing nest failure. Fragmentation of habitat also increases cowbird nest parasitism by artificially creating favored habitats of cowbirds, and it isolates small, fringe vireo populations. In turn, these populations are more susceptible to localized extirpations, contributing to large-scale range reductions. Domestic and feral cats are also a significant predatory force in some areas. Despite historic population losses, recent trends indicate that populations are on the rise and that the least Bell's vireo is returning to parts of its former range, as well as colonizing some new areas.

Although this species is known to occur within ten miles of the project sites, riparian habitats suitable for the nesting of this species were not present during the reconnaissance and focused plant surveys; therefore, this species is considered absent as a nesting species from all project areas. In addition, since this species tends to migrate along riparian corridors, it is assumed absent as a migrant.

San Bernardino Kangaroo Rat (*Dipodomys merriami parvus*)

The San Bernardino kangaroo rat is a federally endangered species and a California Species of Concern. Its historic range included over 300,000 acres of alluvial sage scrub in San Bernardino and Riverside Counties in California. Its current range includes approximately 3,240 acres of suitable habitat, fragmented in about seven distinct populations. It prefers gravelly and sandy soils in alluvial habitats where it constructs underground burrows and rarely occurs in dense vegetation. This species is a small,

nocturnal rodent with pale yellow and dusky brown fur, and dark brown tail stripes, footpads, and tail hairs. Unlike most kangaroo rats, it is active year-round. It can live indefinitely without water, subsisting on dry seeds that it often stores in is burrows for later consumption. It also consumes some green vegetation and insects when available. The primary threats to the continued existence of this species include habitat loss, degradation, and fragmentation due to developments related to housing, mining, and flood control.

This species is known to occur in alluvial sage scrub habitats within five miles of the project area. Upon consultation with USFWS-permitted kangaroo rat specialist Steve Montgomery and due to the lack of suitable habitat and onsite conditions (i.e., lack of suitable soils, alluvial sage scrub habitats, and the presence of steep terrain onsite), the San Bernardino kangaroo rat is assumed absent from the reservoir sites. However, marginally suitable habitat was present at the proposed pipeline site, and protocol trapping surveys were conducted from May 16 to May 21, 2007 by Steve Montgomery. Trapping results at the proposed pipeline site were negative for this species (Montgomery 2007); therefore, this species is considered absent from the proposed project sites.

Stephens' Kangaroo Rat (*Dipodomys stephensi*)

The Stephens' kangaroo rat is a federally endangered and state-listed threatened species. Current populations exist only in the San Jacinto Valley, western Riverside County, and northwestern San Diego County, California. This species generally occurs in both non-native and perennial grasslands with sparse perennial vegetation, as well as in sparse coastal sage scrub and sagebrush communities with sparse canopy coverage. Plant species may include buckwheat (*Eriogonum* spp.), chamise, brome grasses (*Bromus* spp.), and filarees (*Erodium* spp.). Although it can burrow into firm soil, it prefers areas with well-drained, gravelly or sandy soils for digging its burrows. It can live indefinitely without water, subsisting on dry seeds that it often stores in is burrows for later consumption. It also consumes some green vegetation and insects when available. This species physically resembles other kangaroo rat species with long hind legs, small front legs and feet, brown upper parts, a white belly, and a long, tufted tail. Stephens' kangaroo rat is threatened by the continued destruction, fragmentation, and degradation of its habitat through human and human-induced activities, such as the clearing of land for urban and suburban development, agriculture, water projects, military activities, wildland or prescribed fires, off-road vehicle use, and to a lesser degree, by livestock grazing and the invasion of non-native plant species.

The nearest known location for Stephens' kangaroo rat is approximately 8-9 miles south of Crafton Hills Reservoir, to the west of Beaumont and south of California State Route 60. Upon consultation with Steve Montgomery and due to the lack of suitable habitat and onsite conditions (i.e., lack of suitable soils, open grassland or sage scrub habitats, and the presence of steep terrain onsite), this species is considered absent from the reservoir sites. However, marginally suitable habitat was present at the proposed pipeline site, and protocol trapping surveys were conducted from May 16 to May 21, 2007 by Steve Montgomery. Trapping results at the proposed pipeline site were negative for this species (Montgomery 2007); therefore, this species is considered absent from the proposed project sites.

Santa Ana Speckled Dace (*Rhinichthys osculus* ssp. 3)

The Santa Ana speckled dace is a California Species of Concern. Although once widely distributed in the Santa Ana, San Gabriel, and Los Angeles River systems, the speckled dace currently has a very limited distribution in the headwaters of the San Gabriel and Santa Ana Rivers. Many individuals are known to occur within the San Gabriel River system. The West, North, and East forks of the San Gabriel River are considered the best remaining habitat for the Santa Ana speckled dace. Found only in permanent flowing streams with summer water temperatures of 17-20° C, it usually inhabits shallow cobble and gravel riffles within its river systems. This small, slender fish species is cryptically colored to mimic its stream substrates. It primarily eats algae, but will also take small insects and larval insects as well.

Although water is present in the Crafton Hills Reservoir, it is hydrologically isolated from source populations, and does not provide the proper flowing aquatic habitat that this species occurs in. There are no regularly flowing creeks or river areas suitable for the presence of the Santa Ana speckled dace anywhere on the existing or proposed project sites. Therefore, this species is absent from the proposed project sites.

Silvery Legless Lizard (*Anniella pulchra pulchra*)

The silvery legless lizard is a California Species of Concern. Its range extends from the San Francisco Bay in California to northwestern Baja California, Mexico, and it can also be found on a few offshore islands of California. This species is found in chaparral, pine-oak woodlands, riparian woodlands, and also on beaches from sea level to around 5,100 feet. It occurs less commonly in desert scrub. Within these habitats, it prefers loose soils or sand for burrowing, moisture, warmth, and plant cover (Stebbins 2003). It forages in leaf litter during the day for insects, such as termites, spiders, beetles, and larvae. On warm evenings, it may emerge to forage during the night. This legless lizard has a silver, gray, or beige dorsal coloration with a dark mid-dorsal line and is yellow below. The primary threats to the continued existence of this species include habitat loss due to agriculture and urban sprawl, overabundant non-native vegetation (i.e., iceplant on sand dunes), sand mining operations, off-road vehicle use, and other anthropogenic disturbances, including trampling and over-collecting for the pet trade.

This species is known to occur within ten miles of the project sites, and marginally suitable habitat is present only within small areas of the project site. Therefore, this species has a low potential to occur within the project sites.

Orange-Throated Whiptail (*Aspidoscelis hyperythra*)

The orange-throated whiptail is a California Species of Concern. This species is found from San Bernardino County, California to Baja California, Mexico. It frequents sandy washes, alluvial floodplains, rocky hillsides, and vegetation communities that provide both open territory and adequate shading. This species is often associated with California buckwheat, California sagebrush, black sage, white sage, chamise, and redshank (*Adenostema sparsifolium*) sage scrub and chaparral habitats. Due to similar habitat requirements, it typically occurs in association with the San Diego horned lizard. Hibernation sites occur on well-insolated, south-facing open slopes that are often adjacent to terraces with woody perennials. The orange-throated whiptail is a moderately sized, gray, reddish brown, dark brown, or black lizard with five to seven pale yellow or tan stripes along each side. The top of the head has a yellow-brown to olive gray, single, fused frontoparietal scale. Undersurfaces are yellowish white, often with gray or bluish slate on the belly. Adults have varying degrees of red- orange wash that may occur on all undersurfaces. The latter is especially prominent on the throat and chest in breeding males. In hatchlings and juveniles, the tail is a highly visible bright blue. Prey items include a variety of insects and spiders. The primary threat to the continued existence of this species is habitat loss.

Since suitable habitat is present in many areas of the project sites and several known occurrences are within five miles, this species has a moderate potential to occur within the project sites.

San Bernardino Mountain Kingsnake (*Lampropeltis zonata parvirubra*)

The San Bernardino Mountain kingsnake is a California Species of Concern. This California endemic is restricted to the San Gabriel, San Bernardino, and San Jacinto mountains of southern California. It occurs in well-illuminated canyons with rocky outcrops or rocky talus in association with bigcone spruce (*Pseudotsuga macrocarpa*) and various canyon chaparral species at lower elevations, and with black oak (*Quercus kelloggii*), incense cedar (*Calocedrus decurrens*), Jeffrey pine (*Pinus jeffreyi*), and ponderosa pine (*Pinus ponderosa*) at higher elevations. The San Bernardino Mountain kingsnake is a medium-sized

(21-44 inches total length) snake with a distinctive sequence of red, black, and white rings; the relatively narrow white rings are always bordered by black rings, and red coloration, which can occur as rings or bands, borders alternate black rings. The number of tricolor rings on the body (except the tail) ranges from 35 to 48, and between 4 and 100 percent of the red rings are complete. The snout is jet black and the iris is very dark brown. It eats a variety of prey, including birds, eggs, and nestlings, lizards, snakes, and small mammals. The primary threats to this species include habitat loss and over-collection for the pet trade.

Marginally suitable habitat is present in some of the project sites, but the nearest known occurrences are in the higher elevations over ten miles from the project sites; therefore, this species has a very low potential to occur within the three project sites.

Coast (=San Diego) Horned Lizard (*Phrynosoma coronatum blainvillii*)

The coast horned lizard is a California Species of Concern. It occurs from the Transverse Ranges in Kern, Los Angeles, Santa Barbara, and Ventura counties southward throughout the Peninsular Ranges of southern California to Baja California, Mexico as far south as San Vicente. It is found in a wide variety of habitats including coastal sage scrub, annual grasslands, chaparral, oak woodlands, riparian woodlands, and coniferous forests. It is perhaps most abundant in riparian and coastal sage scrub habitats on old alluvial fans of the southern California coastal plain. In foothill and mountain habitats that are covered with dense brush or other vegetation, the species is largely restricted to areas with pockets of open microhabitat; this habitat structure can be created by natural events, such as fire and floods or human-created disturbances, such as livestock grazing, fire breaks, and road construction. The key elements of these microhabitats are loose, fine, sandy soils, an abundance of native ants, open areas for basking, and low, but relatively dense shrubs for refuge. The coast horned lizard is a moderately-sized, dorso-ventrally flattened lizard with five backwardly projecting head spines, a large shelf above each eye, large, convex, smooth scales on the forehead, and two parallel rows of pointed scales fringing each side of the body. No stripes radiate from the eyes, and the iris is black. The dorsal color is highly variable, but typically gray, tan, reddish-brown, or whitish, and usually resembles the prevailing soil color, while the venter is yellow to white with discrete, dark spots. Its diet is almost entirely composed of ants, especially harvester ants, but it will take other insects on an opportunistic basis. The primary threat to the continued existence of this species is habitat loss. Other threats include non-native ants, especially Argentine ants (*Linepithema humile*), and disturbances related to off-road vehicles.

Since suitable habitat is present in many areas of the project sites and several known occurrences are within five miles, this species has a moderate potential to occur within the project sites.

Two-Striped Garter Snake (*Thamnophis hammondii*)

The two-striped garter snake is a California Species of Concern. It is found in disjunct populations from the San Francisco area in California to northwest Baja California, Mexico. Additional populations occur several hundred miles further to the south in Baja California. It is found in or near permanent and intermittent freshwater, habitats include streams, rivers, ponds, and small lakes from sea level to around 8,000 feet. Oak woodlands, brushlands, sparse coniferous forests, and riparian forests may surround its watery realm. It is recognized by its lack of a mid-dorsal stripe and coloration is usually olive or brownish above and dull yellow to orange-red or salmon below. Intergrading color morphs are common. This highly aquatic snake is most active at dusk or at night, but it may also forage by day. Its diet includes tadpoles, toads, frogs, small fish, earthworms, California newt (*Taricha torosa torosa*) larvae, and aquatic eggs. The two-striped garter snake is a live-bearing species that gives birth to up to 36 young at a time. The historic range of this species has been lost to housing, urban development, and other human impacts by an estimated 40 percent (Stebbins 2003).

This species is known to occur in the Santa Ana River and Mill Creek within five miles of the project sites. Although permanent water is present in Crafton Hills Reservoir, the movement of this species from source

populations into the reservoir is highly unlikely since the reservoir is not connected to a permanent creek or stream. Therefore, this species is assumed absent at the existing reservoir and is considered absent from the rest of the project area.

Cooper's Hawk (*Accipiter cooperii*)

The Cooper's hawk (nesting) is a California Species of Concern. This species occurs as a migrant and/or resident over most of the U.S. from southern Canada to northern Mexico. Favored habitats include open woodlands, mature forests, woodland edges, and river groves. More recently, the Cooper's hawk has been known to breed in suburban and urban areas with similar tree structure to native habitats. This medium-sized (i.e., 14-20 inches) hawk is well-adapted for hunting birds as prey with its long tail and short, rounded wings; these features allow maneuverability in pursuit and on the ambush. It is similar in appearance to the sharp-shinned hawk (*Accipiter striatus*), but is distinguished by its larger size, more rounded tail, and darker crown. In addition to birds, it may also take amphibians, reptiles and small mammals as supplemental prey items. Historic population losses resulted from the widespread use of DDT. Other threats include habitat loss and illegal hunting (Remsen 1978).

The Cooper's hawk was found present at Crafton Hills Reservoir on July 16, 2007 (Figure 4). One individual was observed flying low over the surrounding hills and foraging for prey. Although the nearest known nesting occurrence is almost ten miles from the project sites, this species could include a portion of the project sites as breeding territory. However, due to a lack of suitable nesting trees, this species is assumed absent for nesting onsite, and since it was found present foraging at the existing reservoir, it has a high potential to occur as a foraging species over the remainder of the project sites.

Southern California Rufous-Crowned Sparrow (*Aimophila ruficeps canescens*)

The southern California rufous-crowned sparrow is a California Species of Concern. It is one of seventeen recognized subspecies of the rufous-crowned sparrow, whose overall range includes parts of California, Arizona, New Mexico, Texas, Oklahoma, Arkansas, and Mexico. However, this subspecies is a resident of southwest California on the slopes of the Transverse and Coastal ranges from Los Angeles County south to Baja California Norte; it can also be found on San Martin Island. Habitats include broken sage scrub and chaparral, native grasslands with sparse shrubs, and rocky, brushy hillsides and canyons with open patches. It is a small non-descript sparrow with a rusty crown, white eye-ring, dark whisker marks, and a flat-headed appearance. It is a secretive species that is more often heard than seen as it forages among the shrubs. Habitat loss is the primary factor in the decline of the southern California rufous-crowned sparrow.

The southern California rufous-crowned sparrow was present at the reservoir expansion site during the reconnaissance-level survey on June 15, 2007 (Figure 4). One location, which may represent a breeding pair, was found on the slopes downgrade of the reservoir expansion area. Since suitable habitat exists in many areas of the other two sites as well, it has a high potential to occur at the proposed pipeline site and existing reservoir.

Burrowing Owl (*Athene cunicularia*)

The burrowing owl is a California Species of Concern. It breeds in open plains from southern Canada and the western United States to Baja and central Mexico (Johnsgard 1988); another population occurs in southern Florida. It is found year-round in the southwestern states south of San Francisco through Baja California and central Mexico. It is a common year-round resident of the Salton Sea and Imperial Valley (Garrett and Dunn 1981). Population densities in Imperial County are the highest compared to any other county in California. This species inhabits dry, open, annual or perennial short grasslands, deserts, treeless plains, coastal dunes, rangelands, scrublands and occasionally, urban areas characterized by low-growing vegetation (Haug et al. 1993). It may occupy golf courses, cemeteries, road rights-of way,

airstrips, abandoned buildings, irrigation ditches, and vacant lots with holes or cracks suitable for use as burrows (Haug et al. 1993). It primarily occupies small mammal burrows, particularly ground squirrel, for subterranean shelter and nesting. When burrows are scarce, the burrowing owl may use man-made structures, such as openings beneath cement or asphalt pavement, pipes, culverts, and nest boxes (Robertson 1929). One burrow is typically selected for use as the nest; however, satellite burrows are usually found in the immediate vicinity of the nest burrow within the defended territory of the owl. Breeding typically occurs from March through August, with peak periods in May and July. The burrowing owl is a small, ground-dwelling owl with a round, grey-brown, tuftless head, long and bare yellow legs, bright yellow iris, brown back, and buffy-white underparts with brown barring. Insects form the bulk of its diet, but small mammals are also occasionally taken. Threats to burrowing owl populations include the loss of habitat to urban development and agriculture, and the destruction of burrows and indirect poisoning via rodent eradication efforts (Collins 1979, James and Espie 1997, Remsen 1978).

Marginally suitable habitat is present at all three project sites, and there are few known occurrences within a ten mile radius. Therefore, this species has a low potential of occurrence at all three project sites.

Lawrence's Goldfinch (*Carduelis lawrencei*)

The Lawrence's goldfinch (nesting) is not a listed species, but it is considered rare in California. It appears on the Watch lists of several conservation groups and is a United States Fish and Wildlife Service Birds of Conservation Concern species (BCC - nesting). It breeds in the foothills surrounding the Central Valley of California and in the coastal Californian foothills from Contra Costa County south to Santa Barbara County. In southern California, it is rarely found at higher elevations in the Colorado Desert and was also found historically in the lower Colorado River Valley. It inhabits arid and open woodlands near chaparral or other bushy areas and tall annual grasslands, and tends to associate with sources of water. Its nesting grounds are frequently dominated by live oaks (*Quercus* spp.) and blue oaks (*Quercus douglasii*) and may also use riparian woodlands, coastal scrub, or broadleaf evergreen forests (Davis 1999). The Lawrence's goldfinch is a small, grey finch with a conical bill and yellow washes on the breast and wings. The male has a black "mask" covering the lores and chin. The female has similar features but does not have a mask and has duller yellow markings. Unlike many wildlife species, the Lawrence's goldfinch may benefit from non-intensive human activities that increase annual plant populations, consequently providing food for the species. However, the small relative abundance of the species may make it more susceptible to habitat loss.

Lawrence's goldfinch was present at the proposed reservoir expansion site during the focused plant survey on July 16 and 17, 2007 (Figure 4). Small flocks of up to twelve individuals were observed on both days, but its breeding status at the reservoir is uncertain at this time. It has a very low potential to occur as a breeding species at the reservoir, and it is assumed absent for nesting in the other two sites due to a lack of appropriate nesting vegetation and a steady source of water. Since water features and riparian vegetation are relatively removed from the other sites, it has a moderate potential to occur as a foraging or migrating species at the proposed pipeline site and the reservoir expansion site.

Yellow Warbler (*Dendroica petechia brewsteri*)

The yellow warbler (nesting) is a California Species of Concern. Its breeding range includes most of North America from northern Alaska and northern Canada to the southern U.S. and Mexico. Wintering birds occur from Mexico to Peru. Breeding habitats include wet areas such as riparian woodlands, orchards, gardens, swamp edges, and willow thickets. Most breeding habitats generally contain medium to high-density tree and shrub species with ample early successional understories. In migration, it may occur in other habitats, including early seral riparian habitats. Its plumage is more extensively yellow than most North American wood-warblers, and is unique in having yellow on the inner webs of tail feathers, except the middle pair. Males show rusty streaking on the breast. It is almost entirely insectivorous but

also eats a few berries. Populations are in decline in California due to habitat loss, grazing of riparian understories, and brood parasitism by the brown-headed cowbird.

Since suitable nesting habitat does not exist within the three project sites, this species is considered absent as a nesting species, and it has a very low potential to occur as a migrant.

California Horned Lark (*Eremophila alpestris actia*)

The California horned lark is a California Species of Concern. It is a sub-species of the horned lark, a widespread species of the northern hemisphere, that breeds in California generally from Sonoma County southward. It occurs in a variety of open habitats, including bare ground, sparse short grasslands, dry prairies, open fields, deserts, brushy flats, tundra, and developed habitats, such as fallow agricultural fields, airports, golf courses, parks, and open residential areas. It is present in the winter mostly in flocks. Breeding territories are more widespread, and flocks do not typically occur during the breeding season. In southern California and particularly in the desert region, winter populations are greatly augmented by other subspecies. This dusky brown ground-dwelling species is identifiable by its two black, horn-like feathers, black sideburns, and black chest patch. It is white below. It walks along the ground rather than hops, and forages for seeds and insects. The diet during the breeding season consists primarily of insects, snails, and spiders. Since the California horned lark prefers open habitats, which are easier targets for development, habitat loss is one of the primary factors in the decline of this subspecies. Other factors include pesticide poisoning on agricultural fields, and tilling, harvesting, and mowing operations.

Open habitats favored by this species are found only in small portions of the overall project area, and there are no known locations of this species within five miles of the project sites; therefore, this species has a low potential of occurrence. It is more likely to occur as a winter visitor or migrant adjacent to the project sites on open, disturbed areas, including dirt roads, shoulders, and the current construction of Crafton Hills Estates.

Yellow-breasted Chat (*Icteria virens*)

The yellow-breasted chat (nesting) is a California Species of Concern. The breeding range of this species includes most of the U.S., south-central Canada, and northern Mexico. It winters from the southern U.S. to Panama. This species is a summer resident along coastal and cismontane California and in the foothills of the Sierra Nevada Range. Migrants and breeders arrive in California in April and return to their wintering grounds in September. Habitats include swamplands, riparian willow thickets and other dense brush, often near watercourses. The yellow-breasted chat feeds on insects, larvae, spiders, berries, and fruits. It breeds from May to August with a clutch of 3-6 eggs. Incubation lasts for 11-15 days, and chicks fledge at 8-11 days. Both parents take care of young till they fledge. Nests are located 2-8 feet from the ground. The yellow-breasted chat is the largest North American warbler, and it behaves more like a mockingbird than a warbler. It mimics songs (often at night), sports an impressive array of sounds, and is often conspicuous within its territory early in the breeding season. It has a characteristic display flight, whereupon it takes off from a perch, jumbles through the air, and sings all the while. Predators include snakes, accipiters, and small mammals. Population declines are due to the loss and degradation of riparian habitats rangewide. The decline is also due to parasitism of brown-headed cowbirds.

This species is not known to breed within five miles of the project sites. Riparian scrub habitats occur in the project sites only in small areas bordering the Crafton Hills Reservoir. The amount of habitat is not suitable to support this species; therefore, this species is considered absent from all three project sites as a breeding species. However, since this species is known to migrate through a variety of habitats, it has a low potential to occur as a migrant on all three sites.

Loggerhead Shrike (*Lanius ludovicianus*)

The loggerhead shrike (nesting) is a California Species of Concern. Its range includes most of the U.S. from southern Canada to southern Mexico. The U.S. population is largely resident to the south and migratory to the north, but migrants and residents frequently overlap throughout its range. Habitats may include oak savannas, open chaparral, desert washes, juniper woodlands, Joshua tree woodlands, and other semi-open areas. It can occupy a variety of semi-open habitats with scattered trees, large shrubs, utility poles, and other structures that serve as lookout posts for potential prey. It is a carnivorous species that preys primarily upon insects, but also takes lizards, mice, birds, carrion and other opportunistic items. The loggerhead shrike has a habit of caching its food for later consumption by impaling its prey on thorns, sharp twigs, or barbed wire; it is known as the "butcher bird". It is recognized by its black facial mask, overall gray, black, and white color pattern, relatively big head, and hook-tipped bill, not unlike that of a small raptor. Habitat loss and pesticides are the two dominant factors in the decline of this species (Ehrlich et al. 1988, Scott 1990).

Marginally suitable habitat is found in some areas of the project sites, and few known occurrences exist within ten miles of the sites. Therefore, this species has a low potential for occurrence as a nesting or foraging species.

Osprey (*Pandion haliaetus*)

The osprey (nesting) is a California Species of Concern and is considered a sensitive species by the California Department of Forestry (CDF). The osprey breeds from the northern United States up through Canada and into Alaska. Most of the North American population winters south of the U.S. in Central and South America, as well as along the Pacific and Caribbean coasts of Mexico. Wintering grounds also include coastal California and southeastern California. This raptor species forages primarily on fish and is strongly associated with open water throughout its range. It builds a large nest of twigs, sticks, moss, and other materials high on a tree or artificial structure, and will use it for several seasons. The osprey is a large raptor with white belly and chest and black back and wings. Its forehead and crown are white, with a thick black eyestripe that extends down onto the back. Osprey populations have increased greatly since the ban of agricultural DDT, although shooting, electrocution at power lines, and habitat degradation still pose threats to populations.

One foraging osprey was observed at the Crafton Hills Reservoir on July 16, 2007 (Figure 4). Due to a lack of suitable foraging habitat, it is assumed absent as a foraging species from the reservoir expansion site and the proposed pipeline. Due to a lack of suitable nesting sites and no known occurrences of nesting within ten miles, the osprey is considered absent as a breeding species on all three project sites.

Double-Crested Cormorant (*Phalacrocorax auritus*)

The double-crested cormorant (rookery sites) is a California Species of Concern. It is the most numerous and widely distributed of the North American cormorants, occurring in large numbers in the interior of the North American continent, as well as on the coast. Breeding colonies in California are generally found on the northeastern coast of the state, in small numbers in San Francisco Bay and the Central Valley, and in declining numbers on the Salton Sea. The species is associated with aquatic habitats, such as lakes, artificial impoundments, slow-moving rivers, lagoons, estuaries, swamps, seacoasts, and coastal cliffs. It is a colonial nester and typically nests on the sloped grounds of coastal cliffs and offshore islands, or in the tall trees at the margins of lakes when inland. It is a large cormorant with black or dark brown glossy plumage and distinctive orange-yellow skin on the face and throat (gular region). It is an excellent swimmer that forages underwater primarily for fish, frogs, and invertebrates. Communal roosts may be found on dead trees, islands, and rocky shorelines. Declines in California are due to the loss of marshland nesting habitats, pesticides, nest predation by gulls and crows, and human disturbances (Zeiner et al. 1990).

One double-crested cormorant was observed resting on a dam structure at the Crafton Hills Reservoir during the focused plant survey on July 16, 2007 (Figure 4). No rookeries were observed onsite, and this species is not known to breed within ten miles of the project sites. Therefore, this species is considered absent for breeding onsite. However, since one individual was seen at the reservoir and many cormorants are known to occur just south of the reservoir in the lakes of Yucaipa Regional Park, this species likely occurs on a regular or semi-regular basis at Crafton Hills Reservoir as a foraging/resting species. It has a moderate potential to occur on the other two project sites as a flyover species.

Pallid Bat (*Antrozous pallidus*)

The pallid bat is listed as a California Species of Concern. Its range extends from southern British Columbia along the Pacific coast south to central Mexico and east to central Kansas and Oklahoma. It occurs in a variety of habitats, including arid desert scrub, oak woodlands, juniper woodlands, grasslands, coniferous forests, and water-associated habitats. It may be more common throughout its range where rock outcrops provide roost sites. The pallid bat, a member of the Vespertilionidae family (free-tailed bat family), is a rather large, pale, yellowish-brown bat with paler coloration below and a wingspan of about 9 inches. It has large ears crossed by 9-11 transverse lines, no dark hair bases, a blunt pinkish muzzle, and relatively large, strong feet. This species is known to form day roosts of 12-100 individuals. Roosts may be natural or artificial, and often times, alternate night roosts are used as social centers. It emerges from its roost well after dark, later than most other bats. Unlike most other bat species, the pallid bat takes few insects on the wing. It forages by looking for prey on the ground and actually listening for the footsteps of ground-dwelling insects, scorpions, crickets, grasshoppers, spiders, centipedes and other prey. Fifty-four (54) different prey items have been catalogued for the pallid bat. Once located, the bat lands and chases down its prey before consuming it elsewhere. Occasionally, it consumes its prey on the ground. In fact, pallid bats have become so engrossed in eating that researchers have actually been able to pick individuals from the ground. Population dynamics are not fully understood, but one contributing factor in the decline of this species includes roost disturbance; it is highly susceptible to disturbance and may vacate a roost for years afterwards. Other factors include the razing of abandoned buildings, mining operations, pesticide-induced poisoning, and loss of foraging habitats.

Since surface water suitable for foraging bats is present at Crafton Hills Reservoir and this species is known to occur within ten miles of the project site, this species has a moderate potential to occur as a foraging species at the existing reservoir. It has a low potential to forage elsewhere in the project sites. Due to an absence of rock outcrops or artificial substrates, roosting potential is assumed absent for all three project sites.

Northwestern San Diego Pocket Mouse (*Chaetodipus fallax fallax*)

The northwestern San Diego pocket mouse is a California Species of Concern. It ranges from the northern slopes of the San Bernardino Mountains in California to northern Baja California, Mexico. It occurs in sage scrub, sparse grasslands, and chaparral communities from sea level to about 6,000 feet in elevation. This nocturnal mouse species forages for seeds below shrub and canopies and spends the day in relatively elaborate burrow systems. It may occasionally consume young herbaceous forbs or grasses and even insects when available. It has relatively small ears and yellowish to orange-tinted pelage along the sides contrasting with a dark brown back. Major threats to its populations include habitat loss and fragmentation via urbanization, agriculture, sand and gravel mining, and flood control projects.

The northwestern San Diego pocket mouse is common in many areas of the Mill Creek and Santa Ana River alluvial plains in the vicinity of the project sites. This species was found present along the proposed pipeline site during the focused kangaroo rat trapping survey conducted by Steve Montgomery. During this trapping survey, a habitat assessment was conducted by Steve Montgomery for the potential of the two potentially occurring kangaroo rat species at the reservoir sites. It was determined that the two kangaroo rat species had no reasonable potential to occur, and that the northwestern San Diego pocket

mouse had only a low potential in the few relatively level areas of the expansion site. The overall site conditions are not favorable for this species; the topography is steep, the soil is granitic, and the vegetation is generally too dense. In addition, most of the small mammal burrows observed onsite were of pocket gophers.

California Western Mastiff Bat (*Eumops perotis californicus*)

The California western mastiff bat is listed as a California Species of Concern. It is a permanent resident throughout its range in southern California, southern Arizona, Texas, and south to South America. With a wingspan approaching two feet, the western mastiff bat is the largest bat species in North America. It is also unique in that its call can be readily identified with the unaided ear. It roosts in small colonies or singly in primarily natural substrates, such as cliff faces, large boulders, and exfoliating rock surfaces. It is less commonly found in artificial structures, such as buildings and roof tiles. It is found in a wide variety of habitats, including desert scrub, chaparral, woodlands, floodplains, and grasslands. Reasons for observed population declines are unknown.

Since surface water suitable for foraging bats is present at Crafton Hills Reservoir and this species is known to occur within ten miles of the project site, this species has a moderate potential to occur as a foraging species at the existing reservoir. It has a low potential to forage elsewhere in the project sites. Due to an absence of rock outcrops or artificial substrates, roosting potential is assumed absent for all three project sites.

San Bernardino Flying Squirrel (*Glaucomys sabrinus californicus*)

The San Bernardino flying squirrel is a California Species of Concern. Although little is known about its distribution, populations are known to occur in the San Jacinto and San Bernardino Mountains. The San Bernardino populations are separated from Sierra Nevada populations by the Mojave Desert. The Banning Pass separates the San Bernardino population and the San Jacinto population. This species inhabits various woodlands, including coniferous, mixed coniferous-deciduous, and broad-leaf-deciduous forests. It prefers old growth forests, but will also occur in second growth forests. Populations of flying squirrels tend to fare better in riparian areas than upland areas. It feeds mostly on fungus and lichens, but will also eat fruit, nuts, staminate cones, seeds, insects, and mammal material. The flying squirrel is mostly nocturnal and is biphasic in the summer. On specialized stretches of skin between its femurs, it moves by gliding from tree to tree, but will also spend time on the ground. Most nests occur in tree cavities, but leaf nests may be used during summer months. Breeding activity takes place in the spring or summer months, depending on winter rainfall. Females will usually have two litters of 2-6 young per year. Females care for young without the help from males. They will live in family groups outside of the breeding season. Little is known about threats to the San Bernardino flying squirrel, but logging, recreation, and fragmentation of habitat all may be factors. Flying squirrels have been found entangled in barbed wire, and parasites may pose another problem. More information is needed for the conservation of this species.

Since mature woodland habitats are not present on any of the project sites and elevations are generally lower than that which the species prefers, this species is considered absent from all three project sites.

Pocketed Free-Tailed Bat (*Nyctinomops femorosaccus*)

The pocketed free-tailed bat is a California Species of Concern. This species is common in Mexico, but rare in California. It is rarely found in Riverside, San Diego, and Imperial Counties. While its movements are not well-known in California, it is most likely a year-long resident. It inhabits pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert washes, alkali desert scrub, Joshua tree, and palm oasis habitats. It roosts in small groups in rock crevices, caverns, and buildings. The pocketed free-tailed bat emerges from its roost after sunset and feeds on insects flying over desert

habitat, streams, or ponds. This species feeds on many different insects, but mostly moths. It gives birth to one young per year, which takes place in June or July. Lactation occurs in July and August. Reasons for observed population declines are unknown.

Since the pocketed free-tailed bat is historically uncommon in the project vicinity and most records exist well south of the project sites, this species has a very low potential to occur as a foraging species within the project sites. Due to an absence of rock outcrops or artificial substrates, roosting potential is assumed absent for all three project sites.

White-Eared Pocket Mouse (*Perognathus alticolus alticolus*)

The white-eared pocket mouse is a California Species of Concern. This species only occurs in California, mostly in the western San Bernardino Mountains in the Strawberry Creek area and in the Mount Pinos area. It occurs in elevations between 3,500 and 5,900 feet. It inhabits ponderosa and Jeffrey pine forests with grass and bracken fern undergrowth. Although uncommon, it has also been found in chaparral, sagebrush habitats, and in a field of Russian thistle. Very little is known about this species. The white-eared pocket mouse feeds on seeds, mostly from grasses, and maybe some insects. It forages on open ground and under shrubs. It burrows in loose soils and builds nests of grass inside the burrows. It is a nocturnal species that will aestivate in very hot summers and hibernate in cold winters. Reproduction for this species is probably like that of a very similar species, *P. parvus*. This species breeds from March to April, and its average litter size is five young. Predators are probably weasels, coyotes, fox, owls, and snakes. Population declines are likely the result of urban sprawl, frequent fires, and other habitat degradation.

Elevations within the project sites are well below the requirements of this species and there are no known occurrences of this species within ten miles of the project sites; therefore, the white-eared pocket mouse is considered absent from the project site.

Los Angeles Pocket Mouse (*Perognathus longimembris brevinasus*)

The Los Angeles pocket mouse is a California Species of Concern. This pocket mouse occurs in lower elevation grasslands and sage scrub communities in the Los Angeles Basin of California, including Burbank and San Fernando on the northwest to San Bernardino on the northeast, and Cabazon, Hemet, and Aguanga on the east and southeast. Habitats include non-native grasslands, sparse Riversidean sage scrub, Riversidean alluvial fan sage scrub, and redshank chaparral. Within its habitats, it occurs in open patches with fine sandy soils potentially suitable for burrowing (CDFG 1986). The Los Angeles pocket mouse is primarily a granivore, foraging under shrub and tree canopies or around rock crevices. It has a characteristically short rostrum and is grayish-yellow to buff above with brownish or white underparts. Its tail is uniformly brownish, and it has two small white patches at the base of its ears (Whitaker 2001). Major threats to its populations include habitat loss and fragmentation via urbanization, agriculture, sand and gravel mining, and flood control projects.

Marginally suitable habitat for this species is only present at the proposed pipeline site. However, the nearest known occurrence is ten miles east, and the site location may be slightly outside of the known range of this species. In addition, this species was not found present along the proposed pipeline site during the focused kangaroo rat trapping survey conducted by Steve Montgomery. Therefore, this species is considered absent from all three project sites.

American Badger (*Taxidea taxus*)

The American badger is a California Species of Concern. This carnivorous species ranges over most of the western U.S. and upper midwestern U.S. south into central Mexico. In California, the badger may occupy a variety of habitats, especially grasslands, savannas, montane meadows, sparse scrublands,

and deserts. It prefers friable soils for burrowing, and relatively open, uncultivated ground. Prey items include gophers, ground squirrels, marmots, kangaroo rats, other rodents, and the occasional reptile or amphibian. This tenacious mammal may weigh up to 25 pounds and is easily recognized by its overall yellowish gray coloration, the white stripe on top of its head, white cheeks, and black feet with noticeably long front claws. It is a heavy-bodied animal with short legs and a characteristic pigeon-toed gait. It is chiefly nocturnal, but it is often seen by day as well. It gives birth to 2-5 young anywhere from February to May, depending on its altitude and latitude. Threats to this species include habitat loss to agriculture, housing, and other land conversions, and illegal hunting.

Substantial prey bases exist at all three sites, and numerous dens and diggings were observed on the grassland slopes just north of the reservoir expansion area. Upon further examination, most dens or diggings that superficially resembled potential badger dens were found collapsed or only dug into the ground to a depth of about one foot, and positive badger sign was not identified anywhere on the three project sites. However, this species is known to occur within five miles of the site, and suitable habitat exists within the project sites. Therefore, this species has a moderate potential for occurrence.

SECTION 4.0 – DISCUSSION

The Discussion section includes sub-sections on wildlife corridors, jurisdictional waters, and an overall analysis of sensitive habitats, and sensitive plant and animal species on the pipeline and existing and proposed reservoirs.

4.1 WILDLIFE MOVEMENT CORRIDORS

The concept of habitat corridors addresses the linkage between large blocks of habitat that allows the safe movement of mammals and other wildlife species from one habitat area to another. The definition of a corridor is varied, but corridors may include greenbelts, refuge systems, underpasses, and biogeographic landbridges, for example. In general, a corridor is described as a linear habitat, embedded in a dissimilar matrix that connects two or more large blocks of habitat.

Wildlife movement corridors are critical for the survivorship of ecological systems for several reasons. Corridors can connect water, food, and cover sources, spatially linking these three resources with wildlife in different areas. In addition, wildlife movement between habitat areas provides for the potential of genetic exchange between wildlife species populations, thereby maintaining genetic variability and adaptability to maximize the success of wildlife species in response to changing environmental conditions. This is especially critical for small populations subject to loss of variability from genetic drift and effects of inbreeding. Naturally, the nature of corridor use and wildlife movement patterns varies greatly among species.

Drainages generally serve as movement corridors because wildlife can move easily through these areas, and fresh water may be available. Corridors also offer wildlife unobstructed terrain for foraging and for the dispersal of young individuals. Due to the protective cover afforded by dense vegetation, movement corridors along drainages are particularly important to larger terrestrial species, such as mountain lion (*Felis concolor*), coyote, bobcat, and mule deer (*Odocoileus hemionus*), all of which were found in the project area or are known to occur in the vicinity.

The project area is generally surrounded by open space and light residential land uses. The proposed pipeline site is situated along the southern side of the undeveloped Mill Creek floodplain, while the reservoir sites are situated in the largely undeveloped foothills to the south of the pipeline site. Vast undeveloped areas of the San Bernardino Mountains are found to the north and east of the project area. The onsite portion of Mill Creek provides an ideal corridor for the port of entry/exit into the more confined upstream reaches of Mill Creek that begin less than one mile east of the proposed pipeline site and continue well into the mountains. In addition, a network of dirt access roads and trails, which effectively serve to facilitate the movement of larger terrestrial species, are found in the hills immediately surrounding the reservoir sites.

Light residential developments are found just southeast of the existing reservoir with the more heavily developed City of Yucaipa just south and east of the Crafton Hills. More significantly developed areas are found to the south and west of the Crafton Hills. However, the magnitude of development in this area of California is not as substantial as many coastal California areas, and large tracts of undeveloped land remain in many areas around the Crafton Hills.

From the project area, a corridor runs in a northern direction through the Crafton Hills to Mill Creek, which connects to the San Bernardino National Forest. From the San Bernardino Mountains, the corridor continues westerly through the San Gabriel and Los Angeles National Forests, as well as further north and east into the Mojave Desert. To the southwest of the project area, a corridor runs through the Crafton Hills and the San Bernardino foothills south through mountain ranges and valleys that connect to Mexico. Large culverts and underpasses occur at many major road crossings over the valleys and washes throughout these corridor routes that effectively permit the passage of medium and large terrestrial mammal species.

The development of the proposed reservoir expansion and pipeline would not significantly deter wildlife from using the corridor in a local or regional context. If the Crafton Hills and Mill Creek areas were to remain in their mostly undeveloped states with the reservoir expansion, a locally small land area (approximately 26 acres) would be lost to inundation, new dam structures, and associated facilities. Sensing significant disturbances, many of the burrowing animals on the expansion site would likely vacate the area on their own or may be effectively cleared through trap and relocation efforts and/or temporary fencing. The resulting increase of surface water, shoreline, and access roads may actually serve to benefit the corridor potential.

4.2 JURISDICTIONAL WATERS

A formal wetland delineation and jurisdictional determination was completed by Chambers Group for all three areas of the project site (Chambers Group 2008). Jurisdictional results were compiled for the three agencies with jurisdiction over waters and drainage features within California: the U.S. Army Corps of Engineers (USACE), the Regional Water Quality Control Board (RWQCB), and the CDFG. No wetlands were found on any of the sites, but other jurisdictional features were found on all three sites. A summary of jurisdictional findings is provided below. For detailed results, please refer to the Chambers Group report, titled *Wetland Delineation and Jurisdictional Determinations for Crafton Hills Reservoir Enlargement*.

4.2.1 Proposed Pipeline Site

The proposed pipeline site has one jurisdictional isolated ephemeral drainage feature. The rest of the pipeline study area consists of non-jurisdictional swales and upland habitats. A significant nexus for this drainage was determined not to exist for the USACE; therefore, there is no USACE jurisdiction at this site. However, the RWQCB has jurisdiction on 0.02 acres (170 linear feet), and the CDFG has jurisdiction on 0.08 acres (170 linear feet) within this single ephemeral drainage.

4.2.2 Crafton Hills Reservoir and the Proposed Reservoir Expansion Site

Drainage features within these two sites consist of Crafton Hills Reservoir and the ephemeral drainage that runs through the center of the proposed expansion site. A significant nexus was determined to exist for both of these features; therefore, the features are USACE-jurisdictional. Crafton Hills Reservoir is a Relatively Permanent Water (RPW) impoundment, and by definition, is considered a "Waters of the U.S." and USACE-jurisdictional. Although the water that exists within the reservoir is primarily pumped in artificially, this has no bearing on its RPW determination or USACE jurisdiction. Controlled release from the reservoir enters the immediate downstream ephemeral drainage, which then connects to Lake 2 within Yucaipa Regional Park. Lake 2 is used for interstate commerce (i.e., recreational fishing, boating, swimming, and camping as well as an onsite bait shop and snack bar), and is therefore considered a Traditional Navigable Water (TNW). The distance from Crafton Hills Reservoir to Lake 2 is approximately 4,200 river feet.

The ephemeral drainage within the proposed expansion site connects directly to the downstream drainage of Crafton Hills Reservoir, and consequently to Lake 2. A significant nexus exists for this drainage; therefore, it is considered USACE jurisdictional. Total USACE jurisdiction for the reservoir sites includes 5.41 acres. 5.32 acres occur within Crafton Hills Reservoir, and 0.09 acres (1,979 linear feet) occur within the ephemeral drainage.

The RWQCB includes all areas of USACE jurisdiction for the reservoir sites. CDFG jurisdiction is slightly larger, at 5.54 total acres. Since the banks of the ephemeral drainage are vertical throughout, CDFG jurisdictional bank-to-bank measurements do not extend beyond the Ordinary High Water Marks (OHWMs) that define USACE and RWQCB jurisdiction in the drainage. At the existing reservoir, CDFG

extends beyond the waterline to include the outer edges of the riparian vegetation dripline that surrounds the site. This extension amounts to an additional 0.14 acres of CDFG jurisdiction as compared to USACE and RWQCB jurisdiction.

4.3 GENERAL ANALYSIS AND RECOMMENDATIONS

None of the project sites have much potential to contain threatened or endangered species, and some potentially occurring species are absent based on focused surveys or a lack of suitable habitat. Nevertheless, a diverse wildlife species composition is expected to seasonally occur at the project sites, and a number of plant species have been documented on the project sites. With proper mitigation measures, project impacts would be considered less than significant under California Environmental Quality Act (CEQA) guidelines.

4.3.1 Proposed Pipeline Site

There were no federal- and/or state-threatened or endangered species or otherwise sensitive species observed within the proposed pipeline site during the reconnaissance survey, focused plant survey, or the small mammal trapping survey conducted by Steve Montgomery. However, sensitive RAFSS communities were found along the proposed pipeline site.

Chambers Group recommends that pipeline construction activities impact the least amount of land as possible. Since the northwestern San Diego pocket mouse was identified as present along the pipeline route, trap and relocation efforts should be conducted prior to initiating construction. Silt fencing should be installed at least six inches into the ground and extend at least one foot above the ground surrounding the entire construction site. All trapped small mammals should then be relocated outside of the silt fencing. After construction of the pipeline, the RAFSS vegetation communities within the proposed pipeline site should be restored to a natural state according to the shrub species presently associated within the RAFSS communities.

4.3.2 Crafton Hills Reservoir and Proposed Reservoir Expansion Site

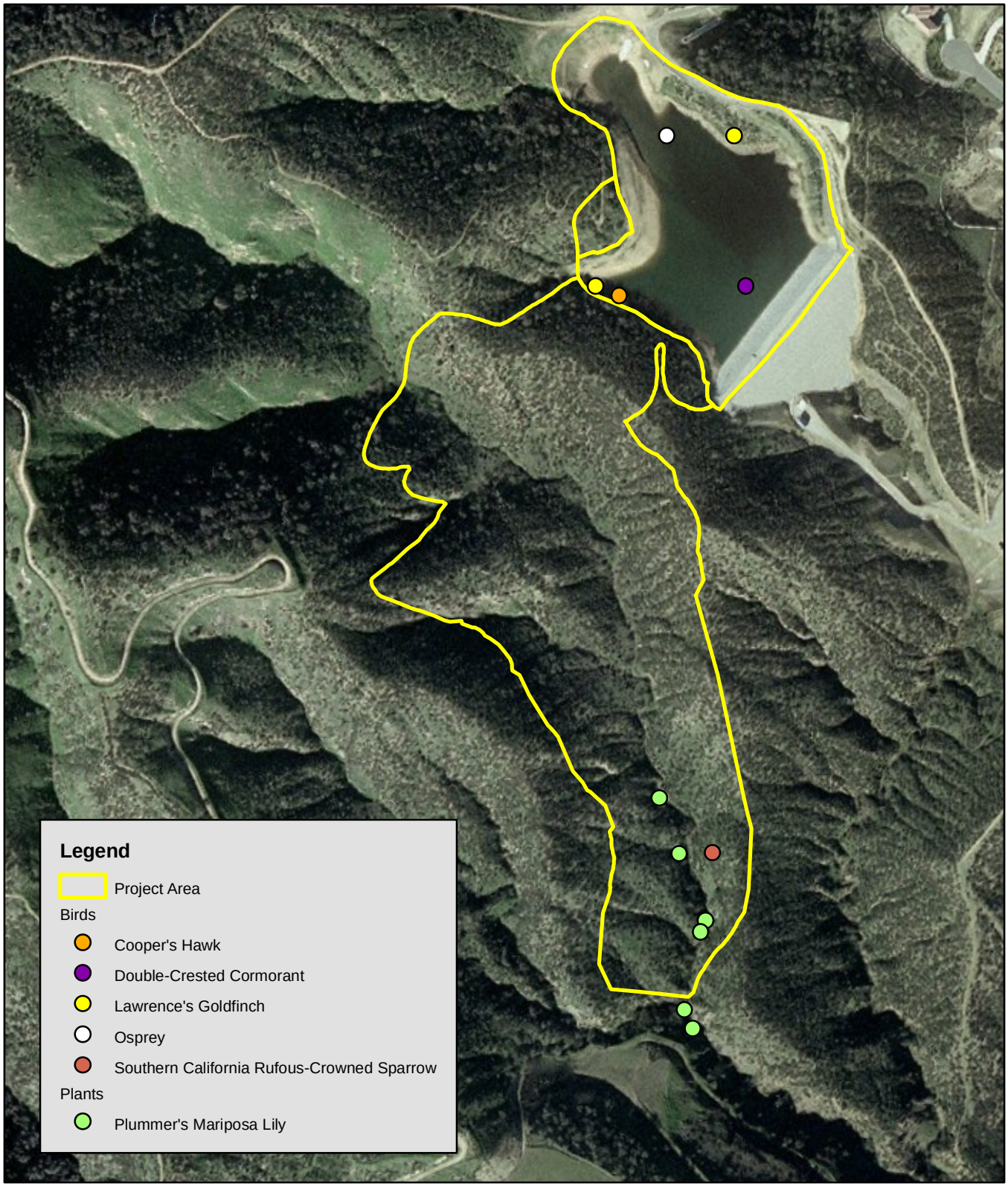
There were no federal- and/or state-threatened and/or endangered species or otherwise sensitive species or habitats observed within the existing reservoir site during the reconnaissance survey or the focused plant survey.

During the reconnaissance survey, the Plummer's mariposa lily, a CNPS 1B.2 special status plant species, was identified at six locations within the reservoir expansion site (Figure 4). One to three plants were observed at each location, for a total of nine individual plants observed onsite. This survey was not conclusive, however, and additional individual plants are likely present elsewhere onsite. Chambers Group recommends that any Plummer's mariposa lily bulbs within the potential impact area should be transplanted to areas outside the proposed reservoir expansion footprint prior to construction activities.

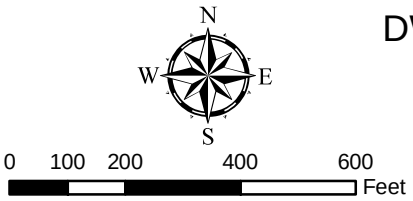
The focused plant survey, in which the entire project site was surveyed on-foot, occurred subsequent to the flowering period of Plummer's mariposa lily; therefore, the species was not identifiable at that time. Persistent vegetation of mariposa lilies is not sufficient to identify specimens to the species level. However, persistent vegetation of the federal- and state-listed plant species with some potential to occur onsite was sufficient to identify specimens to the species level at the time of the focused plant survey. Because there were no federal- or state-listed plant species found during the focused plant survey, Section 7 Consultation under the Endangered Species Act will not be necessary for plant species at the proposed reservoir expansion site. There were no sensitive habitats mapped within the proposed reservoir expansion site.

Inundated and/or impacted habitats present within the proposed reservoir expansion site should be restored at a 1:1 ratio. The grasslands along the slopes north of the expansion area footprint provide an excellent on-site mitigation opportunity, and additional areas may be found elsewhere in the Crafton Hills. In addition, the increased shoreline that would result from the reservoir expansion provides an opportunity for riparian creation that would increase wildlife use of the site.

Due to the abundance of small mammal burrows and predator sign at the reservoir sites, trap and relocation efforts should be conducted prior to construction within a silt-fenced perimeter like that proposed for the pipeline site.



Chambers Group Inc.



DWR - Crafton Hills Reservoir
Location Map
Figure 4

SECTION 5.0 – REFERENCES

Atwood, J. L.
1990 Status review of the California Gnatcatcher (*Polioptila californica*). Manomet Bird Observatory, P.O. Box 1770, Manomet, MA 02345.

Bontrager, D.R.
1991 Habitat requirements, home range requirements, and breeding biology of the California Gnatcatcher (*Polioptila californica*) in south Orange County, California. Prepared for Santa Margarita Company, Ranch Santa Margarita, CA. April.

Bradford, D. F.
1989 Allotopic distribution of native frogs and introduced fishes in high Sierra Nevada lakes of California USA: Implication of the negative effect of fish introductions. Copeia. 1989:775-778.

Bradford, D. F., F. Tabatabai, and D. M. Graber
1993 Isolation of remaining populations of the native frog, *Rana muscosa*, by introduced fishes in Sequoia and Kings Canyon National Parks, California. Conservation Biology. 7:882-888.

California Department of Fish and Game (CDFG)
1986 Los Angeles Pocket Mouse, Mammalian Species of Special Concern in California.

California Natural Diversity Database (CNDDB)
2007 Database Record Search for *Yucaipa* and *Redlands,* California 7.5-minute USGS quadrangles. California Department of Fish and Game, State of California Resources Agency, Sacramento, California.

California Native Plant Society Electronic Inventory (CNPSEI)
2007 Database Record Search for *Yucaipa* and *Redlands,* California 7.5-minute USGS quadrangles. California Native Plant Society, Sacramento, California. www.CNPS.org.

Chambers Group, Inc.
2008 Wetland Delineation and Jurisdictional Determinations for Crafton Hills Reservoir Enlargement.

Collins, C.P. and T. D. Reynolds
2005 Ferruginous Hawk (*Buteo regalis*):A Technical Conservation Assessment Prepared for the USDA Forest Service, Rocky Mountain Region, Species Conservation Project.

Davis, J. N.
1999 Lawrence's Goldfinch (*Carduelis lawrencei*). In The Birds of North America, No. 480 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennsylvania.

Department of the Interior, Fish and Wildlife Service
2000 Endangered and Threatened Wildlife and Plants; Proposed Designation of Critical Habitat for the San Bernardino Kangaroo Rat. Federal Register, December 8, 2000, Volume 65(237) 77177-77208. Accessed February 29, 2008 online at http://www.fws.gov/policy/library/00fr77177.html.

Ehrlich, P. R., D. S. Dobkin, and D. Wheye
1988 The birder's handbook. Simon and Schuster, New York.

Evans, R.A. and J.A. Young
1989 "Characterization and analysis of abiotic factors and their influences on vegetation." Pages 13-28 *in* L.F. Huenneke and H.A. Mooney, editors. *Grassland Structure and function: California Annual Grassland.* Kluwer Academic Publishers, Boston, Massachusetts.

Garrett, K., and J. Dunn
1981 Birds of southern California. Los Angeles Audubon Society. 408 pp.

Gordon, H.J. and T.C. White
1994 Ecological guide to southern California chaparral plant series. Technical Publication R5-ECOL-TP-005. USDA, Forest Service, Pacific Southwest Region, San Francisco, California.

Grinnell, J., and A. H. Miller
1944 The Distribution of the Birds of California. Pac. Coast Avifauna No. 27. 608pp.

Hanes, T.L., R.D. Friesen, and K. Keane
1989 "Alluvial Scrub Vegetation in Coastal Southern California." Pages 187-193. *Proceedings of the California Riparian Systems Conference*, September 22-24, 1988. Davis, California. USDA Forest Service Gen. Tech. Rep. PSW-110.

Harris, J.H., S.D. Sanders, and M.A. Flett
1988 The status and distribution of the willow flycatcher (*Empidonax trailli*) in the Sierra Nevada. California Department of Fish and Game, Wildlife Management Branch Administrative Report 88-1.

Hatch, J. J., and D. V. Weseloh
1999 Double-crested Cormorant (*Phalacrocorax auritus*). In The Birds of North America, No. 441 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennslvania.

Haug, E. A., B. A. Millsap, and M. S. Martell
1993 Burrowing Owl (*Athene cunicularia*). *In* The Birds of North America, No. 61 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Hickman, J. C. (Editor)
1993 *The Jepson* Manual*: Higher Plants of California.* University of California Press, Berkeley, California.

Holland, R.F.
1986 *Preliminary Descriptions of the Terrestrial Natural Communities of California*. State of California, The Resources Agency.

Hughes, J. M.
1999 Yellow-billed Cuckoo (Coccyzus americanus). In The Birds of North America, No. 418 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennsylvania.

James, P.C. and R.H.M. Espie
1997 Current status of the burrowing owl in North America: Anagency survey. J. Raptor Res. Rep. 9:3-5.

Johnsgard. P.A.
1988 North American Owls: Biology and Natural History. Washington D.C. Smithsonian Institution Press.

Kirkpatrick, J.B. and C.F., Hutchinson
1977 The Community Composition of California Coastal Sage Scrub. Vegetation 25: 21-33.

Matthews, K. R., and K. L. Pope.
1999 A telemetric study of the movement patterns and habitat use of Rana muscosa, the mountain yellow-legged frog, in a high-elevation basin in Kings Canyon National Park, California. Journal of Herpetology 33:615-623.

Mock, P.J., B.L. Jones, M. Grishaver, J. Konecny, and D. King
1990 Home range size and habitat preferences of the California Gnatcatcher in San Diego County. 108th Meeting of the American Ornithologists' Union, 60th Meeting on Cooper Ornithological Society, 1990. 95pp.

Montgomery, S.
2007 San Bernardino Kangaroo Rat Trapping Results Letter Report. June 30, 1997.

Munz, P. A.
1974 *A Flora of Southern California*. University of California Press, Berkeley, California.

Poole, A. F., R. O. Bierregaard, and M. S. Martell
2002 Osprey (*Pandion haliaetus*). *In* The Birds of North America, No. 683 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, Pennsylvania.

Preston K.L., P.J. Mock, M.A. Grishaver, E.A. Bailey, and D.F. King
1998 California territorial behavior. Western Birds 29: 242-257.

Remsen, J.V.
1978 Bird species of special concern in California: An annotated list of declining or vulnerable bird species. CDFG Wildlife Management Branch. Report No. 78-1.

Robertson, J.M.
1929 Some observations on the feeding habits of the burrowing owl. Condor 31:38-39.

Rocke, T.E. and M. Friend
1999 Avian botulism. In: M. Friend & J.C. Franson (eds) Field Manual of Wildlife Diseases: General Field Procedures and Disease of Birds. U.S. Geological Survey, Biological Resources Division Information and Technology Report 1999-2001: 271-281.

Sawyer, J.O., Jr. and T. Keeler-Wolf
1995 *A Manual of California Vegetation*. California Native Plant Society, Sacramento, California.

Scott, T.A. and M.L. Morrison
1990 Natural history and management of the San Clemente loggerhead shrike. Proc. West. Found. Vertebrate Zoology 4:23-57.

Smith, R.L.
1980 Alluvial Scrub Vegetation of the San Gabriel River Floodplain, California. Madrono 27:126-138.

Stebbins, R.C.
2003 A Field Guide to Western Reptiles and Amphibians. 3d edition. Houghton Mifflin, Boston.

U.S. Department of Agriculture (USDA)
1979 Survey of San Bernardino County, California, Southwestern Part. Washington, D. C.

U.S. Fish and Wildlife Service (USFWS)
1995 Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher. Federal Register 60: 10694 (February 27, 1995).

U.S. Geological Survey (USGS)
1980 Redlands and Yucaipa 7.5' Topographic Quadrangles, 1967; photorevised 1980.

2007 Breeding Ranges of Willow Flycatcher Subspecies. URL: http://sbsc.wr.usgs.gov/cprs/research/projects/swwf/wiflrang.asp. Accessed on June 18, 2007.

Unitt, P.
1987 *Empidonax traillii extimus*: an endangered subspecies. Western Birds 18: 137-162.

Wachtell, John K.
1978 Soil survey of Orange County, and western part of Riverside County, California. United States. Soil Conservation Service. California. Agricultural Experiment Station, Berkeley.

Westman, W.E.
1981 Diversity relations and succession in Californian coastal sage scrub. Ecology 62: 439-455.

Whitaker, J.O.
2001 National Audubon Society Field Guide to North American Mammals. Alfred A. Knopf, New York.

Zeiner, D. C., W. F. Laudenslayer Jr., and K. E. Mayer
1990 California's Wildlife. Vol.2. Birds. California Statewide Wildlife Habitat Relat. System, California. Resources Agency, Dept. Fish and Game, Sacramento, California.

Zweifel, R. G.
1955 Ecology, distribution, and systematics of frogs of the Rana boylii group. Univ. of California Publ. Zool. 54:207-292.

APPENDIX A – PLANT SPECIES LIST

Appendix A
Plant Species Observed at the Crafton Hills Project Site

Scientific Name	Reservoir Site	Proposed Expansion Site	Pipeline Site
FERNS AND FERN ALLIES			
Pellaea mucronata bird's-foot fern		X	X
Pentagramma triangularis goldenback fern	X	X	X
Selaginella bigelovii Bigelow's spike-moss	X	X	X
ANGIOSPERMS (DICOTYLEDONS)			
Acourtia microcephala sacapellote	X	X	
Adenostoma fasciculatum chamise	X	X	X
Ailanthus altissima* tree of heaven	X		
Amaranthus albus* tumbling pigweed	X		X
Ambrosia psilostachya western ragweed			X
Amsinckia menziesii common fiddleneck			X
Anagallis arvensis* scarlet pimpernel	X		
Anthemis cotula* mayweed	X		
Anthriscus caucalis* bur-chervil	X		
Arctostaphylos glauca bigberry manzanita		X	
Artemisia californica California sagebrush	X	X	X
Artemisia dracunculus tarragon	X		
Baccharis salicifolia mule fat	X	X	
Brassica rapa* field mustard		X	
Calandrinia ciliata red maids	X	X	
Calochortus plummerae Plummer's mariposa lily	X		X
***Calochortus* sp.** mariposa lily	X	X	X
Carduus pycnocephalus* Italian thistle	X	X	X
Ceanothus crassifolius hoary leaf ceanothus	X	X	X

Ceanothus cuneatus buck brush	X	X	
Ceanothus leucodermis chaparral whitethorn	X	X	X
Ceanothus tomentosus woolly-leaved ceanothus	X	X	
Centaurea melitensis* tocalote	X	X	X
Cercocarpus betuloides birch-leaf mountain-mahogany		X	
Chenopodium album* lamb's quarters	X		
Clarkia purpurea winecup clarkia	X	X	X
Conyza bonariensis* flax-leaved horseweed	X		
Conyza canadensis horseweed	X	X	
Crassula connata pygmy-weed	X		X
Croton california California croton			X
***Cryptantha* sp.** cryptantha	X	X	
Datura wrightii jimson weed	X		X
Dudleya lanceolata lance-leaved dudleya			X
Emmenanthe penduliflora whispering bells			X
Encelia farinosa brittlebush	X		X
Epilobium ciliatum California cottonweed	X		
Eremocarpus setigerus dove weed	X		X
Eriastrum sapphirinum sapphire eriastrum		X	X
Erigeron foliosus leafy daisy	X	X	X
Eriogonum fasciculatum California buckwheat	X	X	X
Eriogonum gracile slender woolly buckwheat	X		X
Eriophyllum confertiflorum golden yarrow	X	X	X
Erodium botrys broad-lobed filaree		X	
Erodium cicutarium* red-stemmed filaree	X	X	X

Foeniculum vulgare* fennel	X		X
Galium angustifolium narrow-leaved bedstraw	X	X	
***Gilia* sp.** gilia	X		
Gnaphalium californicum California everlasting	X		
Gnaphalium canescens felty everlasting	X	X	
Gnaphalium luteo-album* white cudweed	X		
Gnaphalium palustre lowland cudweed	X		
Gutierrezia californica California matchweed	X		
Hazardia squarrosa saw-toothed goldenbush		X	
Helianthus gracilentus slender sunflower	X		
Heteromeles arbutifolia toyon		X	
Heterotheca grandiflora telegraph weed	X	X	
Heterotheca villosa hairy false goldenaster	X		
Hirshfeldia incana* short-podded mustard	X	X	X
Isocoma menziesii coast goldenbush			X
Keckiella antirrhinoides chaparral beard-tongue			X
Keckiella cordifolia heart leaved keckiella	X		X
Lamium amplexicaule* henbit	X	X	
Lactuca serriola* prickly lettuce	X	X	
***Lepidium* sp.** peppergrass	X	X	
Lepidospartum squamatum scale-broom		X	
Lessingia filaginifolia cudweed aster	X	X	X
Lonicera interrupta chaparral honeysuckle		X	
Lotus purshianus* var. *purshianus Spanish clover	X		
Lotus salsuginosus coastal lotus	X		

Lotus scoparius deerweed	X	X	X
***Lotus* sp.** lotus	X	X	
Lupinus bicolor miniature lupine	X		X
Lupinus hirsutissimus stinging lupine			X
Malosma laurina laurel sumac	X	X	
Marah macrocarpus wild cucumber		X	
Marrubium vulgare* horehound	X	X	
Melilotus indica* sourclover	X		
Mentzelia albicaulis whitestem blazingstar			X
Mimulus aurantiacus orange bush monkey-flower	X		X
Mimulus floribundus many-flowered monkey-flower	X		
Navarretia hamata hooked skunkweed			X
Nicotiana glauca* tree tobacco	X		X
Opuntia parryi cane cholla			X
Paeonia californica California peony	X	X	X
Pectocarya linearis slender pectocarya	X		
Penstemon spectabilis royal penstemon	X	X	X
Phacelia ramosissima branching phacelia	X	X	X
Picris echioides* bristly ox-tongue	X		
Plantago major* common plantain	X		
Populus fremontii Fremont cottonwood	X		
Prunis ilicifolia holly-leafed cherry		X	
Quercus berberidifolia scrub oak	X	X	
Rafinesquia californica California chicory	X	X	
Rhamnus crocea spiny redberry	X	X	X

Rhamnus ilicifolia holly-leafed redberry		X	
Rhus ovata sugar bush		X	X
Rhus trilobata skunkbrush	X	X	X
Rumex crispus* curly dock	X		
Salix gooddingii black willow	X		
Salix lasiolepis arroyo willow	X		
Salix lucida shining willow	X		
Salsola tragus* Russian thistle	X	X	
Salvia apiana white sage	X	X	X
Salvia columbariae chia	X	X	X
Salvia mellifera black sage		X	X
Sambucus mexicana Mexican elderberry	X	X	X
Scrophularia californica California figwort	X	X	X
Senecio vulgare common groundsel	X	X	
Sisymbrium irio* London rocket			X
Solanum xanti chaparral nightshade	X	X	X
Sonchus asper* ssp. *asper* prickly sow thistle	X		
Sonchus oleraceus* common sow thistle	X		
Stephanomeria exigua small wreathplant	X	X	
Stephanomeria pauciflora brownplume wirelettuce			X
Stephanomeria virgata twiggy wreathplant	X	X	
Tamarix ramosissima* *Mediterranean tamarisk*	X	X	X
Tetradymia comosa hairy horsebrush			X
Torilis arvensis* torilis			X
Toxicodendron diversilobum poison oak		X	

***Trifolium* sp.** clover	X	X	
Umbellularia californica California laurel		X	
Vicia villosa* winter vetch	X		X
Yucca whipplei Our Lord's candle		X	X
ANGIOSPERMS (MONOCOTYLEDONS)			
Avena barbata* slender wild oat			X
Avena fatua* wild oat	X	X	
Bloomeria crocea common goldenstar		X	
Bromus diandrus* ripgut grass	X	X	X
Bromus hordeaceus* soft chess	X	X	X
Bromus madritensis* ssp. *rubens* foxtail chess	X	X	X
Bromus tectorum* cheat grass	X	X	X
Chlorogalum pomeridianum soap plant	X		X
Cortaderia selloana* pampas grass	X		
Cynodon dactylon* Bermuda grass	X	X	X
Echinochloa crus-galli* barnyard grass	X	X	
Hordeum murinum* glaucous foxtail barley		X	
Lamarckia aurea* goldentop		X	X
Lolium multiflorum* ryegrass	X	X	
Melica imperfecta coast range melic		X	
Nassella lepida small-flowered needlegrass		X	X
Nassella pulchra purple needlegrass	X		
Panicum dichotomiflorum* fall panic	X	X	
Pennisetum setaceum* fountain grass	X		
Poa secunda Malpais bluegrass		X	X

Polypogon monspeliensis* annual beard grass	X		
Schismus barbatus* Mediterranean schismus	X		
Vulpia myuros* fescue	X	X	X
*** indicates a non-native species.**			

APPENDIX B – WILDLIFE SPECIES LIST

Appendix B
Crafton Hills Wildlife Species

Scientific Name Common Name	Existing Reservoir	Reservoir Expansion	Pipeline
CLASS OSTEICHTHYES BONY FISHES			
Gambusia affinis mosquito fish	O		
CLASS REPTILIA REPTILES			
Uta stansburiana common side-blotched lizard	O	O	
Sceloporus occidentalis western fence lizard	O	O	O
Rhinocheilus lecontei long-nosed snake			C
CLASS AVES BIRDS			
Phalacrocorax auritus double-crested cormorant *	O		
Anas platyrhynchos mallard	O		
Pandion halianetus osprey *	O		
Accipiter cooperii Cooper's hawk *	O		
Buteo jamaicensis red-tailed hawk	O	O	
Callipepla californica California quail	O, V	O, V	
Charadrius vociferous killdeer	O, V	O, V	
Zenaida macroura mourning dove	O, V	O, V	
Tyto alba barn owl		O	
Aeronautes saxatalis white-throated swift	O, V	O, V	
Calypte anna Anna's hummingbird	O, V	O, V	O, V
Calypte costae Costa's hummingbird	O, V	O, V	
Picoides nuttallii Nuttall's woodpecker		V	
Myiarchus cinerascens ash-throated flycatcher		O, V	
Sayornis nigricans black phoebe	O, V		
Sayornis saya Say's phoebe			O

Appendix B (continued)
Crafton Hills Wildlife Species

Scientific Name Common Name	Existing Reservoir	Reservoir Expansion	Pipeline
Tyrannus vociferans Cassin's kingbird	O	O, V	
Petrochelidon pyrrhonota cliff swallow	O, V	O, V	
Stelgidopteryx serripennis northern rough-winged swallow	O, V	O, V	
Aphelocoma californica western scrub-jay	O, V	O, V	V
Corvus corax common raven	O	O, V	O
Psaltriparus minimus bushtit	O, V	O, V	
Thryomanes bewickii Bewick's wren	O, V	O, V	
Chamaea fasciata wrentit	O, V	O, V	O, V
Polioptila caerulea blue-gray gnatcatcher		O, V	
Toxostoma redivivum California thrasher		O, V	
Phainopepla nitens phainopepla		O, V	V
Aimophila ruficeps canescens rufous-crowned sparrow *		O, V	
Pipilo crissalis California towhee	O, V	O, V	O, V
Pipilo maculatus spotted towhee	V	O, V	V
Carduelis lawrencei Lawrence's goldfinch *	O, V		
Carduelis psaltria lesser goldfinch	O, V	O, V	
Carpodacus mexicanus house finch	O, V	O, V	
Gallus domesticus domestic chicken		C	
CLASS MAMMALIA MAMMALS			
Sylvilagus audubonii desert cottontail	O, S, T	O, S, T	O, S, T
Dipodomys simulans Dulzura kangaroo rat			O, S, T, B
Peromyscus maniculatus deer mouse			O, S, B
Chaetodipus fallax fallax northwestern San Diego pocket mouse			O, S, B
Neotoma lepida desert woodrat	N	N	

Appendix B (continued)
Crafton Hills Wildlife Species

Scientific Name Common Name	Existing Reservoir	Reservoir Expansion	Pipeline
Procyon lotor Raccoon	S, T		
Lynx rufus Bobcat	S	S	
Odocoileus hemionus mule deer			T
Equus caballus domestic horse		T	
Thomomys bottae pocket gopher			B, N
Canis latrans coyote	S, B	S, B	S
Canis familiaris domestic dog			C
B = Burrow, C = Carcass, Fe – Feathers, Fu = Fur, N = Nest, O = Observed, Od = Odor, S = Scat, T = Tracks V = Vocalization			
*** Denotes sensitive species**			

Appendix E

Draft Wetland Delineation and Jurisdictional Determination

ESA

DRAFT
WETLAND DELINEATION AND JURISDICTIONAL DETERMINATIONS FOR CRAFTON HILLS RESERVOIR ENLARGEMENT

Prepared for:
ENVIRONMENTAL SCIENCE ASSOCIATES
707 Wilshire Boulevard, Suite 1450
Los Angeles, CA 90017

Prepared by:
CHAMBERS GROUP, INC.
17671 Cowan Avenue, Suite 100
Irvine, CA 92614

August 15, 2008

TABLE OF CONTENTS

Page

SECTION 1.0 – INTRODUCTION 1

1.1 PROJECT DESCRIPTION 1

1.2 PROJECT LOCATION 1

SECTION 2.0 – JURISDICTIONAL CRITERIA 4

2.1 UNITED STATES ARMY CORPS OF ENGINEERS 4

2.2 REGIONAL WATER QUALITY CONTROL BOARD 5

2.3 CALIFORNIA DEPARTMENT OF FISH AND GAME 6

SECTION 3.0 – METHODS 7

3.1.1 Literature Review 7

3.1.2 Field Survey 7

3.1.3 Vegetation 8

3.1.4 Soils 8

3.1.5 Hydrology 8

SECTION 4.0 – FINDINGS 10

4.1 SOILS 10

4.3 WETLANDS 11

4.4 USACE JURISDICTION 11

4.5 RWQCB JURISDICTION 14

4.6 CDFG JURISDICTION 14

SECTION 5.0 – REFERENCES 17

APPENDIX A – SITE PHOTOS

APPENDIX B – WETLAND DETERMINATION DATA FORMS

APPENDIX C – JURISDICTIONAL DETERMINATION FORMS

LIST OF FIGURES

Figure **Page**

1 Vicinity Map 2

2 Location Map 3

3 Reservoir Delineation Map 8

4 Pipeline Delineation Map 9

LIST OF TABLES

Table **Page**

4-1 Jurisdictional Impacts Matrix 7

SECTION 1.0 – INTRODUCTION

1.1 PROJECT DESCRIPTION

Crafton Hills Reservoir was constructed as a component of the East Branch Extension Phase I Department of Water Resources (DWR) project. Environmental documentation for construction of the reservoir was addressed in the *Supplemental EIR No. 1 for the East Branch Extension Phase I* prepared by P&D Consultants in November 1997. The approximately 85 acre-foot (a.f.) reservoir was constructed with the following features: a zoned earthfill dam, an uncontrolled overpour spillway, a 54-inch diameter outlet conduit and appurtenant structures designed for reversible flow, a 12-inch diameter emergency release blow-off, and access roads with adjacent drainage ditches.

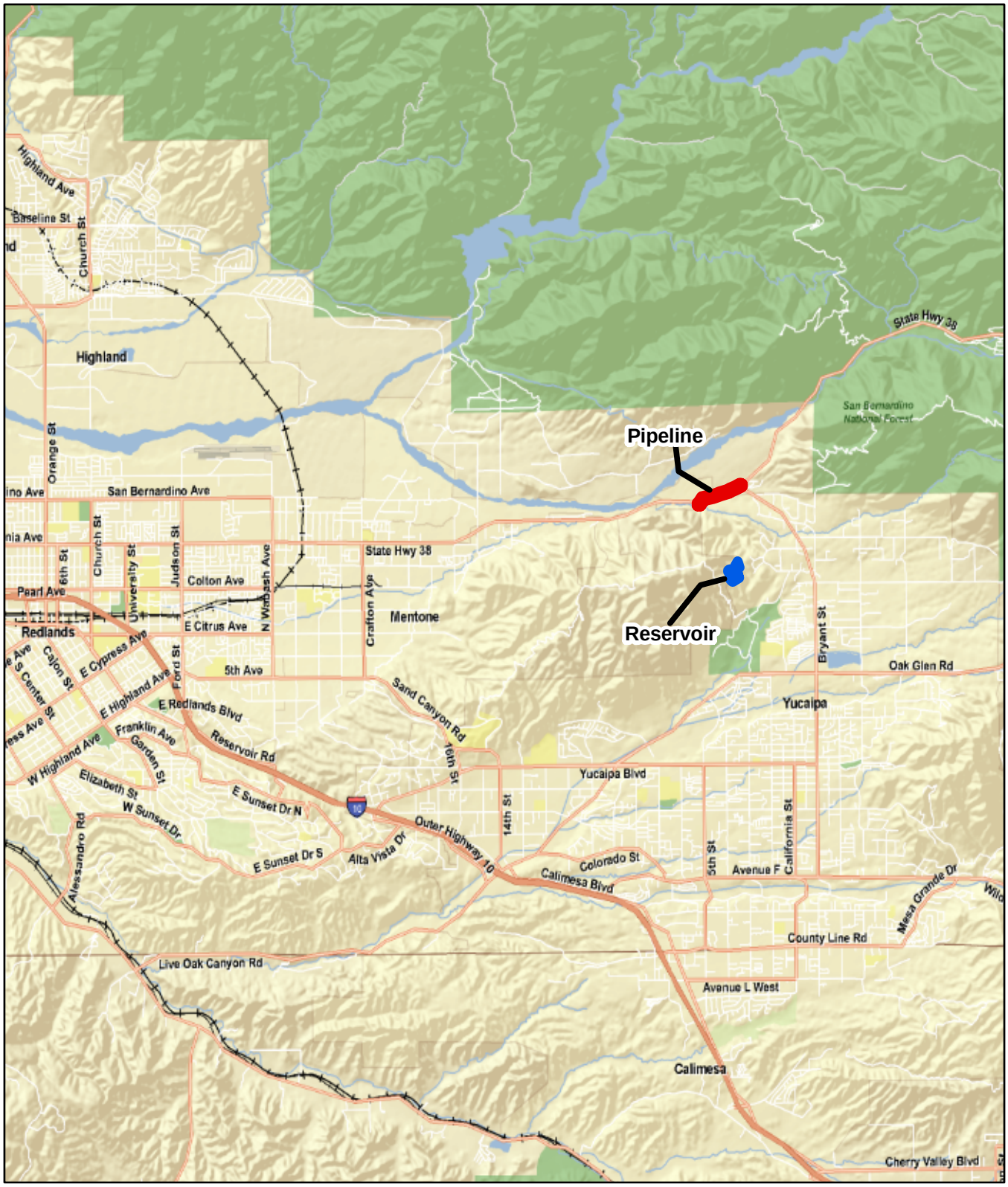
DWR proposes expansion of the Crafton Hills Reservoir to 225 a.f. and construction of approximately 0.5 mile of pipeline from East Branch Extension I to the San Bernardino Valley Municipal Water District's (SBVMWD) Yucaipa pipeline. The purpose of the expansion is to allow for off-peak pumping to meet daytime water deliveries. The existing Crafton Hills Reservoir size is insufficient for current needs, which requires DWR to run the pumps at Crafton Hills Pump Station during peak energy demand times of the day. This puts unnecessary load on the electrical grid system. Enlargement of the reservoir will allow DWR to fill the reservoir during off-peak periods of the day, relieving pressure on the energy grid, and lowering pumping costs.

The proposed project includes the construction of a larger earthfill dam along with access roads, drainage ditches, cut slopes, and all operational dam equipment to be constructed in the adjacent valley to the west of the existing reservoir. The project also includes the construction of an additional pipeline segment in the Mill Creek floodplain which would allow DWR to maintain water deliveries to Reach 2 and Reach 3 segments of the East Branch Extension while the reservoir is being enlarged. After the proposed project is completed, the connector pipeline would remain in place to provide an emergency back that currently does not exist in the event of a reservoir outage.

For the purpose of this report, the project area includes three distinct project sites: the existing reservoir site, the reservoir expansion site, and the proposed pipeline site. The proposed pipeline site includes a study area of 200 feet to either side of the pipeline centerline.

1.2 PROJECT LOCATION

Crafton Hills Reservoir, at an elevation of 2,925 feet, is located within the Yucaipa city limits, San Bernardino County, California, approximately two miles north of the City of Yucaipa. Land uses that surround the reservoir include primarily open space as well as light single-family residential adjacent to the southeast edge of the project area (Figure 1). The proposed pipeline is paralleled by California State Route 38 (Mill Creek Road) to the south, and is adjacent to open space to the north, east, and west. The proposed pipeline alignment includes one crossing of Mill Creek Road along its western portion. Smaller residential areas are to the west, and a new residential area, Crafton Hills Estates, is under construction just south of Mill Creek Road between the reservoir site and the proposed pipeline site. The reservoir expansion site is located in an unnamed canyon at approximately 34° 03' 54" North and 117° 03' 05" West in the southwest ¼ of Section 24 of Township 1 South, Range 2 West of the United States Geological Service (USGS) *Yucaipa* 7.5 minute quadrangle map (Figure 2). The expansion site lies in a natural canyon dominated by chamise chaparral over most of the area and annual grasslands along the northern portion. An ephemeral wash, which originates just north of the proposed expansion site and continues to the south, is generally located in the center of the proposed expansion site.

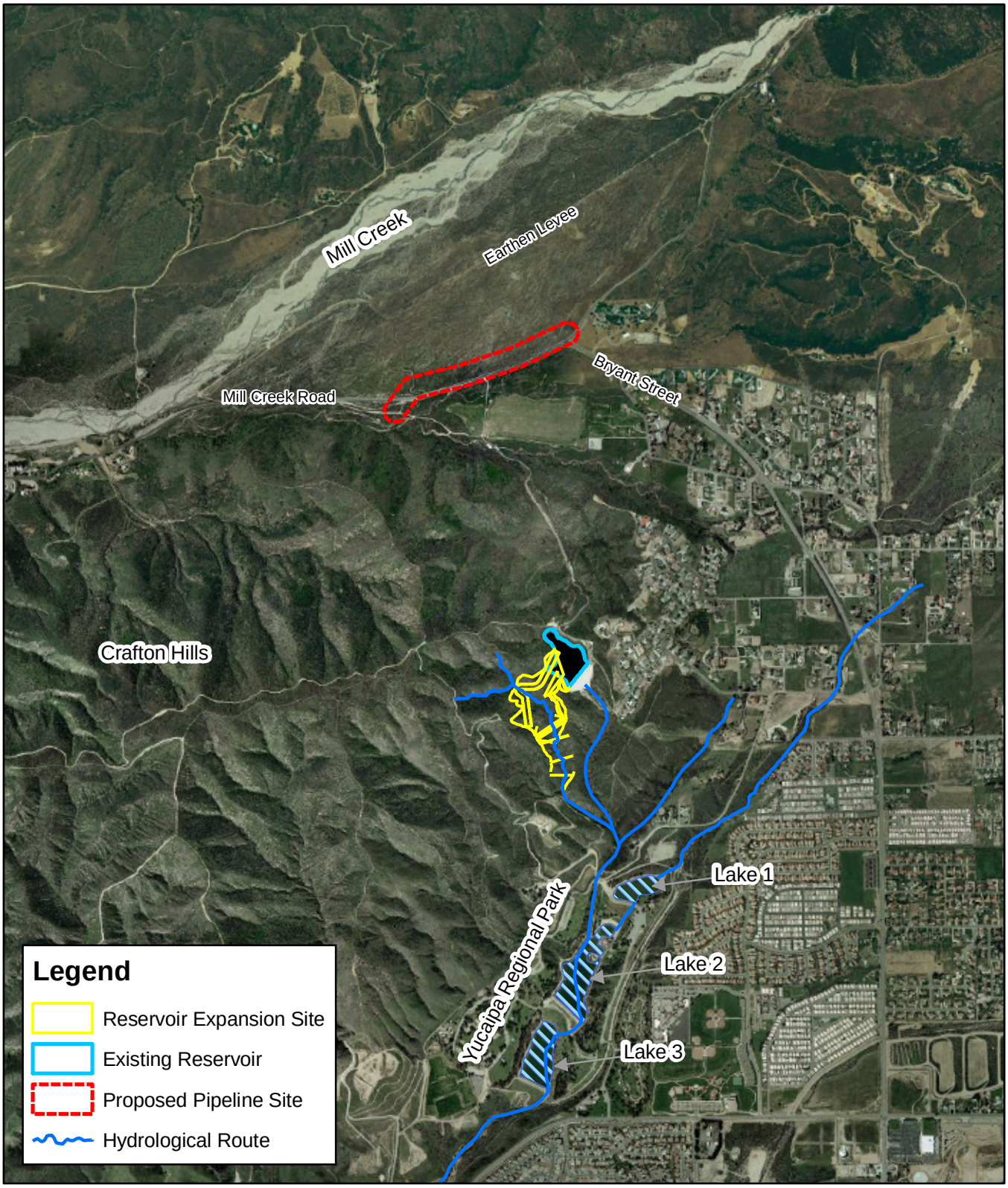


Chambers Group Inc.

N
W E
S

0 0.5 1 1.5 2
Miles

DWR - Crafton Hills Reservoir
Location Map
Figure 1



Chambers Group Inc.

N
W E
S

0 400 800 1,600 2,400 3,200
Feet

DWR - Crafton Hills Reservoir
Location Map
Figure 2

SECTION 2.0 – JURISDICTIONAL CRITERIA

2.1 UNITED STATES ARMY CORPS OF ENGINEERS

Pursuant to Section 404 of the Clean Water Act, the USACE regulates the discharge of dredged and/or fill material into waters of the United States. Waters of the United States include navigable waterways and wetlands adjacent to navigable waterways, and non-navigable waterways and wetlands adjacent to non-navigable waters that are contiguous with navigable waterways. The term "waters of the United States" is defined by 33 Code of Federal Regulations (CFR) Part 328 and currently includes (1) all navigable waters (including all waters subject to the ebb and flow of the tide), (2) all interstate waters and wetlands, (3) all other waters (e.g., lakes, rivers, intermittent streams) that could affect interstate or foreign commerce, (4) all impoundments of waters mentioned above, (5) all tributaries to waters mentioned above, (6) the territorial seas, and (7) all wetlands adjacent to waters mentioned above.

Wetlands are defined by 33 CFR 328.3(b) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support...a prevalence of vegetation typically adapted for life in saturated soil conditions." In 1987 the USACE published a manual to guide its field personnel in determining jurisdictional wetland boundaries. This manual was amended in 2006 by the Arid West Supplement. Currently, the 1987 Wetland Manual and the 2006 Arid West Supplement provide the legally accepted methodology for identification and delineation of USACE-jurisdictional wetlands in southern California.

The methodology set forth in the 1987 Wetland Manual and updated by the Arid West Supplement generally requires that, in order to be considered a wetland, the vegetation, soils, and hydrology of an area exhibit at least minimal hydric characteristics. While the manual provides great detail in methodology and allows for varying special conditions, a wetland should normally meet each of the following three criteria:

- More than 50 percent of the dominant plant species at the site must be typical of wetlands (i.e., rated as facultative or wetter in the 1988 National List of Plant Species that Occur in Wetlands [Reed 1988]). These plants are known as "hydrophytic vegetation."
- Soils must exhibit physical and/or chemical characteristics indicative of permanent or periodic saturation (e.g., a gleyed color, or mottles with a matrix of low chroma indicating a relatively consistent fluctuation between aerobic and anaerobic conditions). Such soils, known as "hydric soils," have characteristics that indicate they are developed in conditions where soil oxygen is limited by the presence of saturated soil for long periods during the growing season.
- Hydrologic characteristics must indicate that the ground is saturated to within 12 inches of the surface for at least 5 percent of the growing season during a normal rainfall year. For most of low-lying Southern California, 5 percent of the growing season is equivalent to 18 days.

Although the most reliable evidence of wetland hydrology may be provided by a gauging station or groundwater well data, such information is often limited for most areas. Thus, most hydrologic indicators are those that can be observed during field inspection. The following indicators provide some evidence of hydrology: (1) standing or flowing water; (2) water-logged soils during the growing season; (3) water marks present on trees or other objects associated with a drainage; (4) drift lines, or small piles of debris oriented in the direction of water movement through an area; (5) shelving; (6) destruction of terrestrial vegetation; and (7) thin layers of sediments deposited on leaves or other objects. The Arid West Supplement of 2006 includes all of these indicators as well as surface soil cracks, inundation visible on aerial imagery, salt and biotic crusts, aquatic invertebrates, hydrogen sulfide odor, evidence of oxidation/reduction reactions within the soil profile, and several others. In general, a combination of hydrologic indicators indicates a more defined hydrological system.

In the absence of wetlands, the limits of USACE jurisdiction in non-tidal waters, including intermittent Relatively Permanent Water (RPW) streams, extend to the Ordinary High Water Mark (OHWM) which is defined by 33 CFR 328.3(e) as:

> *...that line on the shore established by the fluctuation of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.*

On January 9, 2001, the U.S. Supreme Court ruled (in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers*) (SWANCC) that the USACE jurisdiction does not extend to previously regulated isolated waters, including but not limited to isolated ponds, reservoirs, and wetlands. Examples of isolated waters that are affected by this ruling include vernal pools, stock ponds, lakes (without outlets), playa lakes, and desert washes that are not tributary to navigable or interstate waters or to other jurisdictional waters.

A joint guidance by the U.S. Environmental Protection Agency (EPA) and the USACE was issued on June 5, 2007 to clarify circumstances where a Clean Water Act (CWA) Section 404 permit would be required before conducting activities in wetlands, tributaries, and other waters. This guidance is consistent with the Supreme Court's decision in the consolidated cases *Rapanos v. United States* and *Carabell v. United States* (126 S. Ct. 2208 (2006)) ("Rapanos"), which address the jurisdiction over waters of the United States under the Clean Water Act (33 U.S.C. §1251 et seq.). This Rapanos guidance does not supersede the 2003 guidance interpreting SWANCC, and the agencies will continue to evaluate jurisdiction over isolated waters on a case-by-case basis.

The USACE will continue to assert jurisdiction over Traditional Navigable Waters (TNWs), wetlands adjacent to TNWs, non-navigable tributaries of TNWs that are relatively permanent where the tributaries typically flow year-round or have continuous flow at least seasonally (e.g., typically three months), and wetlands that directly abut such tributaries.

Under Rapanos, the USACE uses a fact-specific analysis to determine whether waters have a significant nexus with a TNW for non-navigable tributaries that are non-RPWs, wetlands adjacent to non-navigable tributaries that are non-RPWs, and wetlands adjacent to, but that do not directly abut, a RPW non-navigable tributary. According to USACE, "*a significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical and biological integrity of downstream traditional navigable waters,*" including consideration of hydrologic and ecologic factors. A primary component of this determination lies in establishing the connectivity or non-connectivity of the subject drainages to a TNW; therefore, the drainages of the project site must be analyzed from their origins to their terminus for any USACE jurisdictional determination.

In May 2007, the USACE and EPA jointly published and authorized the use of the *Jurisdictional Determination Form Instructional Guidebook* (USACE 2007). The form and guidebook define how to determine if an area is USACE jurisdictional, and if there is a significant nexus per the Rapanos decision. A nexus is defined as some property of a drainage that has an effect on the physical, chemical, or biological integrity of a downstream TNW. A nexus must have more than insubstantial and speculative effects on the downstream TNW to be considered a significant nexus.

2.2 REGIONAL WATER QUALITY CONTROL BOARD

The State of California (State) regulates discharge of material into waters of the State pursuant to Section 401 of the Clean Water Act and the California Porter-Cologne Water Quality Control Act (California Water Code, Division 7, §13000 et seq.). Porter–Cologne reserves the right for the State of California to regulate activities that could affect the quantity and/or quality of surface and/or ground waters, including isolated wetlands, within the State. Waters of the State determined to be jurisdictional for these purposes

require, if impacted, waste discharge requirements and a 401 Certification (in the case of the required USACE permit). The State Water Resources Control Board (SWRCB) and the local Regional Water Quality Control Boards (RWQCB) are the relevant permitting agencies. Limits of jurisdiction include wetland boundaries and the OHWMs of TNWs, RPWs and non-RPWs.

2.3 CALIFORNIA DEPARTMENT OF FISH AND GAME

Pursuant to Division 2, Chapter 6, Sections 1600-1602 of the California Fish and Game Code, the CDFG regulates all diversions, obstructions, or changes to the natural flow or bed, channel, or bank of any river, stream, or lake, which supports fish or wildlife. Potential CDFG jurisdictional riparian habitats were evaluated using the guidance described in *A Field Guide to Lake and Streambed Alteration Agreements Sections 1600-1607* (CDFG 1994).

CDFG defines a “stream” (including creeks and rivers) as “a body of water that flows at least periodically or intermittently through a bed or channel having banks and supports fish or other aquatic life. This includes watercourses having surface or subsurface flow that supports or has supported riparian vegetation”. CDFG’s definition of “lake” includes “natural lakes or man-made reservoirs”. CDFG limits of jurisdiction include the maximum extents of the uppermost bank-to-bank distance or riparian vegetation dripline.

CDFG jurisdiction within altered or artificial waterways is based upon the value of those waterways to fish and wildlife. CDFG Legal Advisor has prepared the following opinion:

- Natural waterways that have been subsequently modified and that have the potential to contain fish, aquatic insects and riparian vegetation will be treated like natural waterways.

- Artificial waterways that have acquired the physical attributes of natural stream courses and which have been viewed by the community as natural stream courses should be treated as natural waterways.

- Artificial waterways without the attributes of natural waterways should generally not be subject to Fish and Game Code provisions.

SECTION 3.0 – METHODS

3.1 JURISDICTIONAL DETERMINATION AND WETLAND DELINEATION

3.1.1 Literature Review

Prior to beginning the field delineation, high-resolution aerial photographs, National Wetlands Inventory maps, and USGS topographic maps were examined to determine the potential areas of USACE/RWQCB/CDFG jurisdiction on the project sites.

As prescribed by the 1987 Wetland Manual and Arid West Supplement, all available lists of hydric soils were referenced to identify any occurrence of hydric soils listed within the study area. The national, state, and local hydric soils lists were used along with local soil survey maps.

3.1.2 Field Survey

Field surveys were conducted on June 28 and September 6, 2007 and February 25, 2008 by Chambers Group biologists Damon Corley, Kris Alberts, Saraiah Skidmore, and Rebecca Alvidrez.

In the field, boundaries and dimensions of jurisdictional features were recorded on a submeter GPS unit, topographic maps, aerial photographs, and field notes. Features within the study area were investigated for the presence of drainages, water bodies, riparian habitats, potential wetlands, and connectivity. Connectivity to the nearest TNW (i.e., the Pacific Ocean) was ground-truthed by following the drainage from its origin to its connection with the Santa Ana River, and then using a combination of USGS maps and Google Earth images to draw the connection.

Features that exhibited the potential to be three-parameter wetlands (i.e., vegetation, soils, and hydrology) were investigated and recorded onto standardized Wetland Determination Data Forms – Arid West Region data sheets. In order to formally determine the presence or absence of wetlands, other ephemeral wash features were also recorded onto the standardized data sheets. Recorded data included plant species with percent covers, soil profiles in dug soil pits, and evidence of hydrology.

Potential CDFG jurisdictional riparian habitats were evaluated using the guidance described in *A Field Guide to Lake and Streambed Alteration Agreements Sections 1600-1607* (CDFG 1994). Potential USACE / RWQCB / CDFG jurisdictional areas were field-checked for the presence of definable channels and/or wetland vegetation, riparian habitat, soils, and hydrology. The lateral extent of a jurisdictional drainage is measured in several ways, depending on the particular situation. In the absence of a defined wetland, the USACE and the RWQCB traditional use the determination of the presence of a bed and bank to the upper limit of the OHWM. Under the Rapanos court decision, the USACE now requires a fact-specific significant nexus analysis to be performed for dry or ephemeral washes (non-RPWs) in southern California to determine the extent of USACE jurisdiction on a given project site.

Potential wetland habitats are evaluated using the methodology set forth in the 1987 Wetland Manual. The 2006 Arid West Supplement was in effect at the time this survey commenced and was therefore applied to this project. Features with no evidence of wetland hydrology, and which supported only upland vegetation, were evaluated for the upward limits of jurisdiction and not exclusively for wetland parameters.

The RWQCB includes all USACE jurisdictional areas, OHWMs in non-RPWs, isolated wetlands, and any other feature that has an effect on surface or subsurface water quality within California. The CDFG takes jurisdiction to the top of the bank on either side of the drainage or to the outer edge of all riparian vegetation, whichever measurement is greater. This edge, as determined by the “dripline” of the riparian canopy, is used as the line of demarcation between riparian and upland habitats. On smaller streams or dry washes with little or no riparian habitat, the top of the bank is used to mark the lateral extent of CDFG jurisdictional drainage. Drainage widths were measured (in feet) for jurisdictional acreage calculations. Reference photographs were taken during this project and are included as Appendix B.

Wetland Determination Data Forms – Arid West Region data sheets were used to record data and to assist in the determination of the wetland characteristics for each individually numbered soil pit (Appendix A). Data points and soil pits were recorded and used to delineate the wetland boundaries. All determinations and delineations were digitized for the precise mapping of jurisdictional areas. Where no wetlands were present, the lateral limits of USACE / RWQCB / CDFG jurisdiction were measured and recorded onto a submeter GPS unit, aerial photographs, or field notes. All data on jurisdictional determinations and wetland delineations were reproduced using Global Information System (GIS) software and displayed on aerial maps for this report (Appendix C).

3.1.3 Vegetation

For a wetland delineation, plants are categorized according to their probabilities to occur in wetlands versus non-wetlands in accordance with the categories in the *National List of Species that Occur in Wetlands* (Reed 1988). More specifically, the California Land Resource Region (Region 0) wetlands plant list is used, which is a regional adaptation of the *National List*. The wetland species categories are:

I. **Obligate Wetland (OBL)** – Occur almost always (estimated probability >99 %) under natural conditions in wetlands.

II. **Facultative Wetland (FACW) –** Usually occur in wetlands (estimated probability 67 % to 99 %), but occasionally found in non-wetlands.

III. **Facultative (FAC) –** Equally likely to occur in wetlands or non-wetlands (estimated probability 34 % to 66 %).

IV. **Facultative Upland (FACU) –** Usually occur in non-wetlands (estimated probability 67 % to 99 %), but occasionally found in wetlands.

V. **Obligate Upland (UPL) –** May occur in wetlands in another region, but occur almost always (estimated probability >99 %) under natural conditions in non-wetlands in southern California. All species not listed on the *National List of Species that Occur in Wetlands* (Reed 1988) are considered to be UPL.

VI. **No Indicator (NI)** – NI is recorded for those species for which insufficient information was available to determine an indicator status.

Plant species and absolute percent covers are recorded by stratum (i.e., tree, sapling/shrub, herb, woody vine) and evaluated for dominance and prevalence according to guidelines in the 1987 Wetland Manual and Arid West Supplement. Naming conventions follow the Jepson Manual (Hickman 1993).

3.1.4 Soils

Soil pits were dug in all delineated features on the project sites, and soils were evaluated according to guidelines in the 1987 Wetland Manual and Arid West Supplement. Soil layers were examined for the presence or absence of hydric soil indicators and oxidation/reduction features indicative of a history of saturated soil conditions.

3.1.5 Hydrology

Typical hydrologic indicators were observed per the 1987 Wetland Manual and Arid West Supplement guidelines. Indicators include evidence of inundation, saturation, high water table, watermarks, drift lines, sediment deposits, surface soil cracks, water-stained leaves, biotic crust, aquatic invertebrates, hydrogen sulfide odor, and the presence or oxidation/reduction features in the soil, among several others.

Consideration of the climate and flow frequency is given when observing watermarks and drift lines. For the purpose of determining hydrologic connectivity to a TNW, aerial photos, National Wetland Inventory

maps, and USGS quads were referenced, and all features were inspected in the field on and offsite for true connectivity.

SECTION 4.0 – FINDINGS

4.1 SOILS

Prior to conducting the delineation, soil maps were referenced for San Bernardino County Southwestern Part, CA to determine the types of soil found at each project site. Soils were determined in accordance with categories set forth by the U.S. Department of Agriculture (USDA) Soil Conservation Service and by referencing the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey (USDA 1979).

Hydric soils were not found on any of the three project sites. The following soils were found to occur in the project area:

- **Soboba stony loamy sand (SpC)**, 2 to 9 percent slopes, is a gently sloping to moderately sloping soil that is located on long, broad, smooth alluvial fans. The surface of this soil is covered with 0.1 percent stones and boulders. The surface texture rating for this soil is "very stony loamy sand". The parent material is alluvium derived from granite. Runoff on this soil is slow, and the hazard of erosion is slight. Depth to a root restrictive layer is greater than 60 inches. Organic matter content in the surface horizon is about 1 percent. This soil is rarely flooded; it is not ponded. There is no zone of water saturation within a depth of 72 inches. This soil does not meet hydric criteria. Soboba stony loamy sand is used for dry farmed seeded pasture and citrus groves (USDA 1979, NRCS 2008). This soil type occurs on the proposed pipeline site, and is the dominant regional soil of the Mill Creek alluvial floodplain.

- **Cieneba-Rock Outcrop Complex (Cr)**, 30 to 50 percent slopes, is a steep to very steep soil type occurring on hillsides or mountainsides. The surface texture rating for this soil is "sandy loam". These soils are excessively drained and formed in material weathered from granite. If the soil is bare, runoff is rapid and erosion is high. Available water capacity is very low (approximately 1.4 inches). Depth to a root restrictive layer, bedrock, is 14 to 18 inches. This soil is not flooded; it is not ponded. Available water to a depth of 60 inches is very low. This soil does not meet hydric criteria. Historic land uses are range, watershed, and wildlife habitat (Wachtell 1978, NRCS 2008). This soil type occurs at the reservoir sites and is the dominant soil found in the Crafton Hills.

4.2 DRAINAGE FEATURES

Features found on the project sites included two ephemeral washes and one reservoir. One ephemeral wash was found on the proposed pipeline site, and one was found generally in the center of the proposed expansion site; both exhibited OHWMs and bed and bank formations. The reservoir is Crafton Hills Reservoir.

Crafton Hills Reservoir is located on an upland site and is fed by pumped water from lower elevations. Since there historically was an ephemeral wash in that area prior to the construction of the reservoir, the entire reservoir is considered a man-induced feature. However, the artificially translocated water at this site does contribute to the overall hydrologic regime of the drainage system. Incidental seepage exits the reservoir and enters the existing ephemeral drainage downstream. Downstream of the reservoir, this drainage connects to a USGS blue-line drainage that then feeds into the reservoirs of Yucaipa Regional Park.

This blue-line drainage is the ephemeral wash that is located in the center of the proposed expansion site. The drainage is a second same-order tributary that parallels and confluences downstream, above Yucaipa Park. Blue-line drainages are typically RPWs, ponds, lakes, reservoirs, or other relatively permanent or permanent water features. However, the portion of this drainage on the proposed expansion site did not contain RPW characteristics, including the complete lack of wetland vegetation, the lack of evidence of steadily flowing water, and the dominance of upland plants during both dry and wet period site visits. A weak bed-and-bank formation with nearly vertical faces was the only discernable OHWM. The drainage ranges from one foot wide in the upper reach to three feet wide in the lower reach. Except for 16 scattered Mexican elderberry trees (*Sambucus mexicana*) along the banks of the wash on

the expansion footprint, the drainage had the appearance of a typical dry wash, and contained only upland vegetation during all site visits. During the February 25, 2008 site visit, which followed intermittent and occasionally substantial rainfall throughout the previous week, gently trickling water was seen only in the lower reaches at the south end of the reservoir expansion footprint. Following this wash further downstream and above the reservoirs of Yucaipa Regional Park, the drainage exhibited characteristics even more indicative of a RPW, including mature California sycamore (*Platanus racemosa*) and willow (*Salix* spp.) woodlands and steadily more surface water. Part of this additional surface water came directly from the ephemeral drainage below Crafton Hills Reservoir, where a small waterfall was seen just above the convergence of these two tributaries during the February site visit. In addition, numerous Pacific chorus frogs (*Pseudacris regilla*) were heard calling from these woodlands during the February site visit. This further elucidates the lower reach as a RPW and the upper reaches, within the expansion footprint, as ephemeral.

The other ephemeral drainage was found at the west end of the proposed pipeline site. This wash originated from a swale within the north side of the study area, crossed below Mill Creek Road via a culvert, and terminated at the exit point of the culvert at the south side of the study area. At the terminus, construction was ongoing for Crafton Hills Estates, but the final grading design was clearly evident. Upon consultation with the general contractor and completing a site inspection during the February site visit, the terminus ends as a swale, and is not connected to a wash. The contractor indicated that the swale is to be finished using a split rockface design constructed from the boulders unearthed during excavation and grading activities. The finished swale will then be restored with native vegetation. As such, this drainage is an isolated feature with no connectivity to a RPW or TNW. The remainder of the proposed pipeline site consisted of non-jurisdictional swales and upland habitats.

4.3 WETLANDS

No wetlands were found within the three project sites. Soil pits were dug in areas with the highest potentials to contain wetland parameters. Pits were also dug in adjacent uplands to characterize native/existing soils and potential wetland boundaries. While recent wetland vegetation was found along the perimeter of the Crafton Hills Reservoir and hydrology was present in the form of surface water, hydric soils were not found there or elsewhere on the project sites. The soils found were consistent with those described in Section 4.1.

4.4 USACE JURISDICTION

USACE jurisdiction was determined to apply to the existing Crafton Hills Reservoir and the reservoir expansion sites. USACE jurisdiction does not apply to the ephemeral drainage of the proposed pipeline site. The following sub-sections describe these findings.

4.4.1 Proposed Pipeline Site

The onsite inspection of the drainage along the proposed pipeline site showed that the natural drainage enters a culvert, which then continues below Mill Creek Road, and outflows just south of the outlet. At this outlet, the drainage becomes an upland swale with no definable OHWM or bed and bank formations, and water infiltrates into the ground. This is an isolated wash with no connectivity to receiving waters.

For a non-RPW to be USACE jurisdictional per the Rapanos decision, it must have a significant nexus with a TNW. Since this drainage does not connect to a TNW, it cannot have a significant nexus, and therefore, is not USACE jurisdictional per the Rapanos decision. For an isolated system to have USACE jurisdiction per SWANCC, it must have an overriding tie to interstate commerce, provide habitat for endangered species, or water for irrigation, and the USACE may assert jurisdiction based on these and other factors. However, this drainage does not support any of these criteria; therefore, it is not USACE jurisdictional per the SWANCC decision.

4.4.2 Crafton Hills Reservoir

Crafton Hills Reservoir is a man-induced RPW impoundment, and by definition, is considered a "Waters of the U.S." and USACE-jurisdictional. The USACE gained jurisdiction with their approval to originally build the reservoir. The onsite assessment of the reservoir as a RPW was based on, 1) the presence of surface water during all site visits, 2) the presence of surface water on aerial imagery, 3) the presence of riparian tree and shrub species along the edge of the waterline that indicates a constant source of water, including willows (*Salix* spp.), mule fat (*Baccharis salicifolia*), Mediterranean tamarisk (*Tamarix ramosissima*), and Mexican elderberry (*Sambucus mexicana*), and 4) the presence of mosquitofish (*Gambusia affinis*) in the water. Although the water that exists within the reservoir is primarily pumped in artificially, this has no bearing on its RPW determination or USACE jurisdiction (Salas, G. pers comm.)

For the establishment of connectivity of Crafton Hills Reservoir to the nearest TNW, incidental seepage from the reservoir enters the immediate downstream ephemeral drainage, which then connects to a convergence of two blue-line drainages before reaching a culvert. This culvert passes below a paved road within Yucaipa Regional Park, and water then empties into a concrete channel before reaching Lake 2 within Yucaipa Regional Park. Lake 2 is a stocked fishing reservoir open to the public that is used for interstate commerce and is therefore considered a Traditional Navigable Water (TNW). Interstate commerce is supported at Lake 2 through several means, including recreational fishing, boating, camping, swimming, and onsite facilities, such as a snack bar and a bait shop. Fees/money are charged for entry, fishing, boat rentals, camping, swimming, and goods from the snack bar and bait shop, which were made in various parts of the US and internationally. In addition, visitors to Lake 2 may include out-of-state residents or tribal visitors. The distance from Crafton Hills Reservoir to Lake 2, the nearest TNW, is approximately 4,200 river feet.

Following the water out of Lake 2, flow continues via a concrete channel that connects Lake 2 to the lower Lake 3. Water was seen visibly spilling over Lake 2 and traveling down this channel into Lake 3 during the February site visit. Following the water out of Lake 3, flow continues via a concrete channel that connects Lake 3 to a heavily incised natural bed and bank channel. Water was seen visibly spilling over Lake 3 and traveling down this channel into the natural channel during the February site visit. From the natural channel, water flow continues downstream before reaching a series of aqueducts and concrete storm water channels through the City of Yucaipa. The concrete storm water channels eventually empty into San Timoteo Wash, which then connects to the Santa Ana River. The Santa Ana River ultimately ends at the Pacific Ocean. The total river length between Crafton Hills Reservoir and the Pacific Ocean is approximately 79 miles.

A significant nexus was determined to exist for Crafton Hills Reservoir based on the following results:

- It is a RPW impoundment that is hydrologically connected approximately 4,200 river feet from the nearest TNW (Lake 2);

- It has the capacity to carry pollutants, nutrients, and organic carbon to the nearest TNW;

- The nutrients and organic carbon in turn support downstream foodwebs (i.e., the California sycamore/willow woodland and the numerous calling Pacific chorus frogs before reaching Lake 2). The nutrients and organic carbon also contribute to the ecology of Lake 2. Since water is intentionally pumped into Crafton Hills Reservoir, and incidental seepage enters Lake 2 from the reservoir, Crafton Hills Reservoir has an effect on the biological integrity of the nearest TNW.

- Crafton Hills Reservoir effectively contributes to interstate commerce by providing some water, in the form of incidental seepage, to Lake 2. Water quality and presence is vital to the success of fishing and other recreational opportunities that Lake 2 presents to the public.

4.4.3 Proposed Reservoir Expansion Site

The proposed reservoir expansion site contains one ephemeral drainage (a non-RPW) that runs generally through the center of the area. This drainage originates from two forks just north of the expansion area footprint and effectively drains the immediately surrounding slopes. As illustrated above, this drainage

ultimately connects to Lake 2, has a significant nexus, and is USACE jurisdictional based on the above listed results. This non-RPW drainage also contributes seasonally intermittent flow to the California sycamore/willow woodland, the Pacific chorus frog breeding site, and ultimately, to the TNW itself, although its rate of flow is not as great as that which comes from the reservoir.

A significant nexus was determined to exist for Crafton Hills Reservoir expansion site based on the following results:

- It is a non-RPW that is hydrologically connected approximately less than one river mile from the nearest TNW (Lake 2);

- It has the capacity to carry pollutants, nutrients, and organic carbon to the nearest TNW;

- The nutrients and organic carbon in turn support downstream foodwebs (i.e., the California sycamore/willow woodland and the numerous calling Pacific chorus frogs before reaching Lake 2). The nutrients and organic carbon carried by this non-RPW during rain events also contributes to the overall ecological conditions of Lake 2, which ultimately has an effect on the biological integrity of the nearest TNW.

- The Crafton Hills Reservoir expansion site effectively contributes to interstate commerce by providing some water, in the form of flowing water, to Lake 2. Water quality and presence is vital to the success of fishing and other recreational opportunities that Lake 2 presents to the public.

4.5 RWQCB JURISDICTION

The limits of RWQCB jurisdiction within the proposed project sites are defined by the OHWM. Since all delineated drainage features on the three project sites may ultimately have an effect on surface and/or subsurface water quality or quantity in the State of California, the Porter-Cologne Act dictates that RWQCB jurisdiction includes Crafton Hills Reservoir, the ephemeral drainage in the proposed reservoir expansion site, and the ephemeral drainage in the proposed pipeline site.

4.6 CDFG JURISDICTION

The limits of CDFG jurisdiction are normally larger than the other regulatory agencies because CDFG jurisdiction extends laterally to the tops of banks, not just the OHWM. At the ephemeral drainage within the proposed pipeline site, CDFG jurisdiction extends approximately seven feet from bank to bank over 170 linear feet. However, since the 2-foot wide average OHWM is equal to the 2-foot wide average bed and bank formation in the drainage at the proposed reservoir expansion site, CDFG jurisdiction is equal to USACE and RWQCB jurisdiction for that drainage, which is 1,979 linear feet in the project footprint. Although several scattered Mexican elderberry shrubs/small trees occur along the ephemeral drainage at the proposed reservoir expansion site, their disconnected arrangement precludes them from being considered a riparian vegetation community. Therefore, there is no riparian habitat associated with CDFG jurisdiction at this drainage.

Since Crafton Hills Reservoir provides habitat for fish, amphibians, and waterfowl, and the site is a RPW impoundment associated with a hydrologically connected system, CDFG jurisdiction is applicable to the reservoir. In addition, since riparian trees and shrubs exist along the waterline, CDFG jurisdiction extends to the edge of the dripline for riparian species at the reservoir.

Table 4-1
Jurisdictional Acreage Matrix

Authority	Wetland	Riparian	Lake	Other Waters	Total
USACE	0	0	5.32	0.09	5.41
RWQCB	0	0	5.32	0.11	5.43
CDFG	0	0.14	5.32	0.12	5.58

- Total USACE acreage amounts to 5.41 acres for the three project sites. Of this total, 0.09 acres (1,979 linear feet X average of 2 feet wide) occur in the ephemeral drainage within the proposed reservoir expansion site, and 5.32 acres occur on the existing reservoir.

- Total RWQCB acreage amounts to 5.43 acres for the three project sites. Of this total, 0.09 acres (1,979 linear feet X average of 2 feet wide) occur in the ephemeral drainage within the proposed reservoir expansion site. An additional 0.02 acres (170 linear feet X average of 2 feet wide) occur in the ephemeral drainage within the proposed pipeline site.

- Total CDFG acreage amounts to 5.58 acres for the three project sites. Of this total, 0.09 acres (1,979 linear feet X average of 2 feet wide) occur in the ephemeral drainage within the proposed reservoir expansion site. 0.03 acres (170 linear feet X average of 7 feet wide) occur in the ephemeral drainage within the proposed pipeline site. 0.14 acres occur as riparian driplines surrounding the Crafton Hills Reservoir, and 5.32 acres occur on the existing reservoir itself.

Legend

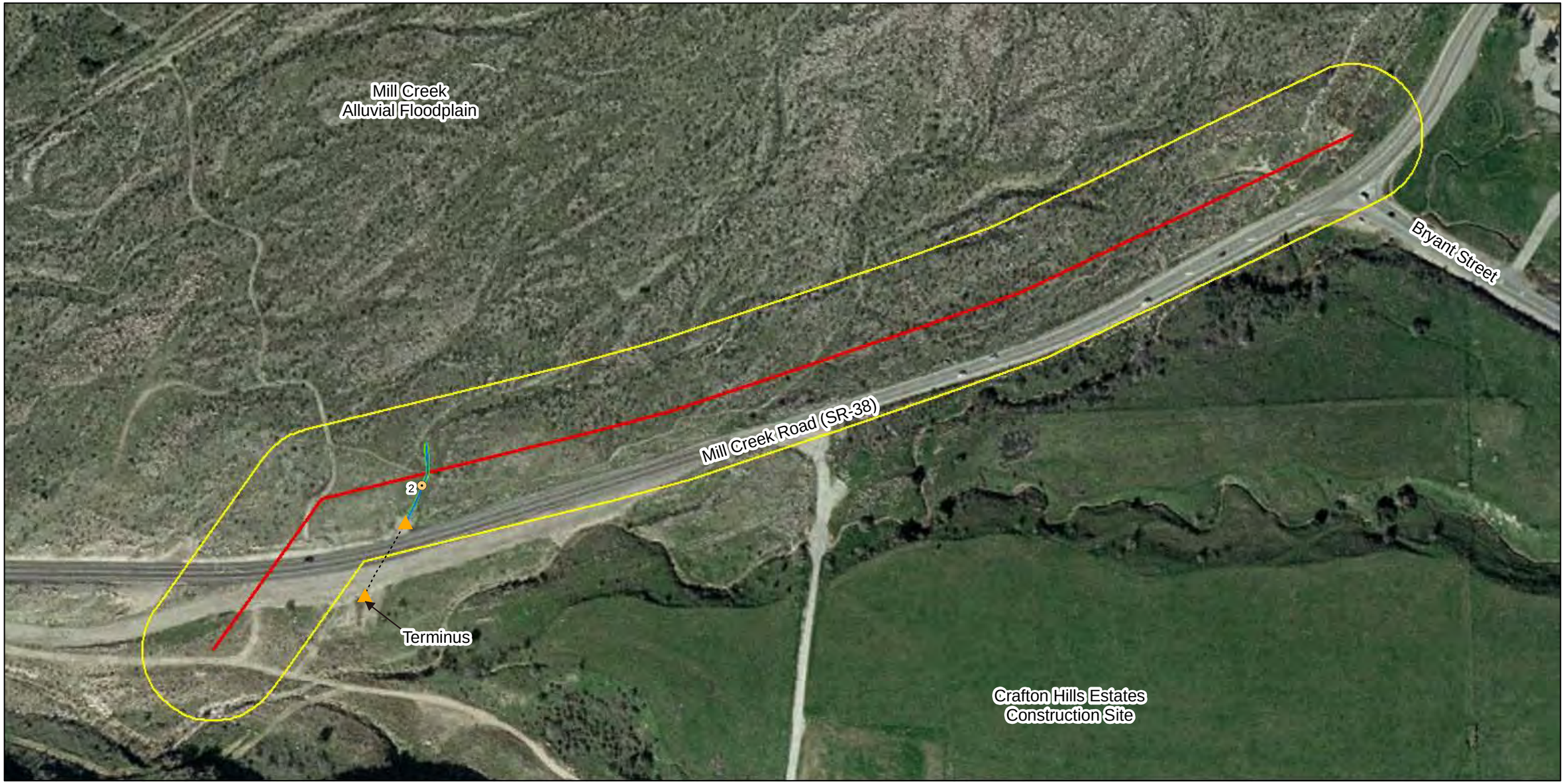
- USACE/RWQCB/CDFG Jurisdiction (0.09 acres)
- CDFG Riparian (0.14 acres)
- USACE/RWQCB/CDFG Jurisdiction (5.32 acres)
- Construction Limits (13.28 acres)
- Proposed Expansion Area (8.18 acres)
- Soil Pit Location

N

0 150 300 450 600 Feet

DWR - Crafton Hills Reservoir
Jurisdictional Determination
Figure 3

Chambers Group Inc.



Legend

- CDFG Jurisdiction (0.03 acres)
- RWQCB Jurisdiction (0.009 acres)
- Proposed Pipeline Centerline
- Study Area
- Culvert
- Hydrologic Connector
- Soil Pit

N

0 150 300 450 600 Feet

DWR - Crafton Hills Reservoir
Jurisdictional Determination
Figure 4

Chambers Group Inc.

SECTION 5.0 – REFERENCES

California Department of Fish and Game (CDFG)
1994 *A Field Guide to Lake and Streambed Alteration Agreements, Sections 1600-1607*. Environmental Services Division.

Hickman, J. C., editor.
1993 *The Jepson Manual: Higher Plants of California*. University of California Press, Berkeley and Los Angeles.

Holland , R.F.
1986 *Preliminary descriptions of the terrestrial natural communities of California.* California Department of Fish and Game, Sacramento, California.

P & D Consultants
1997 *Supplemental EIR No. 1 for the East Branch Extension Phase I*.

Reed, Jr., P. B. et al.
1988 *National List of Plant Species That Occur in Wetlands: Intermountain (Region 8).* U.S. Fish and Wildlife Service Biological Report 88 (26.8).

Salas, Gerry
2008 Personal Communication.

Sawyer, J. O., and T. Keeler-Wolf
1995 *A Manual of California Vegetation.* California Sacramento, California.

U.S. Army Corps of Engineers (USACE)
1987 *U.S. Army Corps of Engineers Wetlands Delineation Manu*al, Technical Report Y-87-1, U.S. Army Engineer Waterways Experimental Station, Vicksburg, Mississippi.

U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS)
1979 Web Soil Survey.

U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS)
1983 Soil Survey of San Bernardino County Southwestern Part, California. CA 677.

U.S. Geological Service (USGS)
7.5 minute topographic quadrangle map for *Yucaipa*, California.

APPENDIX A – PHOTO PAGES

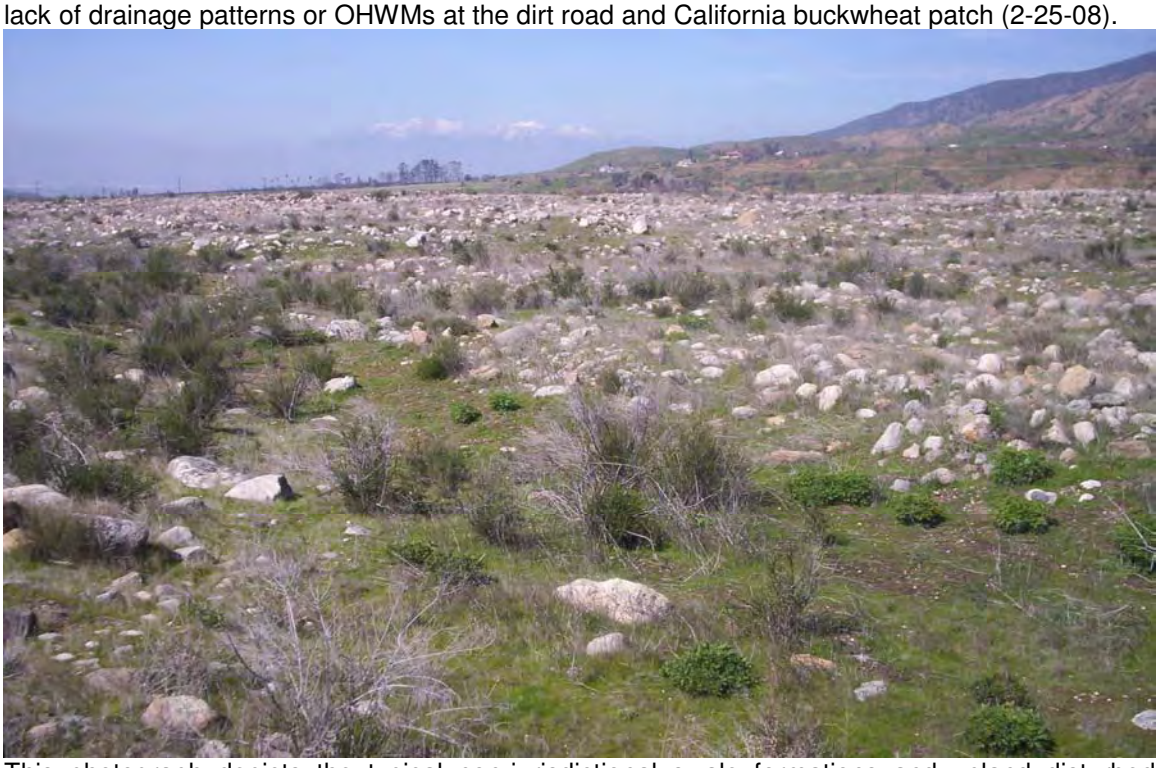
Non-jurisdictional swale upstream of RWQCB/CDFG jurisdictional drainage at the west end of the proposed pipeline site. Note dominance of upland vegetation and lack of OHWM (2-25-08).

RWQCB/CDFG jurisdictional ephemeral drainage at the west end of the proposed pipeline site. Note change in vegetation, OHWM, and weak bed and bank formation (2-25-08).

RWQCB/CDFG jurisdictional ephemeral drainage at the west end of the proposed pipeline site. Note the discontinuous OHWM where the dirt road intersects the drainage, the culvert at the downstream end of the drainage, and the construction equipment in the background (2-25-08).

The culvert at the downstream end of the RWQCB/CDFG jurisdictional ephemeral drainage at the west end of the proposed pipeline site (2-25-08).

Drainage terminus of the RWQCB/CDFG jurisdictional ephemeral drainage at the west end of the proposed pipeline site. Note drainage patterns from recent rains, recently graded soils, and the lack of drainage patterns or OHWMs at the dirt road and California buckwheat patch (2-25-08).



This photograph depicts the typical non-jurisdictional swale formations and upland disturbed mature Riversidian alluvial fan sage scrub habitats that are found throughout the north side of the proposed pipeline study area (2-25-08).

North fork tributary origin of the USACE/RWQCB/CDFG jurisdictional ephemeral drainage that runs through the center of the proposed reservoir expansion site (2-25-08).

East fork tributary origin of the USACE/RWQCB/CDFG jurisdictional ephemeral drainage that runs through the center of the proposed reservoir expansion site (2-25-08).

East and north fork convergence of the USACE/RWQCB/CDFG ephemeral drainage at the north end of the proposed reservoir expansion area. Note stake indicating footprint edge (2-25-08).

One-foot wide section of the USACE/RWQCB/CDFG ephemeral drainage in the proposed reservoir expansion site (6-28-07).

Two-foot wide section of the USACE/RWQCB/CDFG ephemeral drainage in the proposed reservoir expansion site (6-28-07).

Three-foot wide section of the USACE/RWQCB/CDFG ephemeral drainage in the proposed reservoir expansion site (6-28-07).

Standing water is visible at the downstream end of the USACE/RWQCB/CDFG ephemeral drainage in the proposed reservoir expansion area in mid-center frame (2-25-08).

The continuation of the USACE/RWQCB/CDFG ephemeral drainage from downstream of the proposed reservoir expansion area. The City of Yucaipa is in the background (2-25-08).

The standing water is the convergence of two blue-line drainages above Lake 2, including the USACE/RWQCB/CDFG drainage through the center of the proposed reservoir expansion area. A culvert is visible next to the boulders that allows water to pass below the roads (2-25-08).

The concrete channel in center frame is the continuation of the water shown in the previous photo. Lake 2 is in the background, and the surrounding area is within Yucaipa Regional Park (2-25-08).

This photo depicts the Lake 2 inlet for waters from the proposed reservoir expansion area and Crafton Hills Reservoir controlled release (2-25-08).

This photo depicts a recreational area of Lake 2 that supports interstate commerce (2-25-08).

This photo shows fishermen fishing for stocked rainbow trout in Lake 2 (2-25-08).

This photo depicts the store (supportive of interstate commerce) located within the recreational complex on Lake 2 (2-25-08).

This photo shows the spillway of Lake 2 in the far right frame. This spillway connects to the lower Lake 3 (2-25-08).

This photo depicts another spillway between Lake 2 and Lake 3 (2-25-08).

This photo depicts the concrete channel between Lake 2 and Lake 3 (2-25-08).

This photo depicts the downstream extension from Lake 3 into a heavily incised natural channel. The turfgrass-covered earthen berm marks the downstream end of Lake 3, and the concrete spillway at its right edge allows water to pass from the lake to this channel (2-25-08).

The downstream extension of the heavily incised channel below Lake 3. From here, this channel continues through a series of aqueducts and stormwater channels through the City of Yucaipa to the San Timoteo Wash, the Santa Ana River, and ultimately, to the Pacific Ocean (2-25-08).

This photo depicts USACE/RWQCB/CDFG jurisdictional Crafton Hills Reservoir and the inlet feeder (7-17-07).

This photo depicts USACE/RWQCB/CDFG jurisdictional Crafton Hills Reservoir, its earthfill dam, and the adjacent ridgeline to the west. The ridgeline is proposed to be cut to allow reservoir expansion into the adjacent canyon (7-16-07).

This photo depicts the wash below Crafton Hills Reservoir (2-25-08).

APPENDIX B – SOIL PIT DATA SHEETS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crafton Hills Reservoir City/County: San Bernardino Sampling Date: 9/6/07

Applicant/Owner: San Bernardino Municipal Water District State: Ca Sampling Point: 1

Investigator(s): K. Alberts, S. Skidmore Section, Township, Range: Yucaipa quad, Section 24, Township 1, Range 2 West

Landform (hillslope, terrace, etc.): slope Local relief (concave, convex, none): none Slope (%): 5%

Subregion (LRR): Ca Lat: -117.049882 Long: 34.065718 Datum: _____

Soil Map Unit Name: Cieneba - Rock outcrop complex (CR), 30-50% slopes NWI classification: —

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X 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 ✓	No _____	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks: in Crafton Hills Reservoir (man-made)

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1. (None)			
2.			
3.			
4.			
Total Cover:	0		
Sapling/Shrub Stratum			
1. Baccharis salicifolia	30	yes	FACW
2.			
3.			
4.			
5.			
Total Cover:	30		
Herb Stratum			
1. Gnaphalium palustre	70	yes	FACW
2. Conyza canadensis	10	no	FAC
3. Melilotus indica	10	no	FAC
4. Lactuca serriola	1	no	FAC
5. Heterotheca grandiflora	2	no	UPL
6. Lotus purshianus	2	no	UPL
7.			
8.			
Total Cover:	95		
Woody Vine Stratum			
1. (None)			
2.			
Total Cover:	0		

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	100	x 2 =	200
FAC species	21	x 3 =	63
FACU species	0	x 4 =	0
UPL species	4	x 5 =	20
Column Totals:	125 (A)		283 (B)

Prevalence Index = B/A = 2.264

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ✓ No _____

Remarks:

SOIL

Sampling Point: 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-14"	2.5Y 4/4	100	—	—	—	—	sandy loam	coarse, sand, Oxidized Fe in granitic grains

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

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

- ___ 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 (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: bedrock or large rock
Depth (inches): 14"

Hydric Soil Present? Yes ___ No X

Remarks: Soil pit was dug at the northwest corner at the waters edge. No capillary fringe; oxidation in overall soil type.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ✓ High Water Table (A2)
- ✓ Saturation (A3)
- ✓ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ✓ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface 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)

Secondary Indicators (2 or more required)

- ___ 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 (C8)
- ✓ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (Inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

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

Remarks: Lots of mosquito Fish in the water.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Crafton Hills Reservoir Proposed Pipeline Site City/County: Crafton / San Bernardino Sampling Date: 2·25·08
Applicant/Owner: DWR State: CA Sampling Point: 2
Investigator(s): Kris Alberts, Rebecca Alvidrez Section Township, Range:
Landform (hillslope terrace, etc.): alluvial plain Local relief (concave, convex, none): concave Slope (%): 0-2%
Subregion (LRR): California C Lat: 494903.224 Long: 3770654.359 Datum: UTM NAD 83
Soil Map Unit Name: Soboba Stony Loam Sand (SpC) NWI classification: none
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 ____	No ✓	Is the Sampled Area within a Wetland? Yes ____ No ✓
Hydric Soil Present?	Yes ____	No ✓	
Wetland Hydrology Present?	Yes ____	No ✓	

Remarks: Pipeline OHWM channel: begins from Swale, then evident OHWM (1 foot average width) continues downgrade to culvert undercrossing at Mill Creek Rd.
2 disruptions to OHWM insite: OHV/bike trail & old dirt road

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover: 0%			
Sapling/Shrub Stratum			
1. Lessingia filaginifolia	2	✓	UPL
2.			
3.			
4.			
5.			
Total Cover: 2%			
Herb Stratum			
1. Bromus hordeaceus	45	✓	UPL
2. Bromus spp.	45	✓	UPL
3. Lupinus bicolor	15		UPL
4. Avena fatua	5		UPL
5. Erodium cicutarium	1		UPL
6. Amsinckia intermedia	5		UPL
7.			
8.			
Total Cover: 116%			
Woody Vine Stratum			
1.			
2.			
Total Cover: 0%			

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust 0

Dominance Test worksheet:
Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)
Total Number of Dominant Species Across All Strata: 3 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species		x 3 =
FACU species		x 4 =
UPL species	118	x 5 = 590
Column Totals:	118 (A)	590 (B)

Prevalence Index = B/A = 5

Hydrophytic Vegetation Indicators:
- ____ Dominance Test is >50%
- ____ Prevalence Index is ≤3.0[1]
- ____ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes ____ No ✓

Remarks:

SOIL

Sampling Point: 2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 2/2	100	—	—	—	—	Sandy clay loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

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

- ___ 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 (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No ✓

Remarks: Soil was moist, but only due to rains

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface 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)

Secondary Indicators (2 or more required)

- ___ 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 (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

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: Crafton Hills Reservoir Proposed Expansion Site City/County: Crafton / San Bernardino Sampling Date: 2·25·08

Applicant/Owner: DWR State: CA Sampling Point: 3

Investigator(s): Kris Alberts, Rebecca Alvidrez Section, Township, Range: _____

Landform (hillslope, terrace, etc.): valley bottom Local relief (concave, convex, none): concave Slope (%): 3%

Subregion (LRR): California C Lat: 495405.932 Long: 3769266.403 Datum: UTM NAD83

Soil Map Unit Name: Cienba - Rock Outcrop Complex (Cr) NWI classification: none

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 _____	No ✓	Is the Sampled Area within a Wetland? Yes _____ No ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION

Tree Stratum (Use scientific names.)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
Total Cover:	0%		
Sapling/Shrub Stratum			
1.			
2.			
3.			
4.			
5.			
Total Cover:	0%		
Herb Stratum			
1. Erodium cicutarium	5		UPL
2. Hirschfeldia incana	15		UPL
3. Avena barbata	10		UPL
4. Bromus sp.	60	✓	UPL
5. Anagallis arvensis	1		FAC
6.			
7.			
8.			
Total Cover:	91%		
Woody Vine Stratum			
1.			
2.			
Total Cover:	0%		

% Bare Ground in Herb Stratum 9 (rocks, soil) % Cover of Biotic Crust 0

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species		x 1 =
FACW species		x 2 =
FAC species	1	x 3 = 3
FACU species		x 4 =
UPL species	90	x 5 = 450
Column Totals:	91 (A)	453 (B)

Prevalence Index = B/A = 4.98

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present.

Hydrophytic Vegetation Present? Yes _____ No ✓

Remarks:

SOIL

Sampling Point: 3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 3/3	100	—	—	—	—	Sandy loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

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

- ___ 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 (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: _____

Depth (inches): _____

Hydric Soil Present? Yes _____ No ✓

Remarks: Soil moist from recent rains

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (Nonriverine)
- ___ Sediment Deposits (B2) (Nonriverine)
- ___ Drift Deposits (B3) (Nonriverine)
- ___ Surface 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)

Secondary Indicators (2 or more required)

- ___ 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 (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _____ No ✓ Depth (inches): _____

Water Table Present? Yes _____ No ✓ Depth (inches): _____

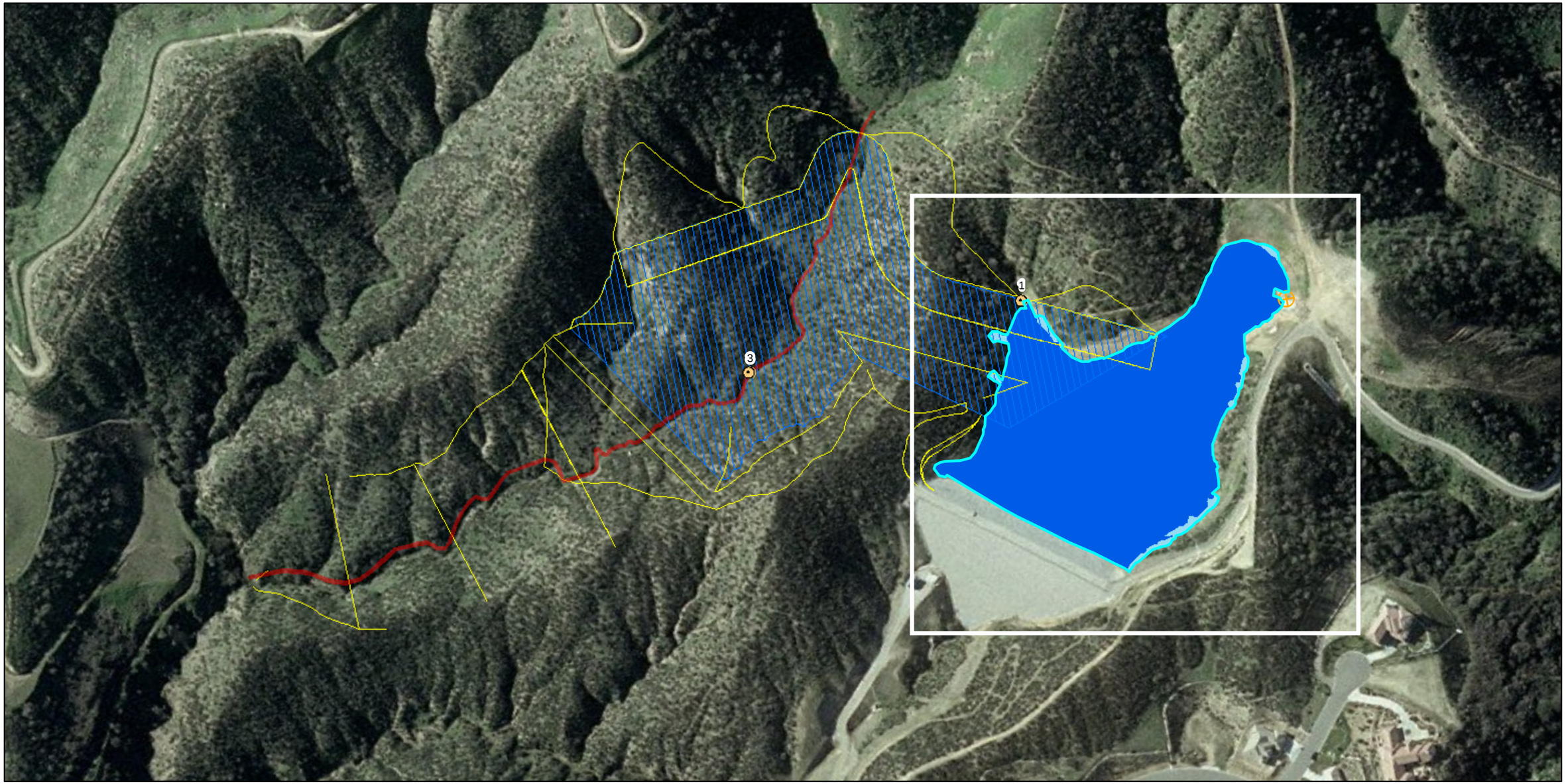
Saturation Present? (includes capillary fringe) Yes _____ No ✓ Depth (inches): _____

Wetland Hydrology Present? Yes _____ No ✓

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

Remarks:

APPENDIX C – JURISDICTIONAL DETERMINATION FORMS



Legend

- USACE/RWQCB/CDFG Jurisdiction (0.09 acres)
- CDFG Riparian (0.14 acres)
- USACE/RWQCB/CDFG Jurisdiction (5.32 acres)
- Construction Limits (13.28 acres)
- Proposed Expansion Area (8.18 acres)
- Soil Pit Location

N

0 150 300 450 600 Feet

DWR - Crafton Hills Reservoir
Jurisdictional Determination
Figure 3

Chambers Group Inc.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): March 5, 2008

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Los Angeles, CA

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: California County/parish/borough: San Bernardino City: Crafton (unincorporated)
Center coordinates of site (lat/long in degree decimal format): Lat. 34°3'51.16"N° **N**, Long. 117°2'59.354"W° **W**.
Universal Transverse Mercator:
Name of nearest waterbody: Crafton Hills Reservoir
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Lake 2 (inYucaipa Regional Park)
Name of watershed or Hydrologic Unit Code (HUC): Santa Ana River / San Timoteo / Gateway

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☐ Office (Desk) Determination. Date:
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☒ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or 5.32 acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): 2,295 feet (at the reservoir).

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: 5.57 **square miles**
Drainage area: **Pick List**
Average annual rainfall: 13.6 inches
Average annual snowfall: 0 inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☒ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: They do not.

Identify flow route to TNW[5]: From Crafton Hills Reservoir (a previously determined USACE-jurisdictional man-induced RPW impoundment that receives most of its water via a pump sytem, but also due to rainfall), incidental seepage

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

continues through a natural bed and bank channel with a disernible Ordinary High Water Mark to a converging point with another bed and bank channel (a USGS blue-line drainage that is located in the adjacent canyon to the west of the reservoir; the proposed reservoir enlargement area) with a discernible OHWM that runs through the center of the enlargement area. From this convergence of the two drainages, the flow continues through a California sycamore/willow woodland (indicative of relatively permanent water) that is located at the convergence of two USGS blue-line drainages. After this woodland, flow continues via a culvert that passes below a paved road inside Yucaipa Regional Park before entering a concrete channel, which then empties into Lake 2 inside Yucaipa Regional Park. Since Lake 2 is tied to interstate commerce, it is considered the nearest TNW. Interstate commerce is supported at Lake 2 through several means, including recreational fishing, boating, camping, swimming, and onsite facilities such as a snack bar and a bait shop. Fees/money are charged for entry, fishing, boat rentals, camping, swimming, and goods from the snack bar and bait shop, which were made in various parts of the US and internationally. In addition, visitors to the Lake may include out-of-state residents or tribal visitors. The waters that reach Lake 2 from Crafton Hills Reservoir and the enlargement area are hydrologically connected via a concrete channel to the lower Lake 3 within the Park. Water was seen passing from Lake 2 to Lake 3 along this channel during a site visit on February 25, 2008. After Lake 3, another concrete channel (also observed with flowing water on February 25), drains from the lake into a natural and highly-incised bed and bank channel, a USGS blue-line drainage, before entering an aqueduct/stormwater channel system through the City of Yucapia. The stormwater channel eventually empties into another natural bed and bank channel before joining the San Timoteo Wash. At this point, the San Timoteo Wash shows up on USGS maps as a blue-line drainage. The blue-line disappears after some length before reappearing further downstream, indicating continued subsurface flow. The San Timoteo Wash then connects to the Santa Ana River, which then ultimately connects to the Pacific Ocean. The total river length from the Crafton Hills Reservoir to the Pacific Ocean is approximately 79 miles. The total river length of the Crafton Hills Reservoir to Lake 2 is approximately 4,200 feet.

.

Tributary stream order, if known: N/A.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☒ Artificial (man-made). Explain: Crafton Hills Reservoir is entirely man-made.
☒ Manipulated (man-altered). Explain: The incidental seepage flow that exits Crafton Hills Reservoir and enters Lake 2 is manipulated via intentional pumping from lower elevations that creates the condition of present water in the first place. However, rainfall also contributes to the hydrology.

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☒ Other. Explain: Sandy loam of granitic origin.		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: stable.
Presence of run/riffle/pool complexes. Explain: None.
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): 5-10 %

(c) Flow:

Tributary provides for: **Intermittent but not seasonal flow**
Estimate average number of flow events in review area/year: **20 (or greater)**
Describe flow regime: For the drainage that exits the Crafton Hills reservoir, flow is by incidental seepage from the reservoir itself. Additional hydrologic contributions may occur during rain events. As such, the incidental seepage from Crafton Hills Reservoir is considered intermittent.
Other information on duration and volume: .

Surface flow is: **Discrete and confined.** Characteristics: On the Crafton Hills Reservoir, water levels are maintained via pumping, incidental seepage, and the earthen spillway.

Subsurface flow: **Yes**. Explain findings: Previously described incidental seepage from the reservoir.
☐ Dye (or other) test performed: None.

Tributary has (check all that apply):
☐ Bed and banks

☒ OHWM[6] (check all indicators that apply):

- ☒ clear, natural line impressed on the bank
- ☐ changes in the character of soil
- ☐ shelving
- ☒ vegetation matted down, bent, or absent
- ☒ leaf litter disturbed or washed away
- ☐ sediment deposition
- ☒ water staining
- ☐ other (list):
- ☒ the presence of litter and debris
- ☐ destruction of terrestrial vegetation
- ☐ the presence of wrack line
- ☐ sediment sorting
- ☐ scour
- ☒ multiple observed or predicted flow events
- ☒ abrupt change in plant community

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:

- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:

- ☐ survey to available datum;
- ☐ physical markings;
- ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: The water that was present in the Crafton Hills reservoir was likewise of good quality. Water was present in this reservoir during all site visits by the Chambers Group in 2007 and 2008, and water was seen being pumped into the reservoir via the pumping system on several occasions, including February 25, 2008. The water was of good quality and exhibited little to no signs of obvious contamination, pollutants, or turbidity, but it is acknowledged that such seepage may contain amounts of contaminants or pollutants.

Identify specific pollutants, if known: None known.

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): Approximately one-acre California sycamore/willow woodland found between Lake 2 and Crafton Hills Reservoir (not on the project site).

☐ Wetland fringe. Characteristics: .

☒ Habitat for:

☐ Federally Listed species. Explain findings: .

☒ Fish/spawn areas. Explain findings: Mosquitofish seen in Crafton Hills Reservoir. Downstream, Lake 2 and 3 are stocked fishing lakes.

☒ Other environmentally-sensitive species. Explain findings: Crafton Hills Reservoir and Lakes 2 and 3 support a number of sensitive bird species, including black-crowned night heron, double-crested cormorant, osprey, and Cooper's hawk.

☒ Aquatic/wildlife diversity. Explain findings: (See above). In addition, numerous Pacific chorus frogs were heard calling at mid-day on February 25, 2008 in the vicinity of the California sycamore/willow woodland. Tadpoles were observed in Crafton Hills Reservoir in summer 2007. Abundant predator sign (bobcat, coyote, and raccoon) was also observed on the fringes of the Crafton Hills Reservoir.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☐ Not directly abutting

☐ Discrete wetland hydrologic connection. Explain: .

☐ Ecological connection. Explain: .

☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☐ Vegetation type/percent cover. Explain: .

☐ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: .

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   ☒ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: Crafton Hills Reservoir is a previously determined USACE-jurisdictional man-induced RPW impoundment that originates at the pumped water port of entry along the NE edge of the reservoir. The presence of mosquitofish and riparian woody species that are several years old at its edge indicate constant surface water at this site. While levels may fluctuate according to pumping schedules, available water, and incidental seepage, water is considered present on a year-round basis. Water was present inside the reservoir during all site visits conducted by Chambers Group in 2007 and 2008 (June, July, September 2007 and February 2008).

☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☒ Other non-wetland waters: **(Sean)** acres.
Identify type(s) of waters: **man-induced RPW impoundment (Crafton Hills Reservoir)**.

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: **.**

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☒ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

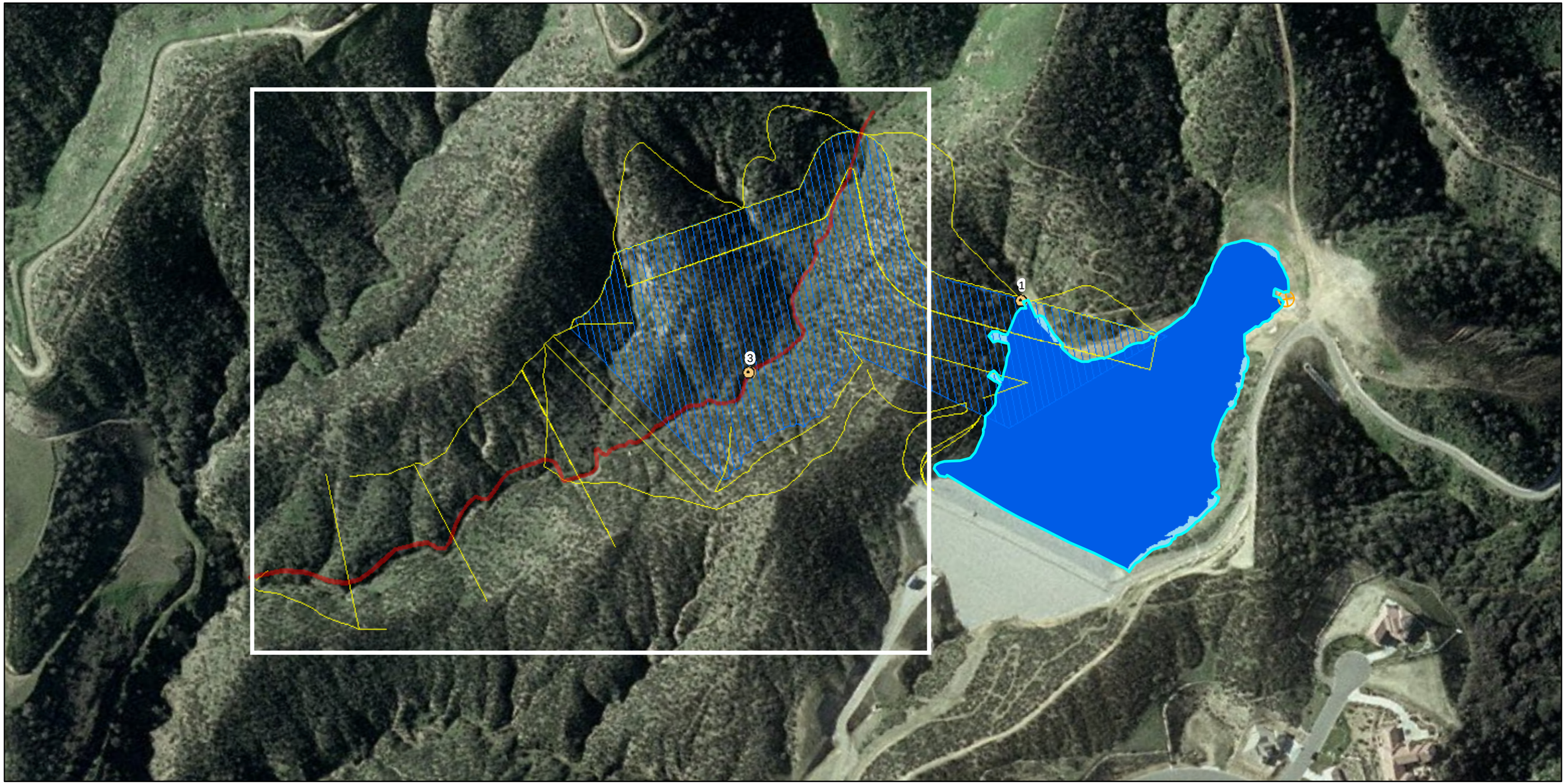
Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: .
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☒ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .



Legend

- USACE/RWQCB/CDFG Jurisdiction (0.09 acres)
- CDFG Riparian (0.14 acres)
- USACE/RWQCB/CDFG Jurisdiction (5.32 acres)
- Construction Limits (13.28 acres)
- Proposed Expansion Area (8.18 acres)
- Soil Pit Location

N

0 150 300 450 600 Feet

DWR - Crafton Hills Reservoir
Jurisdictional Determination
Figure 3

Chambers Group Inc.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): March 5, 2008

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Los Angeles, CA

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: California County/parish/borough: San Bernardino City: Crafton (unincorporated)
Center coordinates of site (lat/long in degree decimal format): Lat. 34°3'51.16"N° **N**, Long. 117°2'59.354"W° **W**.
Universal Transverse Mercator:
Name of nearest waterbody: Crafton Hills Reservoir
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: Lake 2 (inYucaipa Regional Park)
Name of watershed or Hydrologic Unit Code (HUC): Santa Ana River / San Timoteo / Gateway

- ☐ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☐ Office (Desk) Determination. Date:
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☒ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: 1979 linear feet: 2 width (ft) and/or acres.
   Wetlands: acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): 2,295 feet (at the reservoir).

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☐ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: .

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: 5.57 **square miles**
Drainage area: **Pick List**
Average annual rainfall: 13.6 inches
Average annual snowfall: 0 inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☒ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **1 (or less)** river miles from TNW.
Project waters are **1 (or less)** river miles from RPW.
Project waters are **1 (or less)** aerial (straight) miles from TNW.
Project waters are **1 (or less)** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: They do not.

Identify flow route to TNW[5]: From the Crafton Hills Reservoir proposed expansion site, a USGS blue-line drainage with a discernible OHWM that runs through the center of the enlargement area. The flow continues through a California

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

sycamore/willow woodland (indicative of relatively permanent water) that is located at the convergence of two USGS blue-line drainages. After this woodland, flow continues via a culvert that passes below a paved road inside Yucaipa Regional Park before entering a concrete channel, which then empties into Lake 2 inside Yucaipa Regional Park. Since Lake 2 is tied to interstate commerce, it is considered the nearest TNW. Interstate commerce is supported at Lake 2 through several means, including recreational fishing, boating, camping, swimming, and onsite facilities such as a snack bar and a bait shop. Fees/money are charged for entry, fishing, boat rentals, camping, swimming, and goods from the snack bar and bait shop, which were made in various parts of the US and internationally. In addition, visitors to the Lake may include out-of-state residents or tribal visitors. The waters that reach Lake 2 from Crafton Hills Reservoir and the enlargement area are hydrologically connected via a concrete channel to the lower Lake 3 within the Park. Water was seen passing from Lake 2 to Lake 3 along this channel during a site visit on February 25, 2008. After Lake 3, another concrete channel (also observed with flowing water on February 25), drains from the lake into a natural and highly-incised bed and bank channel, a USGS blue-line drainage, before entering an aqueduct/stormwater channel system through the City of Yucapia. The stormwater channel eventually empties into another natural bed and bank channel before joining the San Timoteo Wash. At this point, the San Timoteo Wash shows up on USGS maps as a blue-line drainage. The blue-line disappears after some length before reappearing further downstream, indicating continued subsurface flow. The San Timoteo Wash then connects to the Santa Ana River, which then ultimately connects to the Pacific Ocean. The total river length from the Crafton Hills Reservoir expansion site to the Pacific Ocean is approximately 79 miles. The total river length of the Crafton Hills Reservoir expansion site to Lake 2 is approximately 4,200 feet.

.

Tributary stream order, if known: second.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☒ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: 2 feet
Average depth: 1 feet
Average side slopes: **Vertical (1:1 or less).**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☒ Vegetation. Type/% cover: Annual grasses / 90%	
☒ Other. Explain: Sandy loam of granitic origin.		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: stable.
Presence of run/riffle/pool complexes. Explain: None.
Tributary geometry: **Relatively straight**
Tributary gradient (approximate average slope): 5-10 %

(c) Flow:

Tributary provides for: **Intermittent but not seasonal flow**
Estimate average number of flow events in review area/year: **6-10**

Describe flow regime: For the enlargement area drainage, flow only occurs during rain events. The upper reaches exhibited moist soils on February 25, 2008, but no standing or flowing water, even with recent rains. However, the lower reaches, toward the bottom (south end) of the enlargement footprint, did have areas of standing water. As such, the subject drainage is considered intermittent.

Other information on duration and volume: .

Surface flow is: **Discrete and confined.** Characteristics: It is bound by the bed and bank formations, and there was no evidence indicating that capacity exceeds the banks. .

Subsurface flow: **Unknown**. Explain findings: The blue-line indicated on the USGS map for the enlargement area drainage suggests that it may have originated from a spring or seep at one time. Current conditions of the drainage did not support any kind of relatively permanent flow.

☐ Dye (or other) test performed: None.

Tributary has (check all that apply):
☒ Bed and banks

☒ OHWM[6] (check all indicators that apply):

- ☒ clear, natural line impressed on the bank
- ☐ changes in the character of soil
- ☒ shelving
- ☐ vegetation matted down, bent, or absent
- ☒ leaf litter disturbed or washed away
- ☐ sediment deposition
- ☐ water staining
- ☐ other (list):
- ☒ the presence of litter and debris
- ☐ destruction of terrestrial vegetation
- ☐ the presence of wrack line
- ☐ sediment sorting
- ☐ scour
- ☒ multiple observed or predicted flow events
- ☒ abrupt change in plant community

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:

- ☐ oil or scum line along shore objects
- ☐ fine shell or debris deposits (foreshore)
- ☐ physical markings/characteristics
- ☐ tidal gauges
- ☐ other (list):

☐ Mean High Water Mark indicated by:

- ☐ survey to available datum;
- ☐ physical markings;
- ☐ vegetation lines/changes in vegetation types.

(iii) Chemical Characteristics:

Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).

Explain: The ephemeral drainage in the enlargement area originates just north of the footprint via two forks that exhibit OHWMs up to the higher elevations, but not all the way to the ridgelines, and serves to drain only the immediately adjacent surrounding and undeveloped slopes. The surface water that was present in the lower reaches toward the south end of the footprint was clear, and appeared to be of good quality (i.e., not oily, discolored, or turbid) and exhibit little to no signs of obvious contamination, pollutants, or turbidity.

Identify specific pollutants, if known: None known.

[6]A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.

[7]Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☒ Riparian corridor. Characteristics (type, average width): Approximately one-acre California sycamore/willow woodland found between Lake 2 and Crafton Hills Reservoir (not on the project site).

☐ Wetland fringe. Characteristics: .

☒ Habitat for:

☐ Federally Listed species. Explain findings: .

☒ Fish/spawn areas. Explain findings: Downstream, Lake 2 and 3 are stocked fishing lakes.

☒ Other environmentally-sensitive species. Explain findings: Crafton Hills Reservoir and Lakes 2 and 3 support a number of sensitive bird species, including black-crowned night heron, double-crested cormorant, osprey, and Cooper's hawk.

☒ Aquatic/wildlife diversity. Explain findings: (See above). In addition, numerous Pacific chorus frogs were heard calling at mid-day on February 25, 2008 in the vicinity of the California sycamore/willow woodland. Abundant predator sign (bobcat, coyote, and raccoon) was observed along the enlargement area drainage.

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:

Properties:

Wetland size: acres

Wetland type. Explain: .

Wetland quality. Explain: .

Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:

Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**

Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .

☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:

☐ Directly abutting

☐ Not directly abutting

☐ Discrete wetland hydrologic connection. Explain: .

☐ Ecological connection. Explain: .

☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW

Project wetlands are **Pick List** river miles from TNW.

Project waters are **Pick List** aerial (straight) miles from TNW.

Flow is from: **Pick List.**

Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .

Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .

☐ Vegetation type/percent cover. Explain: .

☐ Habitat for:

☐ Federally Listed species. Explain findings: .

☐ Fish/spawn areas. Explain findings: .

☐ Other environmentally-sensitive species. Explain findings: .

☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**

Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: A significant nexus exists for the ephemeral drainage (non-RPW) in the reservoir enlargement area. The drainage has the capacity to carry pollutants, nutrients, and organic carbon to Lake 2 in Yucaipa Regional Park, which is the nearest TNW at approximately 4,200 feet downstream. The nutrients and organic carbon in turn support downstream foodwebs (i.e., the California sycamore/willow woodland and the numerous calling Pacific chorus frogs before reaching Lake 2). The nutrients and organic carbon also contribute to the ecology of Lake 2. This non-RPW drainage also contributes seasonally intermittent flow to the California sycamore/willow woodland, the Pacific chorus frog site, and ultimately, to the TNW itself. The subject drainage effectively contributes to interstate commerce by provididing water to Lake 2. Water quality and presence is vital to the success of fishing and recreation opportunities that Lake 2 present.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: .

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   ☐ TNWs: linear feet width (ft), Or, acres.
   ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**

☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .

☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):

☐ Tributary waters: linear feet width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: .

3. Non-RPWs[8] that flow directly or indirectly into TNWs.

☒ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):

☒ Tributary waters: **1,979 (enlargement area ephemeral drainage)** linear feet **2** width (ft).

☐ Other non-wetland waters: acres.

Identify type(s) of waters: **.**

4. Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.

☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.

☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: **.**

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.

☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.

☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. Impoundments of jurisdictional waters.[9]

As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.

☐ Demonstrate that impoundment was created from "waters of the U.S.," or

☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or

☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]

---

[8] See Footnote # 3.

[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.

[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☐ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

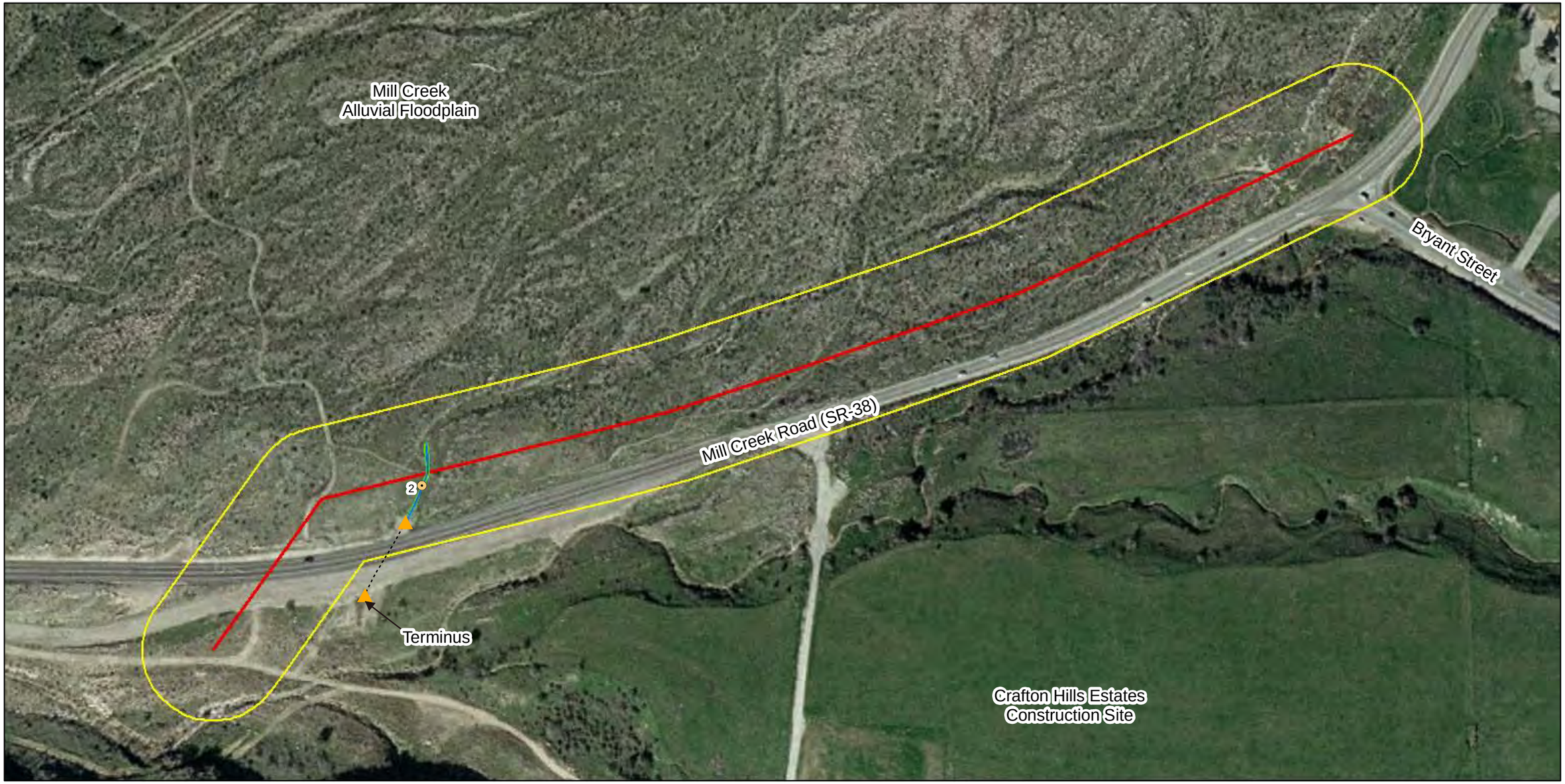
Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet, width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: .
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☒ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .

- ☐ Applicable/supporting case law: .
- ☐ Applicable/supporting scientific literature: .
- ☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .



Legend

- CDFG Jurisdiction (0.03 acres)
- RWQCB Jurisdiction (0.009 acres)
- Proposed Pipeline Centerline
- Study Area
- Culvert
- Hydrologic Connector
- Soil Pit

N

0 150 300 450 600 Feet

DWR - Crafton Hills Reservoir
Jurisdictional Determination
Figure 4

Chambers Group Inc.

APPROVED JURISDICTIONAL DETERMINATION FORM
U.S. Army Corps of Engineers

This form should be completed by following the instructions provided in Section IV of the JD Form Instructional Guidebook.

SECTION I: BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR APPROVED JURISDICTIONAL DETERMINATION (JD): March 5, 2008

B. DISTRICT OFFICE, FILE NAME, AND NUMBER: Los Angeles, CA

C. PROJECT LOCATION AND BACKGROUND INFORMATION:

State: California County/parish/borough: San Bernardino City: Crafton (unincorporated)
Center coordinates of site (lat/long in degree decimal format): Lat. 34°3'51.16"N° **N**, Long. 117°2'59.354"W° **W**.
Universal Transverse Mercator:
Name of nearest waterbody: Mill Creek
Name of nearest Traditional Navigable Water (TNW) into which the aquatic resource flows: It does not flow into a TNW.
Name of watershed or Hydrologic Unit Code (HUC): Santa Ana River / Upper Santa Ana River / Crafton /4.21sqmi

- ☒ Check if map/diagram of review area and/or potential jurisdictional areas is/are available upon request.
- ☐ Check if other sites (e.g., offsite mitigation sites, disposal sites, etc…) are associated with this action and are recorded on a different JD form.

D. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

- ☐ Office (Desk) Determination. Date:
- ☐ Field Determination. Date(s):

SECTION II: SUMMARY OF FINDINGS

A. RHA SECTION 10 DETERMINATION OF JURISDICTION.

There **Are no** "*navigable waters of the U.S.*" within Rivers and Harbors Act (RHA) jurisdiction (as defined by 33 CFR part 329) in the review area. [*Required*]

- ☐ Waters subject to the ebb and flow of the tide.
- ☐ Waters are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Explain: .

B. CWA SECTION 404 DETERMINATION OF JURISDICTION.

There **Are no** "*waters of the U.S.*" within Clean Water Act (CWA) jurisdiction (as defined by 33 CFR part 328) in the review area. [*Required*]

1. **Waters of the U.S.**
   a. **Indicate presence of waters of U.S. in review area (check all that apply):** [1]
   - ☐ TNWs, including territorial seas
   - ☐ Wetlands adjacent to TNWs
   - ☐ Relatively permanent waters[2] (RPWs) that flow directly or indirectly into TNWs
   - ☐ Non-RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to but not directly abutting RPWs that flow directly or indirectly into TNWs
   - ☐ Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs
   - ☐ Impoundments of jurisdictional waters
   - ☐ Isolated (interstate or intrastate) waters, including isolated wetlands

   b. **Identify (estimate) size of waters of the U.S. in the review area:**
   Non-wetland waters: linear feet: width (ft) and/or acres.
   Wetlands: 0 acres.

   c. **Limits (boundaries) of jurisdiction** based on: **1987 Delineation Manual**
   Elevation of established OHWM (if known): .

2. **Non-regulated waters/wetlands (check if applicable):**[3]
   - ☒ Potentially jurisdictional waters and/or wetlands were assessed within the review area and determined to be not jurisdictional. Explain: **The proposed pipeline site study area consists primarily of non-jurisdictional swales and upland habitats. One drainage feature with a discernible OHWM was found at the west end of the site. This feature originates from a**

---

[1] Boxes checked below shall be supported by completing the appropriate sections in Section III below.
[2] For purposes of this form, an RPW is defined as a tributary that is not a TNW and that typically flows year-round or has continuous flow at least "seasonally" (e.g., typically 3 months).
[3] Supporting documentation is presented in Section III.F.

swale within the north side of the study area and passes below Mill Creek Road (SR-38) via a culvert. The culvert exits at the south side of the study area where it immediately terminates into a swale. This swale does not extend into further connective drainages, and ends before a California buckwheat (non-riparian) vegetation community, where water percolates into the ground. As such, the drainage is considered as an isolated feature with no connection to a RPW or TNW, and is also non-jurisdictional per the SWANCC decision.

SECTION III: CWA ANALYSIS

A. TNWs AND WETLANDS ADJACENT TO TNWs

The agencies will assert jurisdiction over TNWs and wetlands adjacent to TNWs. If the aquatic resource is a TNW, complete Section III.A.1 and Section III.D.1. only; if the aquatic resource is a wetland adjacent to a TNW, complete Sections III.A.1 and 2 and Section III.D.1.; otherwise, see Section III.B below.

1. TNW
Identify TNW: .

Summarize rationale supporting determination: .

2. Wetland adjacent to TNW
Summarize rationale supporting conclusion that wetland is "adjacent": .

B. CHARACTERISTICS OF TRIBUTARY (THAT IS NOT A TNW) AND ITS ADJACENT WETLANDS (IF ANY):

This section summarizes information regarding characteristics of the tributary and its adjacent wetlands, if any, and it helps determine whether or not the standards for jurisdiction established under *Rapanos* have been met.

The agencies will assert jurisdiction over non-navigable tributaries of TNWs where the tributaries are "relatively permanent waters" (RPWs), i.e. tributaries that typically flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). A wetland that directly abuts an RPW is also jurisdictional. If the aquatic resource is not a TNW, but has year-round (perennial) flow, skip to Section III.D.2. If the aquatic resource is a wetland directly abutting a tributary with perennial flow, skip to Section III.D.4.

A wetland that is adjacent to but that does not directly abut an RPW requires a significant nexus evaluation. Corps districts and EPA regions will include in the record any available information that documents the existence of a significant nexus between a relatively permanent tributary that is not perennial (and its adjacent wetlands if any) and a traditional navigable water, even though a significant nexus finding is not required as a matter of law.

If the waterbody[4] is not an RPW, or a wetland directly abutting an RPW, a JD will require additional data to determine if the waterbody has a significant nexus with a TNW. If the tributary has adjacent wetlands, the significant nexus evaluation must consider the tributary in combination with all of its adjacent wetlands. This significant nexus evaluation that combines, for analytical purposes, the tributary and all of its adjacent wetlands is used whether the review area identified in the JD request is the tributary, or its adjacent wetlands, or both. If the JD covers a tributary with adjacent wetlands, complete Section III.B.1 for the tributary, Section III.B.2 for any onsite wetlands, and Section III.B.3 for all wetlands adjacent to that tributary, both onsite and offsite. The determination whether a significant nexus exists is determined in Section III.C below.

1. Characteristics of non-TNWs that flow directly or indirectly into TNW

(i) General Area Conditions:
Watershed size: **Pick List**
Drainage area: **Pick List**
Average annual rainfall: inches
Average annual snowfall: inches

(ii) Physical Characteristics:
(a) Relationship with TNW:
☐ Tributary flows directly into TNW.
☐ Tributary flows through **Pick List** tributaries before entering TNW.

Project waters are **Pick List** river miles from TNW.
Project waters are **Pick List** river miles from RPW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Project waters are **Pick List** aerial (straight) miles from RPW.
Project waters cross or serve as state boundaries. Explain: .

Identify flow route to TNW[5]: .
Tributary stream order, if known: .

---

[4] Note that the Instructional Guidebook contains additional information regarding swales, ditches, washes, and erosional features generally and in the arid West.
[5] Flow route can be described by identifying, e.g., tributary a, which flows through the review area, to flow into tributary b, which then flows into TNW.

(b) General Tributary Characteristics (check all that apply):

Tributary is: ☐ Natural
☐ Artificial (man-made). Explain: .
☐ Manipulated (man-altered). Explain: .

Tributary properties with respect to top of bank (estimate):
Average width: feet
Average depth: feet
Average side slopes: **Pick List.**

Primary tributary substrate composition (check all that apply):

☐ Silts	☐ Sands	☐ Concrete
☐ Cobbles	☐ Gravel	☐ Muck
☐ Bedrock	☐ Vegetation. Type/% cover:	
☐ Other. Explain: .		

Tributary condition/stability [e.g., highly eroding, sloughing banks]. Explain: .
Presence of run/riffle/pool complexes. Explain: .
Tributary geometry: **Pick List**
Tributary gradient (approximate average slope): %

(c) Flow:
Tributary provides for: **Pick List**
Estimate average number of flow events in review area/year: **Pick List**
Describe flow regime: .
Other information on duration and volume: .

Surface flow is: **Pick List.** Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
☐ Dye (or other) test performed: .

Tributary has (check all that apply):
☐ Bed and banks
☐ OHWM[6] (check all indicators that apply):

☐ clear, natural line impressed on the bank	☐ the presence of litter and debris
☐ changes in the character of soil	☐ destruction of terrestrial vegetation
☐ shelving	☐ the presence of wrack line
☐ vegetation matted down, bent, or absent	☐ sediment sorting
☐ leaf litter disturbed or washed away	☐ scour
☐ sediment deposition	☐ multiple observed or predicted flow events
☐ water staining	☐ abrupt change in plant community
☐ other (list):	

☐ Discontinuous OHWM.[7] Explain: .

If factors other than the OHWM were used to determine lateral extent of CWA jurisdiction (check all that apply):

☐ High Tide Line indicated by:	☐ Mean High Water Mark indicated by:
☐ oil or scum line along shore objects	☐ survey to available datum;
☐ fine shell or debris deposits (foreshore)	☐ physical markings;
☐ physical markings/characteristics	☐ vegetation lines/changes in vegetation types.
☐ tidal gauges	
☐ other (list):	

(iii) Chemical Characteristics:
Characterize tributary (e.g., water color is clear, discolored, oily film; water quality; general watershed characteristics, etc.).
Explain: .
Identify specific pollutants, if known: .

---

[6] A natural or man-made discontinuity in the OHWM does not necessarily sever jurisdiction (e.g., where the stream temporarily flows underground, or where the OHWM has been removed by development or agricultural practices). Where there is a break in the OHWM that is unrelated to the waterbody's flow regime (e.g., flow over a rock outcrop or through a culvert), the agencies will look for indicators of flow above and below the break.
[7] Ibid.

(iv) Biological Characteristics. Channel supports (check all that apply):

☐ Riparian corridor. Characteristics (type, average width): .
☐ Wetland fringe. Characteristics: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: .

2. Characteristics of wetlands adjacent to non-TNW that flow directly or indirectly into TNW

(i) Physical Characteristics:

(a) General Wetland Characteristics:
Properties:
  Wetland size: acres
  Wetland type. Explain: .
  Wetland quality. Explain: .
Project wetlands cross or serve as state boundaries. Explain: .

(b) General Flow Relationship with Non-TNW:
Flow is: **Pick List**. Explain: .

Surface flow is**: Pick List**
  Characteristics: .

Subsurface flow: **Pick List**. Explain findings: .
  ☐ Dye (or other) test performed: .

(c) Wetland Adjacency Determination with Non-TNW:
☐ Directly abutting
☐ Not directly abutting
  ☐ Discrete wetland hydrologic connection. Explain: .
  ☐ Ecological connection. Explain: .
  ☐ Separated by berm/barrier. Explain: .

(d) Proximity (Relationship) to TNW
Project wetlands are **Pick List** river miles from TNW.
Project waters are **Pick List** aerial (straight) miles from TNW.
Flow is from: **Pick List.**
Estimate approximate location of wetland as within the **Pick List** floodplain.

(ii) Chemical Characteristics:

Characterize wetland system (e.g., water color is clear, brown, oil film on surface; water quality; general watershed characteristics; etc.). Explain: .
Identify specific pollutants, if known: .

(iii) Biological Characteristics. Wetland supports (check all that apply):

☐ Riparian buffer. Characteristics (type, average width): .
☐ Vegetation type/percent cover. Explain: .
☐ Habitat for:
  ☐ Federally Listed species. Explain findings: .
  ☐ Fish/spawn areas. Explain findings: .
  ☐ Other environmentally-sensitive species. Explain findings: .
  ☐ Aquatic/wildlife diversity. Explain findings: .

3. Characteristics of all wetlands adjacent to the tributary (if any)

All wetland(s) being considered in the cumulative analysis: **Pick List**
Approximately ( ) acres in total are being considered in the cumulative analysis.

For each wetland, specify the following:

Directly abuts? (Y/N)	Size (in acres)	Directly abuts? (Y/N)	Size (in acres)

Summarize overall biological, chemical and physical functions being performed: .

C. SIGNIFICANT NEXUS DETERMINATION

A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by any wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of a TNW. For each of the following situations, a significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or insubstantial effect on the chemical, physical and/or biological integrity of a TNW. Considerations when evaluating significant nexus include, but are not limited to the volume, duration, and frequency of the flow of water in the tributary and its proximity to a TNW, and the functions performed by the tributary and all its adjacent wetlands. It is not appropriate to determine significant nexus based solely on any specific threshold of distance (e.g. between a tributary and its adjacent wetland or between a tributary and the TNW). Similarly, the fact an adjacent wetland lies within or outside of a floodplain is not solely determinative of significant nexus.

Draw connections between the features documented and the effects on the TNW, as identified in the *Rapanos* Guidance and discussed in the Instructional Guidebook. Factors to consider include, for example:

- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to carry pollutants or flood waters to TNWs, or to reduce the amount of pollutants or flood waters reaching a TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), provide habitat and lifecycle support functions for fish and other species, such as feeding, nesting, spawning, or rearing young for species that are present in the TNW?
- Does the tributary, in combination with its adjacent wetlands (if any), have the capacity to transfer nutrients and organic carbon that support downstream foodwebs?
- Does the tributary, in combination with its adjacent wetlands (if any), have other relationships to the physical, chemical, or biological integrity of the TNW?

Note: the above list of considerations is not inclusive and other functions observed or known to occur should be documented below:

1. **Significant nexus findings for non-RPW that has no adjacent wetlands and flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary itself, then go to Section III.D: The feature does not connect to a RPW or TNW. A significant nexus does not exist.

2. **Significant nexus findings for non-RPW and its adjacent wetlands, where the non-RPW flows directly or indirectly into TNWs.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: N/A.

3. **Significant nexus findings for wetlands adjacent to an RPW but that do not directly abut the RPW.** Explain findings of presence or absence of significant nexus below, based on the tributary in combination with all of its adjacent wetlands, then go to Section III.D: N/A.

D. DETERMINATIONS OF JURISDICTIONAL FINDINGS. THE SUBJECT WATERS/WETLANDS ARE (CHECK ALL THAT APPLY):

1. **TNWs and Adjacent Wetlands.** Check all that apply and provide size estimates in review area:
   - ☐ TNWs: linear feet width (ft), Or, acres.
   - ☐ Wetlands adjacent to TNWs: acres.

2. **RPWs that flow directly or indirectly into TNWs.**
   - ☐ Tributaries of TNWs where tributaries typically flow year-round are jurisdictional. Provide data and rationale indicating that tributary is perennial: .
   - ☐ Tributaries of TNW where tributaries have continuous flow "seasonally" (e.g., typically three months each year) are jurisdictional. Data supporting this conclusion is provided at Section III.B. Provide rationale indicating that tributary flows seasonally: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

3. **Non-RPWs[8] that flow directly or indirectly into TNWs.**
☐ Waterbody that is not a TNW or an RPW, but flows directly or indirectly into a TNW, and it has a significant nexus with a TNW is jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional waters within the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .

4. **Wetlands directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands directly abut RPW and thus are jurisdictional as adjacent wetlands.
☐ Wetlands directly abutting an RPW where tributaries typically flow year-round. Provide data and rationale indicating that tributary is perennial in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

☐ Wetlands directly abutting an RPW where tributaries typically flow "seasonally." Provide data indicating that tributary is seasonal in Section III.B and rationale in Section III.D.2, above. Provide rationale indicating that wetland is directly abutting an RPW: .

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

5. **Wetlands adjacent to but not directly abutting an RPW that flow directly or indirectly into TNWs.**
☐ Wetlands that do not directly abut an RPW, but when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisidictional. Data supporting this conclusion is provided at Section III.C.

Provide acreage estimates for jurisdictional wetlands in the review area: acres.

6. **Wetlands adjacent to non-RPWs that flow directly or indirectly into TNWs.**
☐ Wetlands adjacent to such waters, and have when considered in combination with the tributary to which they are adjacent and with similarly situated adjacent wetlands, have a significant nexus with a TNW are jurisdictional. Data supporting this conclusion is provided at Section III.C.

Provide estimates for jurisdictional wetlands in the review area: acres.

7. **Impoundments of jurisdictional waters.[9]**
As a general rule, the impoundment of a jurisdictional tributary remains jurisdictional.
☐ Demonstrate that impoundment was created from "waters of the U.S.," or
☐ Demonstrate that water meets the criteria for one of the categories presented above (1-6), or
☐ Demonstrate that water is isolated with a nexus to commerce (see E below).

E. ISOLATED [INTERSTATE OR INTRA-STATE] WATERS, INCLUDING ISOLATED WETLANDS, THE USE, DEGRADATION OR DESTRUCTION OF WHICH COULD AFFECT INTERSTATE COMMERCE, INCLUDING ANY SUCH WATERS (CHECK ALL THAT APPLY):[10]
☐ which are or could be used by interstate or foreign travelers for recreational or other purposes.
☐ from which fish or shellfish are or could be taken and sold in interstate or foreign commerce.
☐ which are or could be used for industrial purposes by industries in interstate commerce.
☐ Interstate isolated waters. Explain: .
☐ Other factors. Explain: .

---

[8] See Footnote # 3.
[9] To complete the analysis refer to the key in Section III.D.6 of the Instructional Guidebook.
[10] Prior to asserting or declining CWA jurisdiction based solely on this category, Corps Districts will elevate the action to Corps and EPA HQ for review consistent with the process described in the Corps/EPA *Memorandum Regarding CWA Act Jurisdiction Following Rapanos.*

Identify water body and summarize rationale supporting determination: .

Provide estimates for jurisdictional waters in the review area (check all that apply):
☐ Tributary waters: linear feet width (ft).
☐ Other non-wetland waters: acres.
Identify type(s) of waters: .
☐ Wetlands: acres.

F. NON-JURISDICTIONAL WATERS, INCLUDING WETLANDS (CHECK ALL THAT APPLY):
☐ If potential wetlands were assessed within the review area, these areas did not meet the criteria in the 1987 Corps of Engineers Wetland Delineation Manual and/or appropriate Regional Supplements.
☒ Review area included isolated waters with no substantial nexus to interstate (or foreign) commerce.
☐ Prior to the Jan 2001 Supreme Court decision in "*SWANCC*," the review area would have been regulated based solely on the "Migratory Bird Rule" (MBR).
☐ Waters do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction. Explain: .
☐ Other: (explain, if not covered above): .

Provide acreage estimates for non-jurisdictional waters in the review area, where the sole potential basis of jurisdiction is the MBR factors (i.e., presence of migratory birds, presence of endangered species, use of water for irrigated agriculture), using best professional judgment (check all that apply):
☐ Non-wetland waters (i.e., rivers, streams): linear feet width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

Provide acreage estimates for non-jurisdictional waters in the review area that do not meet the "Significant Nexus" standard, where such a finding is required for jurisdiction (check all that apply):
☒ Non-wetland waters (i.e., rivers, streams): **170** linear feet, **2** width (ft).
☐ Lakes/ponds: acres.
☐ Other non-wetland waters: acres. List type of aquatic resource: .
☐ Wetlands: acres.

SECTION IV: DATA SOURCES.

A. SUPPORTING DATA. Data reviewed for JD (check all that apply - checked items shall be included in case file and, where checked and requested, appropriately reference sources below):
☒ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant: .
☒ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report.
☐ Data sheets prepared by the Corps: .
☐ Corps navigable waters' study: .
☐ U.S. Geological Survey Hydrologic Atlas: .
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.
☒ U.S. Geological Survey map(s). Cite scale & quad name: .
☒ USDA Natural Resources Conservation Service Soil Survey. Citation: .
☒ National wetlands inventory map(s). Cite name: .
☐ State/Local wetland inventory map(s): .
☐ FEMA/FIRM maps: .
☐ 100-year Floodplain Elevation is: (National Geodectic Vertical Datum of 1929)
☒ Photographs: ☒ Aerial (Name & Date): .
or ☐ Other (Name & Date): .
☐ Previous determination(s). File no. and date of response letter: .
☐ Applicable/supporting case law: .
☐ Applicable/supporting scientific literature: .
☐ Other information (please specify): .

B. ADDITIONAL COMMENTS TO SUPPORT JD: .

Appendix F

Dam Inundation Study

ESA

State of California
The Resources Agency
Department of Water Resources
DIVISION OF ENGINEERING

East Branch Extension, Phase I Improvements
Crafton Hills Reservoir Enlargement
Inundation Study Report

Draft Final

Draft Final
December, 2008

STATE OF CALIFORNIA
Arnold Schwarzenegger, Governor

THE RESOURCES AGENCY
Mike Chrisman, Secretary for Resources

DEPARTMENT OF WATER RESOURCES
Lester A. Snow, Director

(Vacant)
Policy Advisor

Susan Sims
Chief Deputy Director

David Sandino
Office of
Chief Counsel

(Vacant)
Assistant Director
Public Affairs

Kasey Schimke
Assistant Director
Legislative Affairs

Aileen Tokunaga
Office of
Workforce Equality

Gerald Johns
Deputy Director

Mark Cowin
Deputy Director

Sharon Tapia
Acting Deputy Director

Ralph Torres
Deputy Director

Timothy Haines
Deputy Director

David Gutierrez
Deputy Director

East Branch Extension, Phase I Improvements
Crafton Hills Reservoir Enlargement
Inundation Study Report –Draft Final

DIVISION OF ENGINEERING
Richard Sanchez, Chief

This report was prepared under the direction of:

Ted Craddock.....Supervising Engineer, EBX Phase II Specialist
Tim Wehling .....Senior Engineer

by:

Nekane Hollister.....Engineer

Draft Final

State of California
The Resources Agency
Department of Water Resources
DIVISION OF ENGINEERING

ENGINEERING CERTIFICATION

This report has been prepared under my direction as the professional engineer in direct responsible charge of the work, in accordance with the provisions of the Professional Engineers' Act of the State of California.

Timothy M. Wehling
Registration No. C 65001

Date: _____

Draft Final

TABLE OF CONTENTS

Page

ENGINEERING CERTIFICATION I
TABLE OF CONTENTS II
LIST OF FIGURES IV
LIST OF TABLES V

1.0 INTRODUCTION 1
1.1 Purpose and Scope 1
1.2 Project Description 1
2.0 ANALYSIS PROCEDURES 6
2.1 Assumptions and Limitations 6
3.0 ANALYSIS RESULTS 7
3.1 East Crafton Hills Dam 7
3.1.1 DAMBRK Flood Routing Results 7
3.1.2 Possible Debris Content of Flood Flow and Impact on Roads 9
3.2 West Crafton Hills Dam 10
3.2.1 DAMBRK Flood Routing Results 10
3.2.2 Possible Debris Content of Flood Flow and Impact on Roads 12
4.0 CONCLUSION 15
5.0 REFERENCES 15
6.0 APPENDICES 16
6.1 Appendix A: Selected Outflow Hydrographs 16
6.2 Appendix B: ECH Dam Breach - DAMBRK Output File for Reach between Crafton Hills Reservoir and Yucaipa Reservoir No.2 21
6.3 Appendix C: ECH Dam BreacH - DAMBRK Graphic Plots for Reach between Crafton Hills Reservoir and Yucaipa Reservoir No.2 48
6.4 Appendix D: ECH Dam Breach - DAMBRK Output File for Reach Between Yucaipa Reservoir No.2 and yucipa Reservoir no.1 55
6.5 Appendix E: ECH Dam Breach - DAMBRK Graphic Plots for Reach Between Yucaipa Reservoir No.2 and yucaipa reservoir no. 1 71
6.6 Appendix F: ECH Dam Breach - DAMBRK Output File for Reach Downstream of Yucaipa Reservoir No.1 75
6.7 Appendix G: ECH Dam Breach - DAMBRK Graphic Plots for Reach Downstream of Yucaipa Reservoir No.1 91
6.8 Appendix H: WCH Dam Breach - DAMBRK Output File for Reach between Crafton Hills Reservoir and Yucaipa Reservoir No.2 95
6.9 Appendix I: WCH Dam Breach - DAMBRK Graphic Plots for Reach between Crafton Hills Reservoir and Yucaipa Reservoir No.2 111
6.10 Appendix J: WCH Dam Breach - DAMBRK Output File for Reach between Yucaipa Reservoir No.2 and yucaipa reservoir no. 1 115
6.11 Appendix K: WCH Dam Breach - DAMBRK Graphic Plots for Reach between Yucaipa Reservoir No.2 and yucaipa reservoir no. 1 131

Draft Final

6.12 Appendix L: WCH Dam Breach - DAMBRK Output File for Reach Downstream of Yucaipa Reservoir No.1 135
6.13 Appendix M: WCH Dam Breach - DAMBRK Graphic Plots for Reach Downstream of Yucaipa Reservoir No.1 151

Draft Final

LIST OF FIGURES

Page
Figure 1: Vicinity map of CHRE project 2
Figure 2: Site plan (taken from DWR 2008) 3
Figure 3: Maximum section through existing East Crafton Hills Dam 4
Figure 4: Maximum section through proposed West Crafton Hills Dam 5
Figure 5: Inundation map for East Crafton Hills Dam 8
Figure 6: Inundation map for West Crafton Hills Dam 11
Figure 7: Typical terrain between Crafton Hills dams and Yucaipa Reservoir No. 2 14
Figure 8: Wooded terrain at Yucaipa Reservoir No. 2 (from maps.live.com)..... 14

Draft Final

LIST OF TABLES

Page
Table 1: Yucaipa Reservoirs No.2 and No.1 Flood Wave Routing Characteristics for a Breach of the East Crafton Hills Dam 7
Table 2: Flood Wave Summary for Cross-Sections Included in the DAMBRK Model for a Breach of the East Crafton Hills Dam 10
Table 3: Yucaipa Reservoirs No.2 and No.1 Flood Wave Routing Characteristics for a Breach of the West Crafton Hills Dam 12
Table 4: Flood Wave Summary for Cross-Sections Included in the DAMBRK Model for a Breach of the West Crafton Hills Dam 13

Draft Final

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This report presents the inundation map for the proposed Crafton Hills Reservoir Enlargement (CHRE), and presents a summary of the analysis procedures used to prepare the map and the results of the analysis.

In this report, the existing Crafton Hills dam will be referred to as the East Crafton Hills Dam (ECH) and the proposed dam will be referred to as the West Crafton Hills (WCH) Dam. Individual flood routing maps for the ECH Dam and the WCH Dam are presented. Figure 5 presents the inundation map for a breach of the ECH Dam. Figure 6 presents the inundation map for a breach of the WCH Dam.

1.2 PROJECT DESCRIPTION

Crafton Hills Reservoir (CHR) is a component of the East Branch Extension – Phase I, completed in 2000. As part of the East Branch Extension – Phase I Improvements, the CHR is being enlarged from an active storage of 85 acre-feet to 225 acre-feet. The reservoir enlargement is being accomplished by constructing a dam to the west of the existing dam (ECH Dam) and excavating a portion of the ridge between the two dams to join the existing reservoir with the reservoir impounded by the proposed dam (WCH Dam).

The existing reservoir is an off-stream storage project located in the easterly edge of the Crafton Hills, approximately 2 miles north of the city of Yucaipa (Figure 1). The reservoir is impounded by a zoned earth embankment dam with a crest elevation of 2,932 feet, a crest length of 500 feet, and a maximum height of 95 feet above stream bed. The WCH Dam to be constructed is a zoned earth dam with a crest elevation of 2,932, a crest length of 475 feet, and a maximum height above streambed of 90 feet. The reservoir's watershed area is approximately 62 acres. It is worth noting that all elevations shown in this report are based on the NGVD 1929 datum.

A location map is included as Figure 1, and a site plan of the principal project features is included as Figure 2. Figure 3 and Figure 4 contain the maximum cross section of the ECH Dam and the maximum cross section of the WCH Dam, respectively.

Draft Final

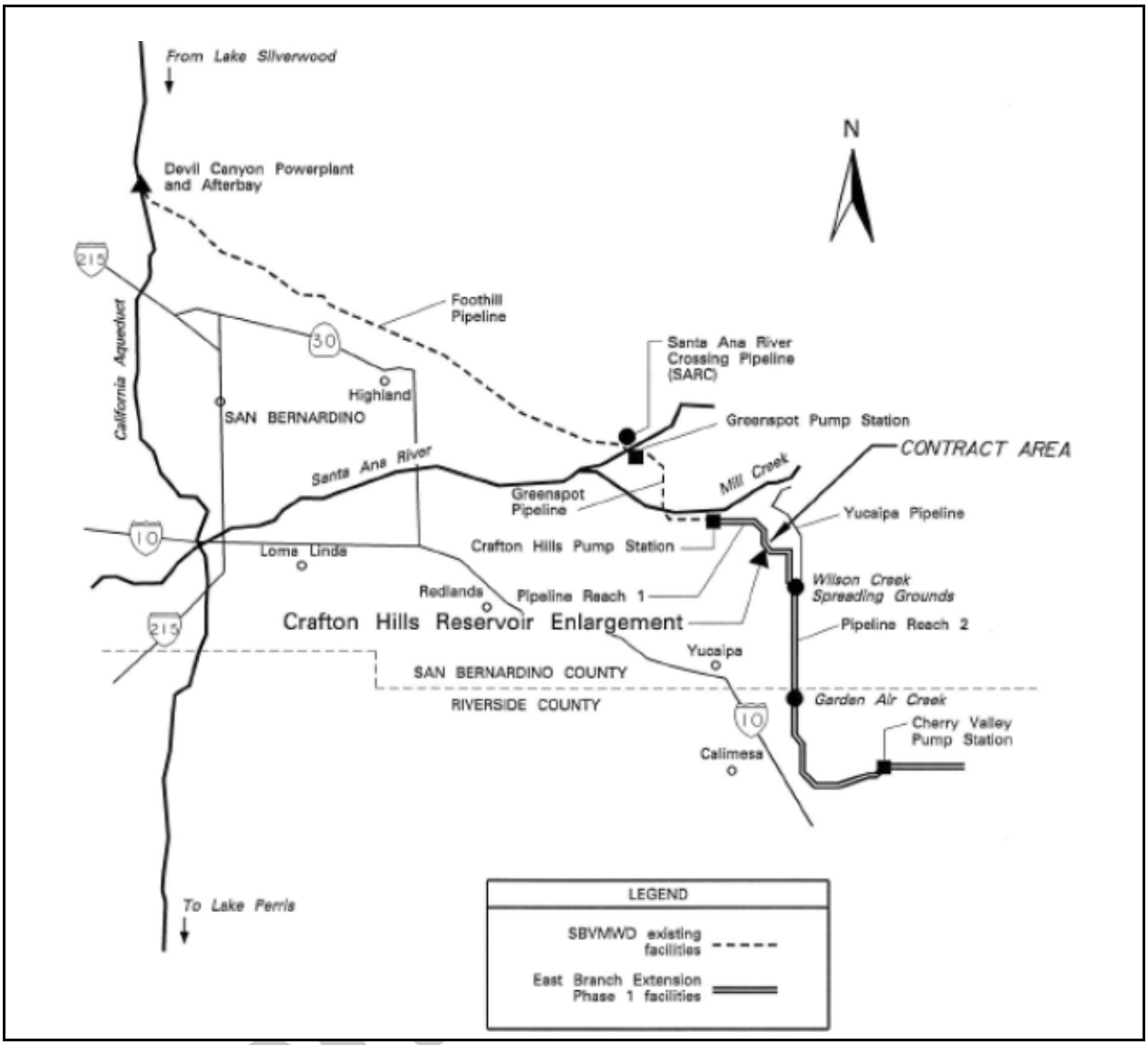


Figure 1: Vicinity map of CHRE project

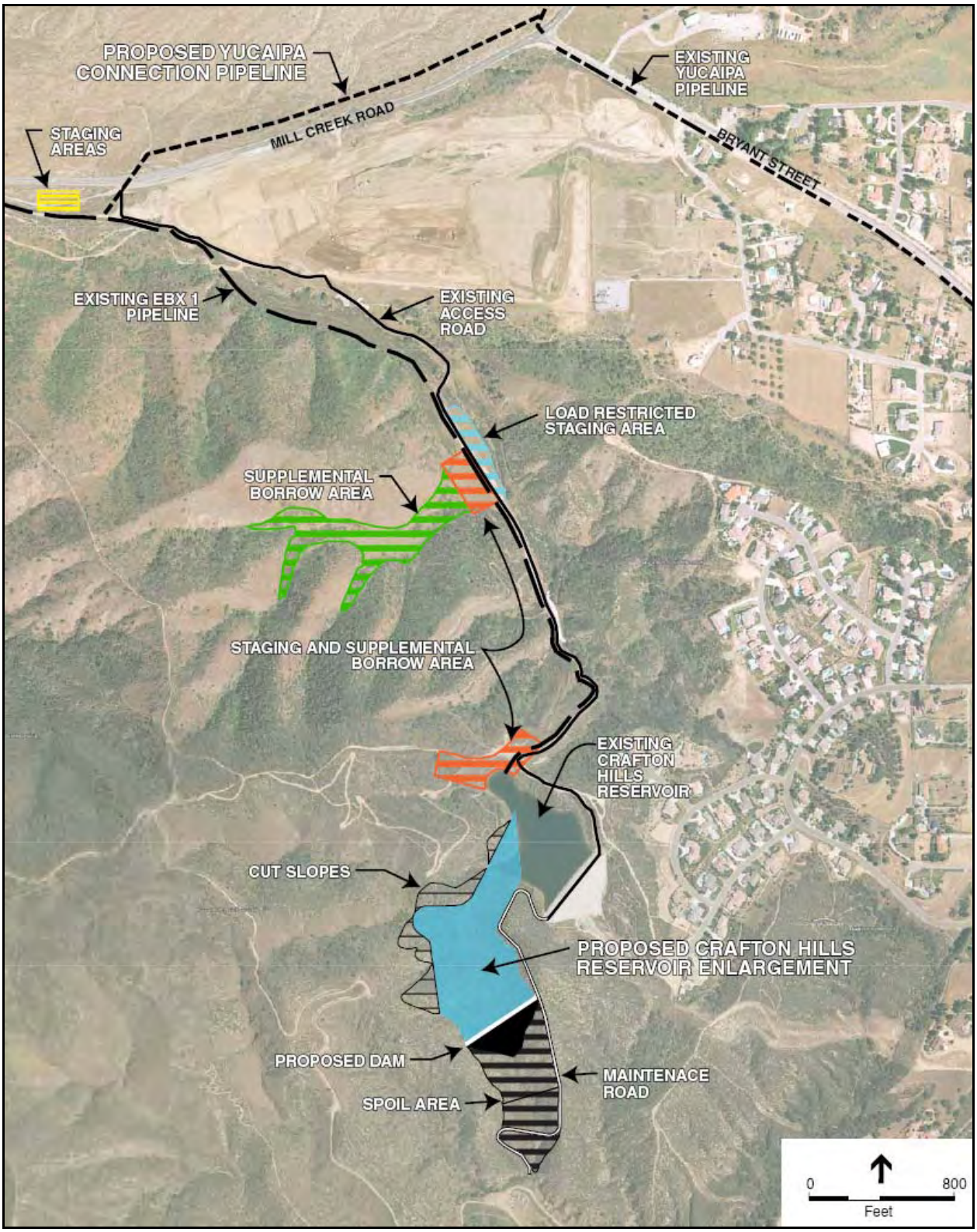


Figure 2: Site plan (taken from DWR 2008)

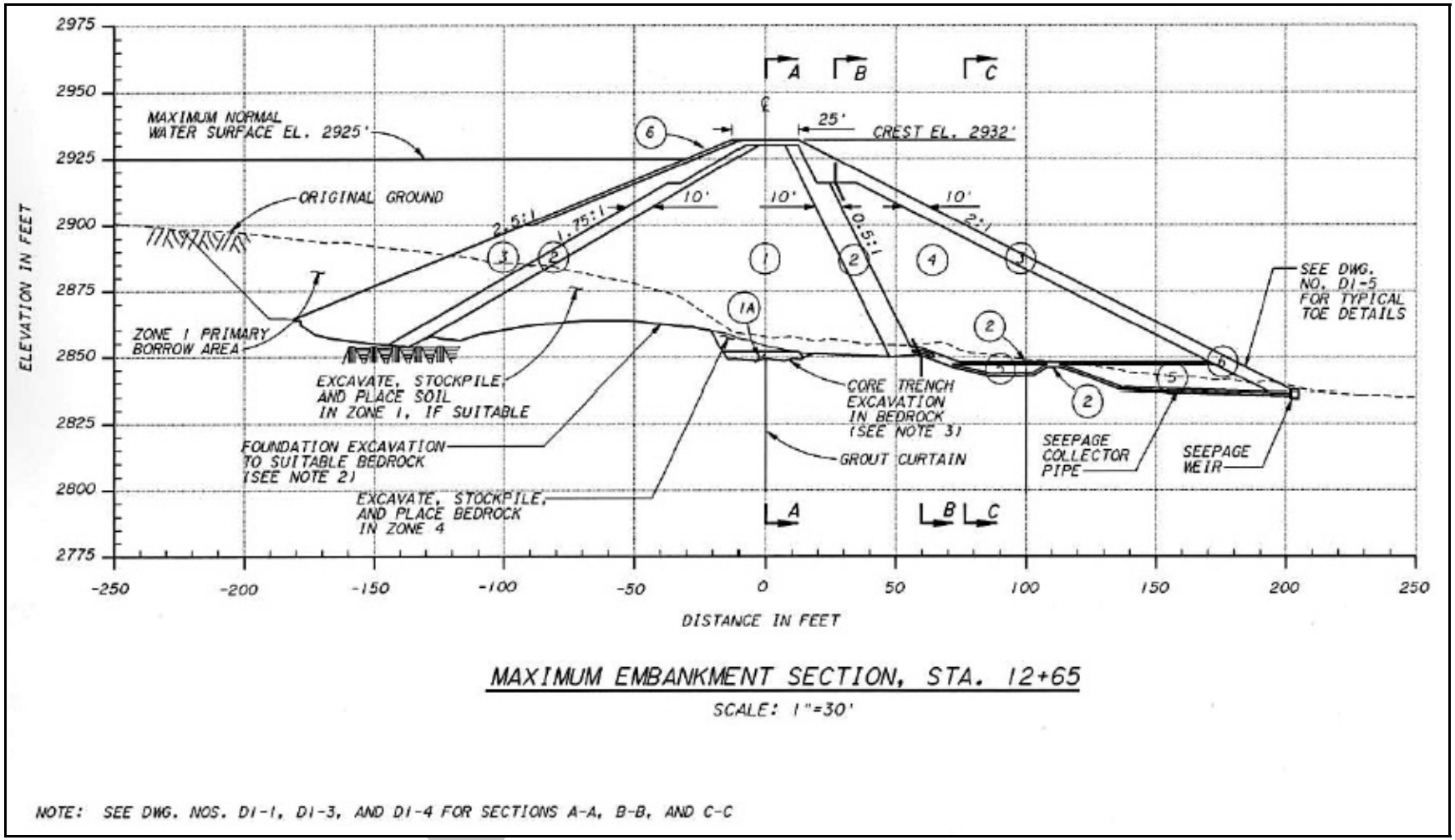


Figure 3: Maximum section through existing East Crafton Hills Dam

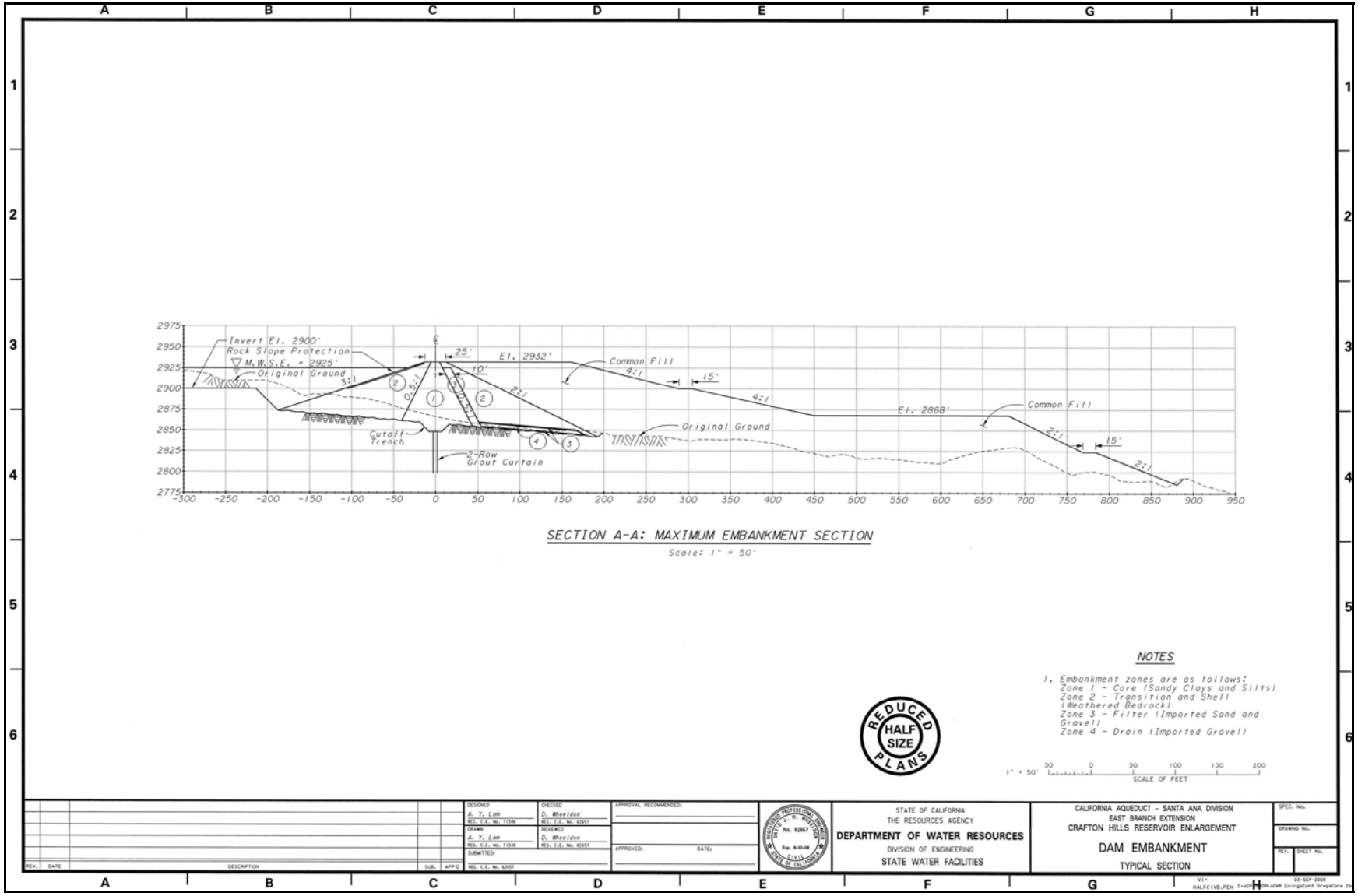


Figure 4: Maximum section through proposed West Crafton Hills Dam

2.0 ANALYSIS PROCEDURES

The inundation map was prepared by modeling hypothetical piping breaches of both the ECH Dam and the WCH Dam, with only one dam failing during each run. The breach was assumed to occur on a sunny day during fair weather. The corresponding flood hydrographs were routed downstream using the dynamic wave method. Breach parameters were derived using procedures outlined in the following references:

1. City of Los Angeles Department of Water and Power, "Determination of Dam Breach Inundated Area, Earth Dams", April 1973.

2. Federal Energy Regulatory Commission, "Engineering Guidelines for the Evaluation of Hydropower Projects", July 1987.

3. Fread, D.L., "DAMBRK: The NWS Dam-Break Flood Forecasting Model", July 1984.

Draft Final

2.1 ASSUMPTIONS AND LIMITATIONS

A simplified numerical model was used to estimate the breach hydrograph and to route the breached outflow. BOSS DAMBRK was used to route the flow through the downstream channel. DAMBRK is a one-dimensional flow model and the outputs are based on simplified boundary conditions, channel geometry, and channel roughness coefficients. In the absence of available data, values of the above parameters were estimated using engineering judgment. The flow routing also neglects downstream infiltration. For conservatism, no runoff losses were incorporated into the model, providing maximum flow throughout the entire route. The following parameters were used to derive the breach hydrograph:

- Breach Formation Time 0.5 hours
- Average Breach Width 105 feet
- Piping Breach Side Slopes vertical

Because of the method, procedures, and assumptions used to develop the inundation maps, the limits of flooding shown and flood wave arrival time are only approximate. Actual flooding area may differ from areas shown, and flooded areas shown on the maps should be used as a rough guideline to establish inundation limits.

3.0 ANALYSIS RESULTS

Maximum flood waves were developed for a fair weather piping breach of the ECH Dam and the WCH Dam. The approximate inundation limit for a breach of the ECH Dam is shown in Figure 5. The approximate Inundation limit for a breach of the WCH Dam is shown in Figure 6.

The flood waves resulting from a breach of the ECH Dam or the WCH Dam are very similar. A breach of the ECH Dam produces a slightly larger peak flood flow which attenuates a little more quickly than a breach of the WCH Dam. Selected outflow hydrographs, at different points in the routing, are shown in Appendix A. DAMBRK output files and graphic plots for the ECH Dam and the WCH Dam are included for reference as Appendices B through G and Appendices H through M, respectively.

3.1 EAST CRAFTON HILLS DAM

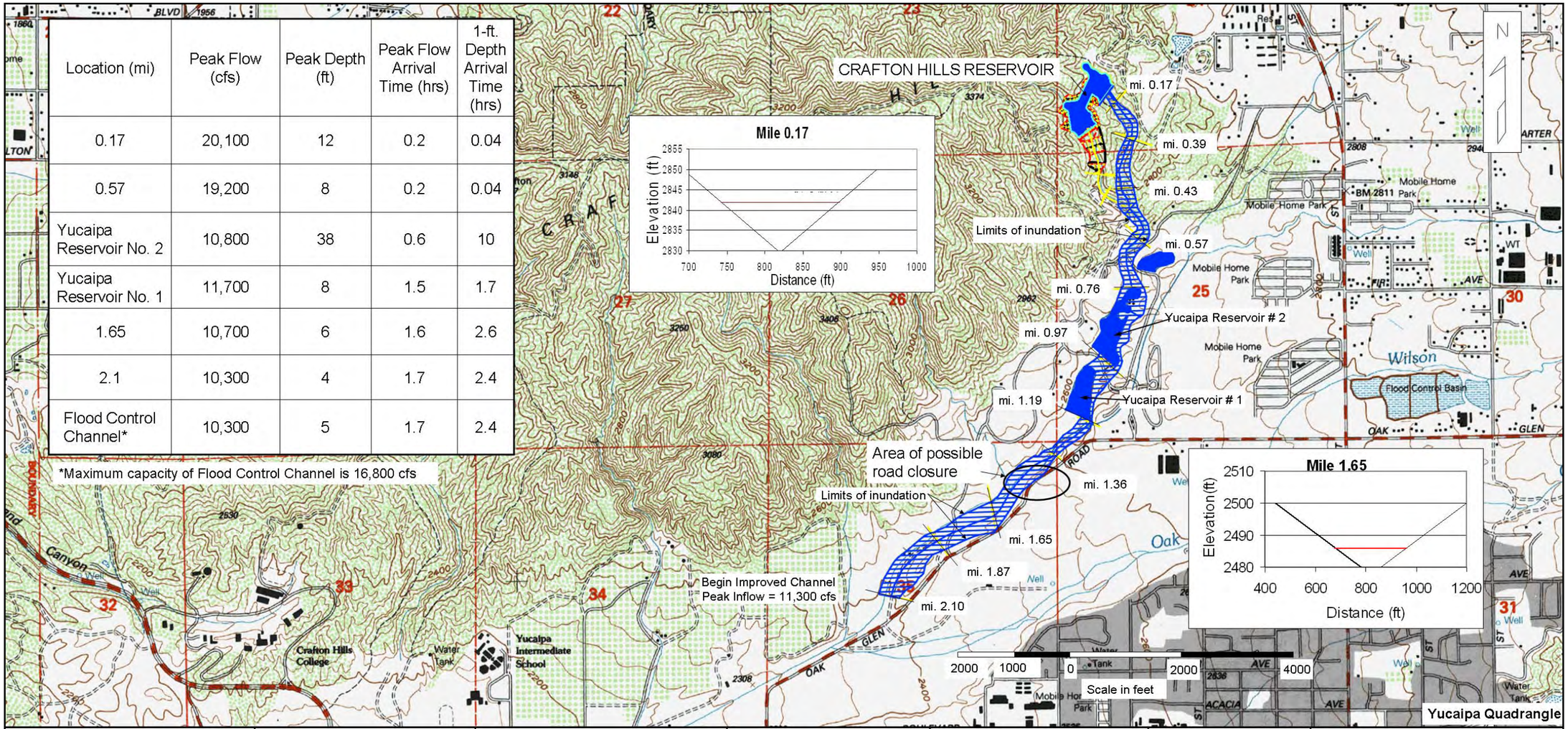
3.1.1 DAMBRK Flood Routing Results

The inundation map for a breach of the ECH Dam is shown in Figure 5. The peak outflow from a breach of the ECH Dam is estimated at 20,600 cfs. As shown in Figure 5, the flood wave would cross the reservoir access road, but would not impact the safety of the adjacent Yucaipa Dam No.3. Peak inflow into Yucaipa Reservoir No.2 is estimated at 19,200 cfs. The flood wave will breach Yucaipa Dam No.2, flow down into Yucaipa Reservoir No.1, breach Yucaipa Dam No.1, and flow downstream, entering a tributary of the Oak Glen Creek. The peak inflow into Yucaipa Reservoir No.1 is estimated at 10,800 cfs. The peak outflow from Yucaipa Reservoir No.1 is estimated at 11,700 cfs. Table 1 presents the sequence of flows.

Table 1: Yucaipa Reservoirs No.2 and No.1 Flood Wave Routing Characteristics for a Breach of the East Crafton Hills Dam

Yucaipa Reservoir	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Reservoir Elevation (feet)
No.2 (Mi. 0.97)	19,200	10,800	2,622
No.1 (Mi. 1.19)	10,800	11,700	2,580

Draft Final



Location (mi)	Peak Flow (cfs)	Peak Depth (ft)	Peak Flow Arrival Time (hrs)	1-ft. Depth Arrival Time (hrs)
0.17	20,100	12	0.2	0.04
0.57	19,200	8	0.2	0.04
Yucaipa Reservoir No. 2	10,800	38	0.6	10
Yucaipa Reservoir No. 1	11,700	8	1.5	1.7
1.65	10,700	6	1.6	2.6
2.1	10,300	4	1.7	2.4
Flood Control Channel*	10,300	5	1.7	2.4

*Maximum capacity of Flood Control Channel is 16,800 cfs

Enlarged Crafton Hills Reservoir
DWR# 1-091
Inundation Map for Failure of East Dam
Map 1 of 1

The inundation area shown on this map represents an extremely rare event. Publication is not intended to reflect in any way upon the integrity of Crafton Hills Dam. All water depths, travel times, and inundated areas shown on this map are approximate.

DEPARTMENT OF WATER RESOURCES
STATE OF CALIFORNIA

DESCRIPTION:		REVISED BY:
		N. Hollister
REVISION NO.:	DATE:	APPROVED BY:
1	Nov 12, 08	

Dam Owner:
Department of Water Resources
Southern Field Division
34534 116th St. East
Pearblossom, CA 93553
(661) 944-8503

Figure 5: Inundation map for East Crafton Hills Dam

Downstream of Yucaipa Reservoir No.1, the flood flow enters a tributary to the Oak Glen Creek, just downstream of mile 2.1. The peak outflow of 10,300 cfs at Mile 2.1 would be confined within the improved stream channel without overtopping. Contract drawings from San Bernardino Flood Control District indicate the design flow of the improved stream channel is approximately 16,800 cfs. Dynamic routing of the flood wave was concluded at this point. The total travel time of the peak flood flow to this point is approximately 1.7 hours.

Table 2 presents a summary of flows, depths, and arrival times of the flood wave at the cross-sections included in the DAMBRK model. As shown, the peak depths of the flood wave in the canyon between the ECH Dam and Yucaipa Reservoir No. 2 Dam varies from about 38 to 8 feet with a peak flood arrival time ranging from 0.1 hours downstream of ECH Dam to 0.2 hours at Yucaipa Reservoir No. 2 Dam. The 1-foot flood depth arrival times for this reach vary from 0 hours at ECH Dam to 0.2 hours at Yucaipa Reservoir No. 2 Dam. The 1-foot deflood depth times vary from 0.4 hours downstream of ECH Dam to over 10 hours at Yucaipa Reservoir No. 2 dam. At 10 hours, the flood flow is approximately 2 feet deep at Yucaipa Reservoir No. 2.

The peak depth of the flood wave between just downstream of Yucaipa Reservoir No. 2 and the start of the improved flood control channel is about 8 feet with an arrival time of 1.7 hours. The 1-foot flood depth arrival times for this reach are approximately 0.7 hours. The 1-foot deflood depth times range from 1.7 to 2.6 hours. The peak depth of the flood wave at the start of the improved flood channel is about 5 feet.

3.1.2 Possible Debris Content of Flood Flow and Impact on Roads

The inundation map for a breach of the East Crafton Hills Dam is shown in Figure 5.

From the ECH Dam to Yucaipa Reservoir No. 2, the flood water will most likely carry silt, sand, gravel, and shrubs. Downstream of Yucaipa Reservoir No. 2, the flood flow may carry some uprooted trees since the area around Yucaipa Reservoir No. 2 is somewhat wooded. Debris of this nature may cause longer road closures due to the amount of clean-up that may be required. The routing indicates that the flood flow just skirts the edge of Oak Glen Road. Due to the uncertainty inherent in the routing, emergency officials may want to consider closing a portion of this road. Figure 7 and Figure 8 show photographs of the terrain.

Draft Final

Table 2: Flood Wave Summary for Cross-Sections Included in the DAMBRK Model for a Breach of the East Crafton Hills Dam.

Location (mile)	Peak Flow (cfs)	Peak Depth (ft)	Peak Flow Arrival Time (hrs)	1-ft. Depth Arrival Time (hrs)	Deflood Time (hrs)
East Crafton Hills Dam	20,600	---	---	---	---
0.17	20,100	12	0.2	0.0	0.4
0.57	19,200	8	0.2	0.0	0.4
Yucaipa Reservoir No. 2 (Mi. 0.97)	10,800	38	0.6	0.2	10
Yucaipa Reservoir No. 1 (Mi. 1.19)	11,700	8	1.5	0.3	1.7
1.65	10,700	6	1.6	0.7	2.6
2.1	10,300	4	1.7	0.7	2.4
Flood Control Channel*	10,300	5	1.7	0.7	2.4

*Maximum capacity of Flood Control Channel is 16,800 cfs

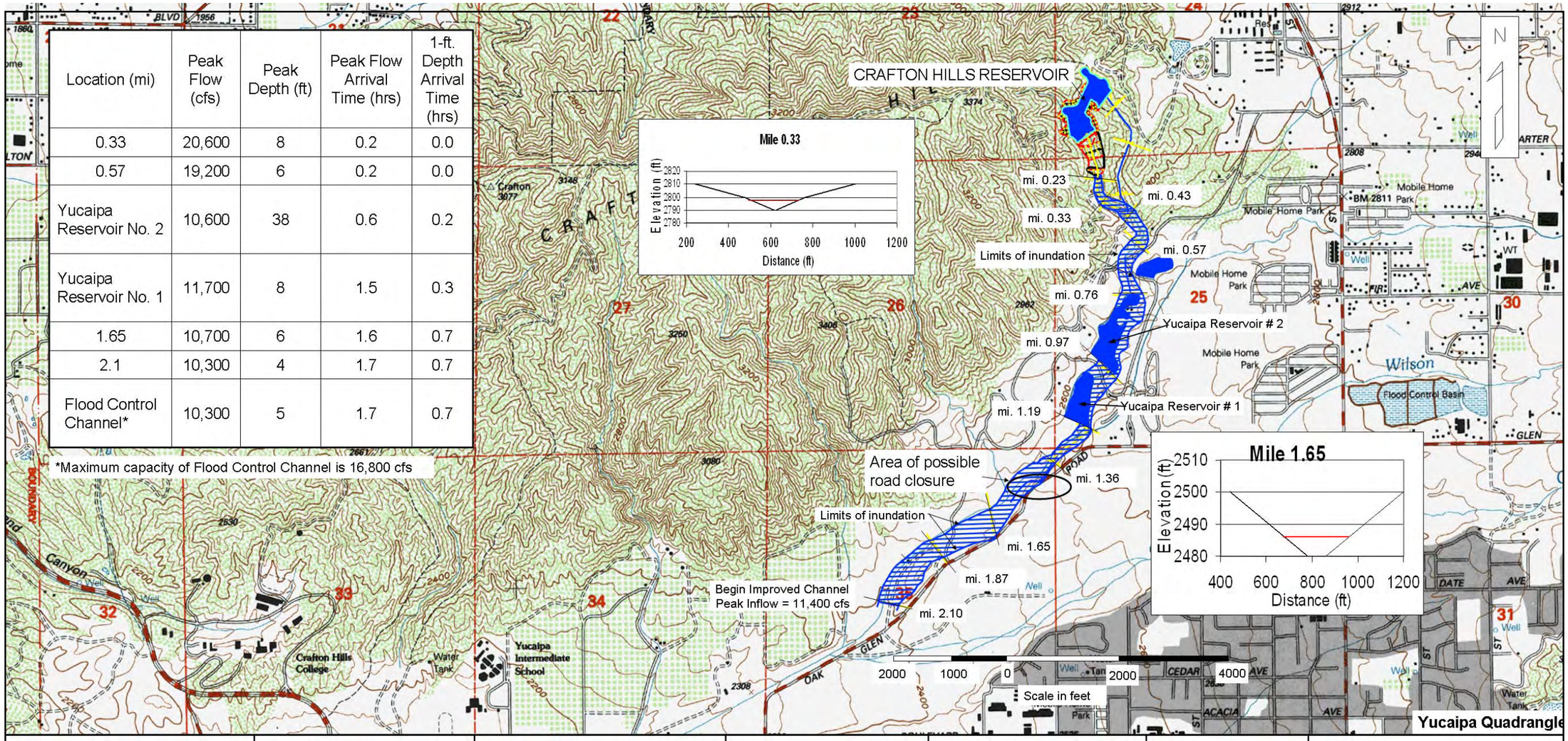
Draft Final

3.2 WEST CRAFTON HILLS DAM

3.2.1 DAMBRK Flood Routing Results

The inundation map for a breach of the West Crafton Hills Dam is shown in Figure 6.

The peak outflow from a breach of the WCH Dam is estimated at 20,600 cfs. As shown in Figure 6, the flood wave would not impact the safety of the adjacent Yucaipa Dam No.3. As shown in Table 3, peak inflow into Yucaipa Reservoir No.2 is estimated at 19,200 cfs. The flood wave will breach Yucaipa Dam No.2, flow down into Yucaipa Reservoir No.1, breach Yucaipa Dam No.1, and flow downstream, entering a tributary of the Oak Glen Creek. The peak inflow into Yucaipa Reservoir No.1 is estimated at 10,600 cfs. The peak outflow from Yucaipa Reservoir No.1 is estimated at 11,700 cfs.



Location (mi)	Peak Flow (cfs)	Peak Depth (ft)	Peak Flow Arrival Time (hrs)	1-ft. Depth Arrival Time (hrs)
0.33	20,600	8	0.2	0.0
0.57	19,200	6	0.2	0.0
Yucaipa Reservoir No. 2	10,600	38	0.6	0.2
Yucaipa Reservoir No. 1	11,700	8	1.5	0.3
1.65	10,700	6	1.6	0.7
2.1	10,300	4	1.7	0.7
Flood Control Channel*	10,300	5	1.7	0.7

*Maximum capacity of Flood Control Channel is 16,800 cfs

Enlarged Crafton Hills Reservoir
DWR# 1-091
Inundation Map for Failure of West Dam
Map 1 of 1

Eureka, Sacramento, San Francisco, Project Area, San Bernadino, Los Angeles, San Diego

The inundation area shown on this map represents an extremely rare event. Publication is not intended to reflect in any way upon the integrity of Crafton Hills Dam. All water depths, travel times, and inundated areas shown on this map are approximate.

DEPARTMENT OF WATER RESOURCES – STATE OF CALIFORNIA

DESCRIPTION:

REVISED BY: N. Hollister

REVISION NO.: 1

DATE: Nov 12, 08

APPROVED BY:

Dam Owner:
Department of Water Resources
Southern Field Division
34534 116th St. East
Pearblossom, CA 93553
(661) 944-8503

Figure 6: Inundation map for West Crafton Hills Dam

Table 3: Yucaipa Reservoirs No.2 and No.1 Flood Wave Routing Characteristics for a Breach of the West Crafton Hills Dam

Yucaipa Reservoir	Peak Inflow (cfs)	Peak Outflow (cfs)	Maximum Reservoir Elevation (feet)
No.2 (Mi. 0.97)	19,200	10,600	2,622
No.1 (Mi. 1.19)	10,600	11,700	2,580

Downstream of Yucaipa Reservoir No.1, the flood flow enters a tributary to the Oak Glen Creek. The peak outflow of 10,300 cfs at mile 2.1 would be confined within the improved stream channel.

Draft Final

Table 4 presents a summary of flows, depths, and arrival times of the flood wave at the cross-sections included in the DAMBRK model. As shown, the peak depths of the flood wave in the canyon between the WCH Dam and Yucaipa Reservoir No. 2 varies from about 38 to 6 feet with a peak flood arrival time ranging from 0.0 hours downstream of WCH Dam to 0.6 hours at Yucaipa Reservoir No. 2 Dam. The 1-foot flood depth arrival times for this reach are almost immediate, being calculated at 0.0 hours. The 1-foot deflood depth times vary from 0.4 hours at WCH Dam to greater than 10 hours at Yucaipa Reservoir No. 2. By 10 hours, the flood depth at Yucaipa Reservoir No.2 has been reduced to approximately 2 feet.

The peak depth of the flood wave between the Yucaipa Reservoirs and the start of the improved flood control channel is about 8 feet with an arrival time of 1.5 hours. The 1-foot flood depth arrival times for this reach are approximately 0.7 hours. The 1-foot deflood depth times range between 1.7 hours and 2.7 hours. The peak depth of the flood wave at the start of the improved flood channel is about 5 feet.

3.2.2 Possible Debris Content of Flood Flow and Impact on Roads

From the WCH dam to Yucaipa Reservoir No. 2, the flood water will most likely carry silt, sand, gravel, and shrubs. Downstream of Yucaipa Reservoir No. 2, the flood flow may carry some uprooted trees since the area around Yucaipa Reservoir No. 2 is somewhat wooded. Debris of this nature may cause longer road closures due to the amount of clean up that may be required. The routing indicates that the flood flow just skirts the edge of Oak Glen Road. Due to the uncertainty inherent in the routing, emergency officials may want to consider closing a portion of this road. Figure 7 and Figure 8 show photographs of the terrain.

Draft Final

Table 4: Flood Wave Summary for Cross-Sections Included in the DAMBRK Model for a Breach of the West Crafton Hills Dam.

Location (mile)	Peak Flow (cfs)	Peak Depth (ft)	Peak Flow Arrival Time (hrs)	1-ft. Depth Arrival Time (hrs)	Deflood Time (hrs)
West Crafton Hills Dam	20,600	---	---	---	---
0.33	20,100	8	0.2	0.0	0.4
0.57	19,200	6	0.2	0.0	0.4
Yucaipa Reservoir No. 2 Mi. 0.97	10,600	38	0.6	0.2	10
Yucaipa Reservoir No. 1 Mi. 1.19	11,700	8	1.5	0.3	1.7
1.65	10,700	6	1.6	0.7	2.7
2.1	10,300	4	1.7	0.7	2.4
Flood Control Channel*	10,300	5	1.7	0.7	2.4

Draft Final

Figure 7: Typical terrain between Crafton Hills dams and Yucaipa Reservoir No. 2

Figure 8: Wooded terrain at Yucaipa Reservoir No. 2 (from maps.live.com)

4.0 CONCLUSION

Given the assumptions of this report, the flood waves from both embankments do not present a significant hazard to occupied structures downstream of the reservoir. The flood wave from ECH Dam or WCH Dam would overtop Yucaipa Reservoir No. 2, causing the dam to breach. The flood would then flow into Yucaipa Reservoir No. 1, overtopping the embankment and causing it to breach also. The flood flow out of Yucaipa Reservoir No. 1 would continue downstream to the improved flood control channel, where it would be contained.

5.0 REFERENCES

BOSS DAMBRK (1993). "BOSS DAMBRK, Version 3.0," Boss International, 6300 University Avenue, Madison, WI 53562-3486.

City of Los Angeles Department of Water and Power, "Determination of Dam Breach Inundated Area, Earth Dams", April 1973.

DWR (2008). "Supplemental Environmental Impact Report, Administrative Draft (Preliminary Version)," State of California, The Resources Agency, Department of Water Resources (DWR).

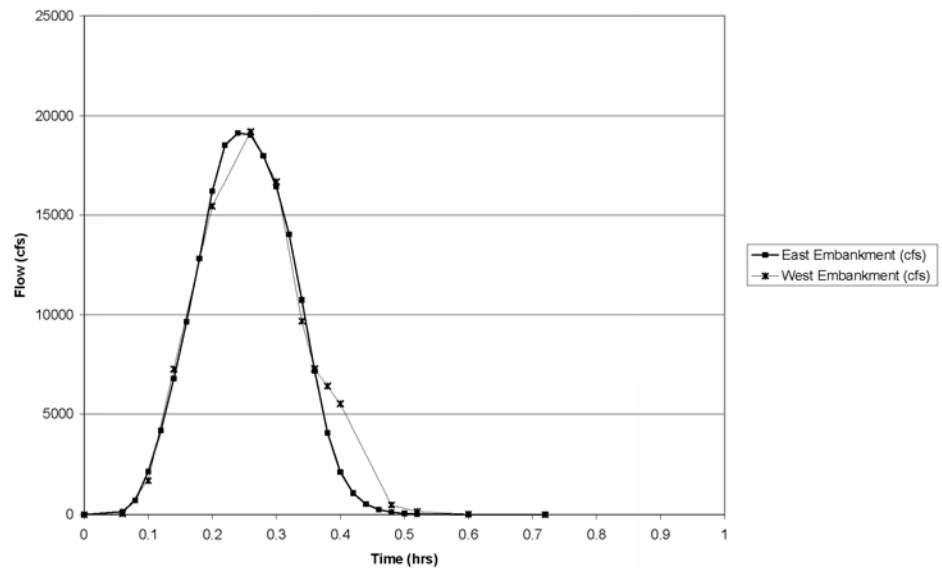
Federal Energy Regulatory Commission, "Engineering Guidelines for the Evaluation of Hydropower Projects", July 1987.

Fread, D.L. (1984). "DAMBRK: The NWS Dam-Break Flood Forecasting Model," July.

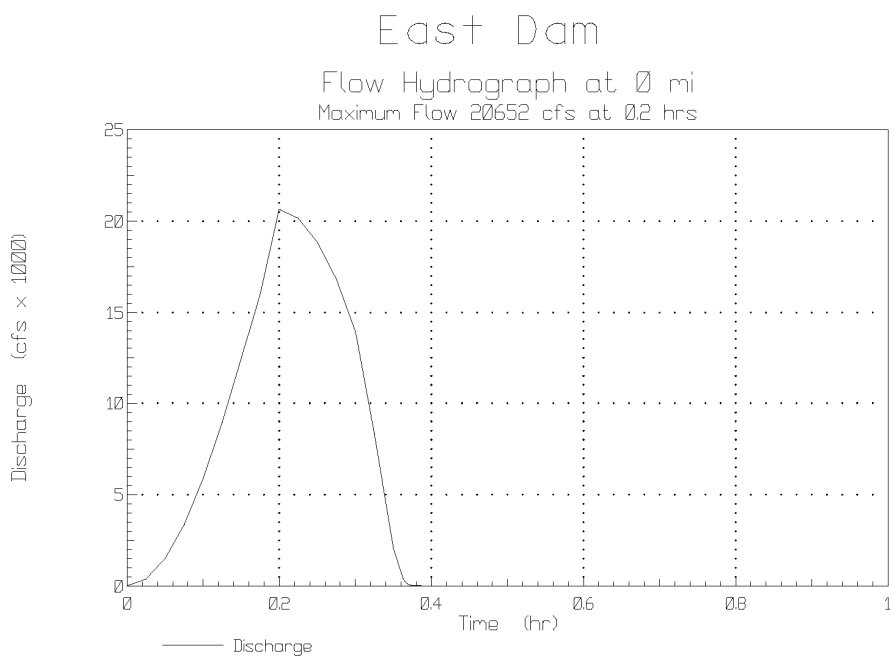
Draft Final

6.0 APPENDICES

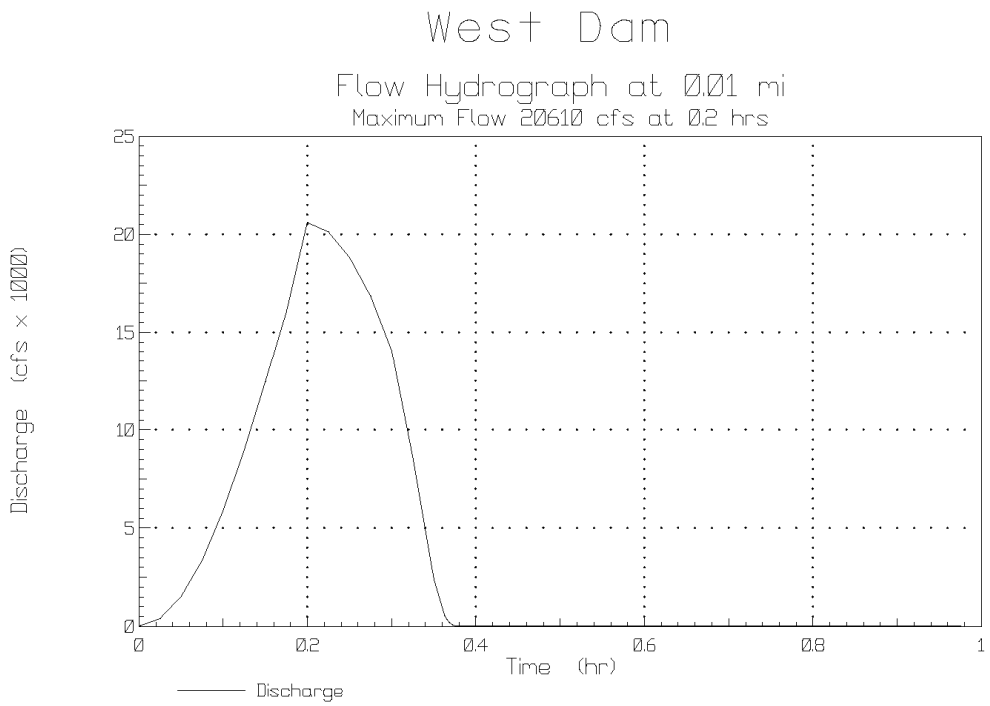
6.1 APPENDIX A: SELECTED OUTFLOW HYDROGRAPHS



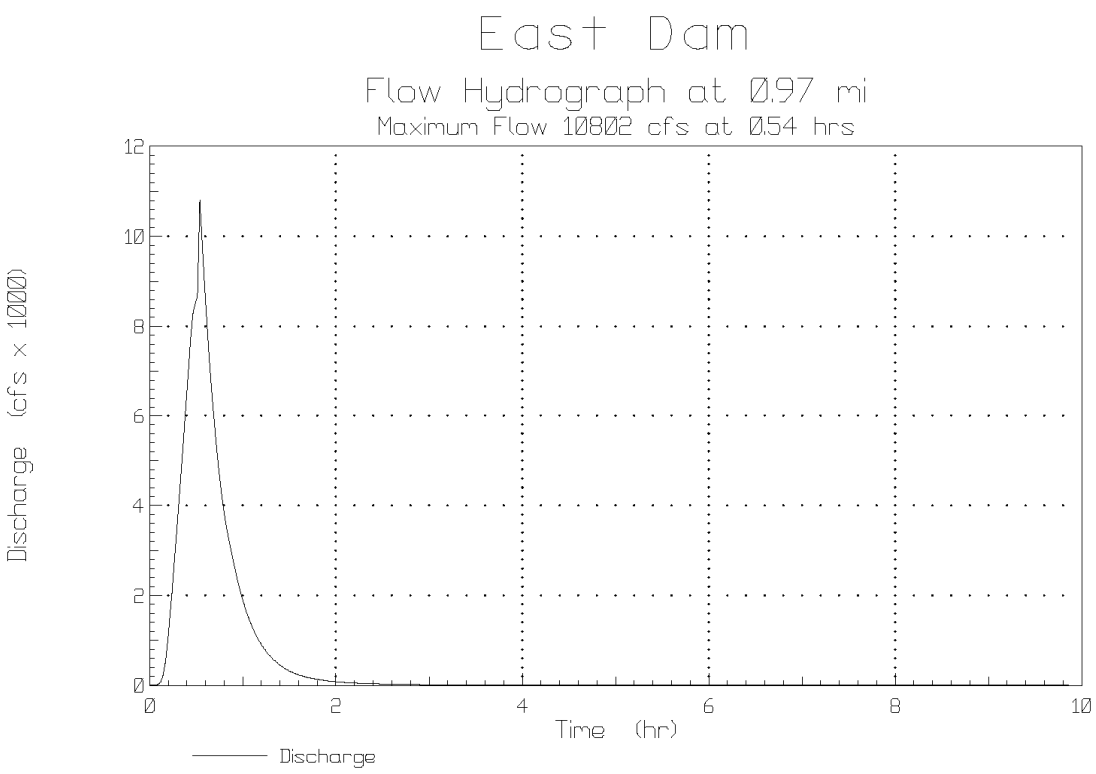
Comparison of Outflow Hydrographs from ECH Dam Breach and WCH Dam Breach



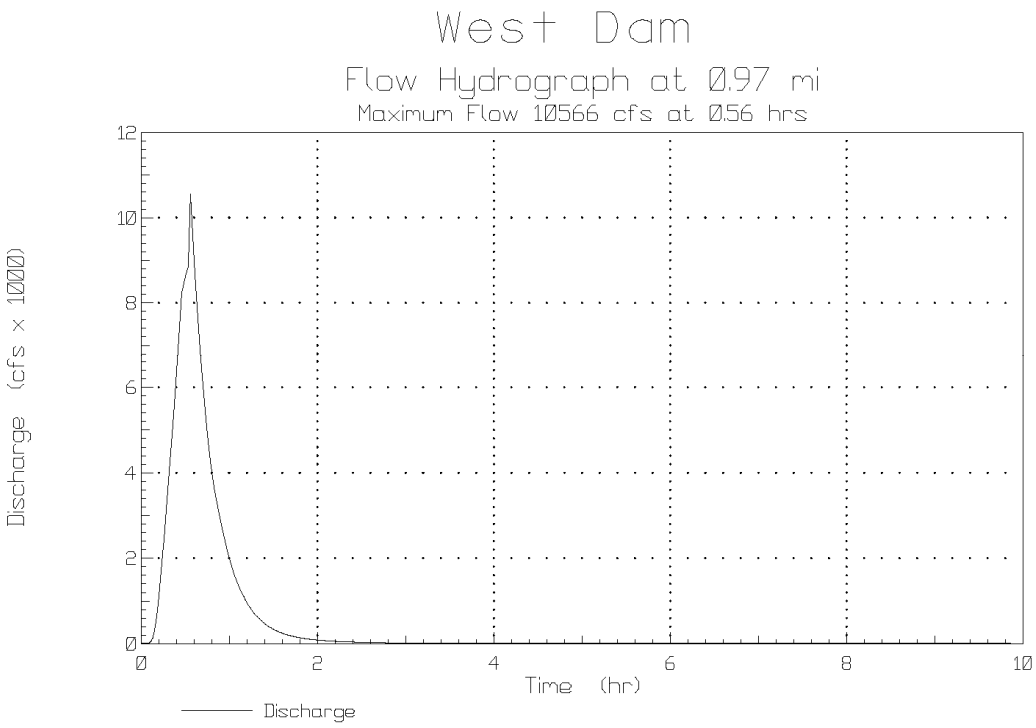
Outflow from ECH Dam Breach



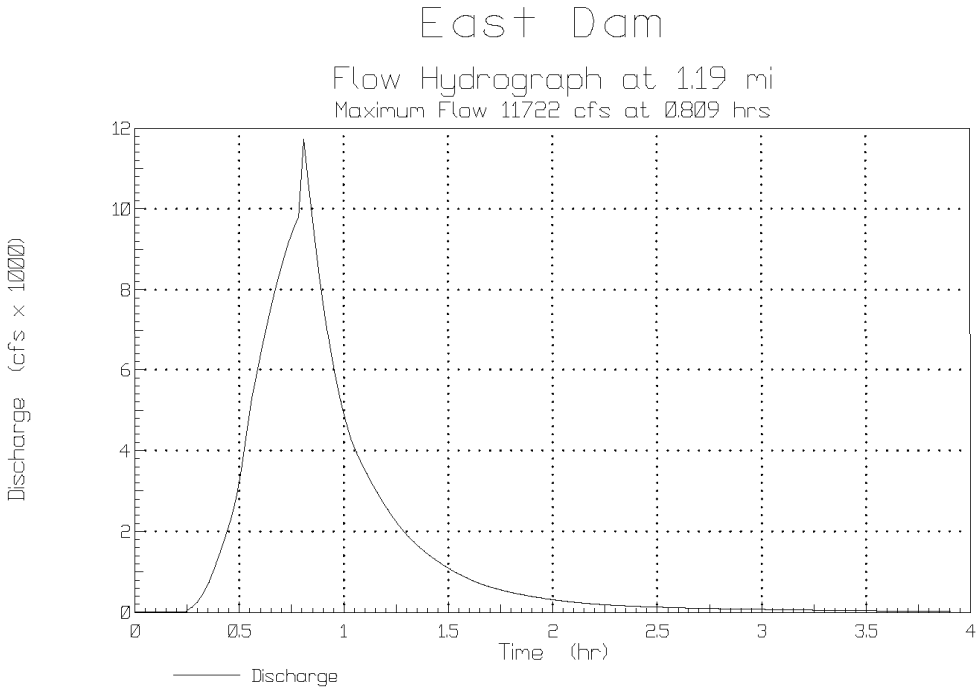
Outflow from WCH Dam Breach



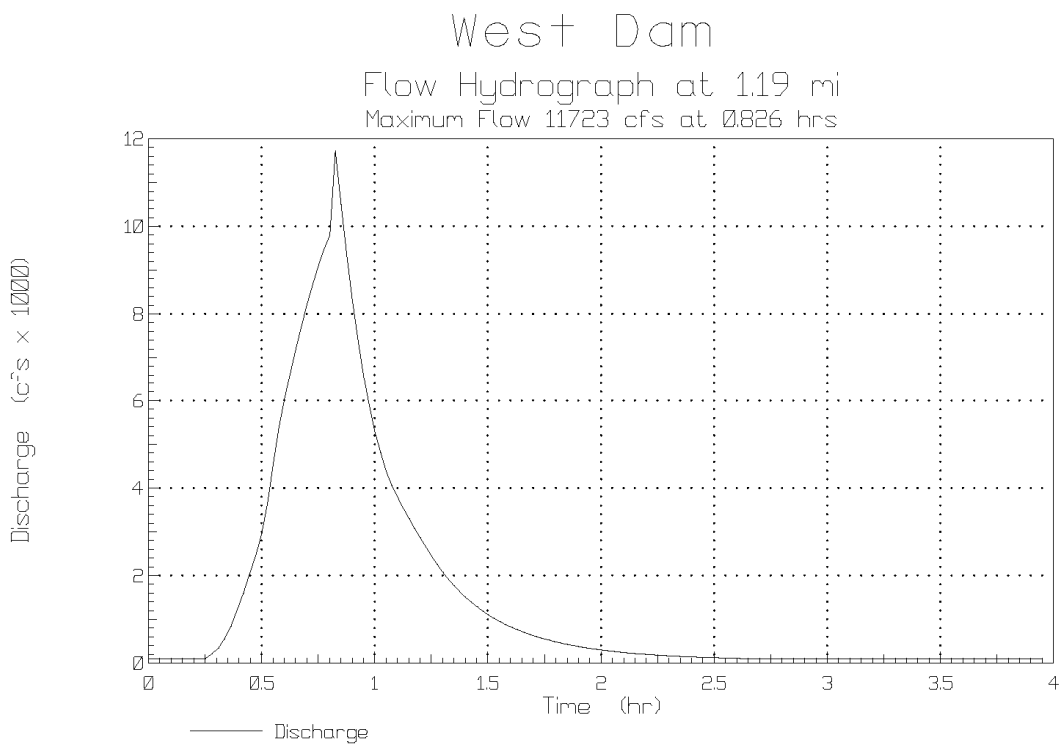
Outflow Hydrograph at Yucaipa Reservoir No. 2 from breach in ECH Dam



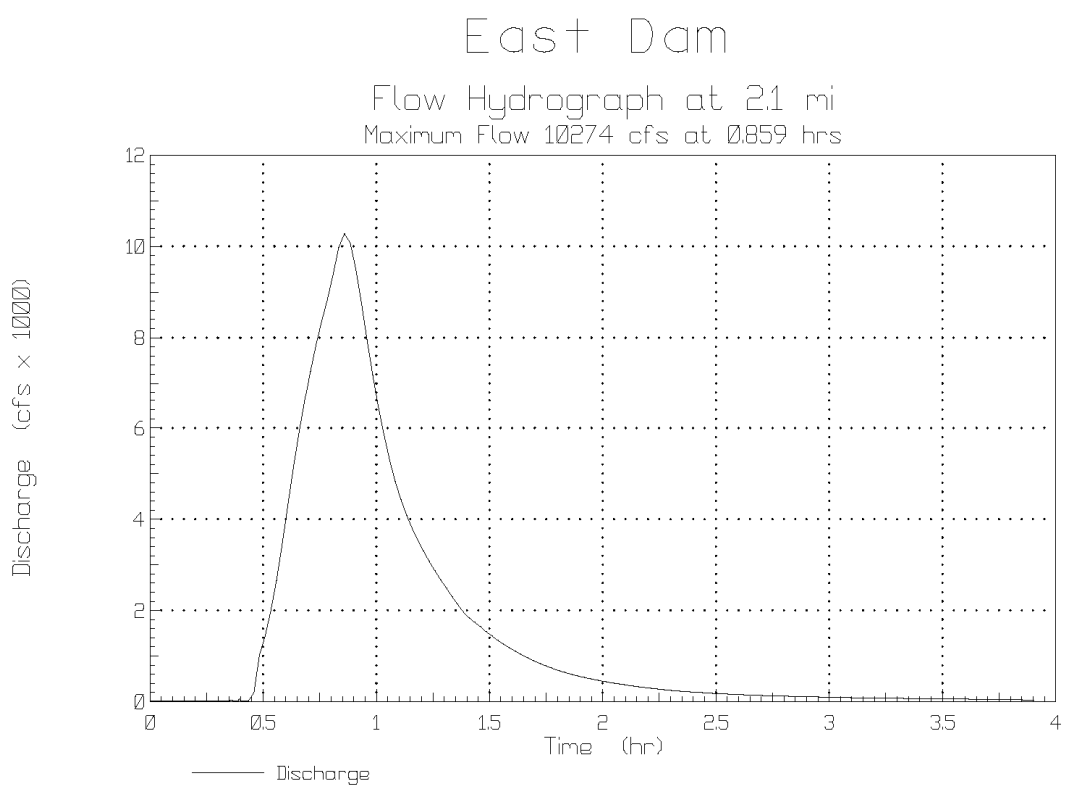
Outflow Hydrograph at Yucaipa Reservoir No. 2 from Breach in WCH Dam



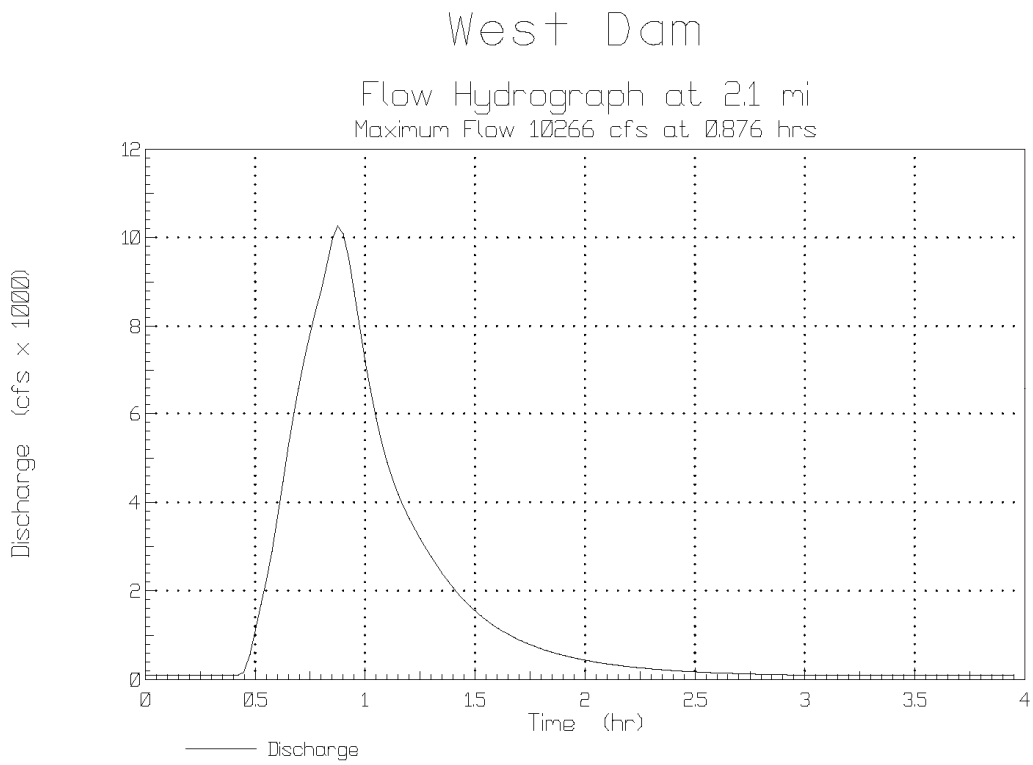
Outflow Hydrograph at Yucaipa Reservoir No. 1 from Breach in ECH Dam



Outflow Hydrograph at Yucaipa Reservoir No. 1 from Breach in WCH Dam



Outflow Hydrograph at Mile 2.1 from Breach in ECH Dam



Outflow Hydrograph at Mile 2.1 from Breach in WCH Dam

Draft

6.2 APPENDIX B: ECH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH BETWEEN CRAFTON HILLS RESERVOIR AND YUCAIPA RESERVOIR NO.2

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
____________________________________________________________________________

                          ============================
                           B O S S    D A M B R K (tm)
                          ============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources


PROGRAM ORIGIN :
----------------
   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------
   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------
   PROJECT TITLE  : CHR Enlargement Main Dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    :
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/30/2008
   TIME OF RUN    : 11:48 am
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	13	
Number of Dynamic Routing Reaches (KKN)	1	
Type of Reservoir Routing (KUI)	1	(dynamic routing)
Number of multiple dams/bridges (MULDAM)	1	
No. of Reservoir Inflow Hydrograph Points (ITEH)	2	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBERS COINCIDENT
WITH UPSTREAM DAM FACE (IDAM) :

1

RESERVOIR VOLUME DESCRIPTION :

Elevation vs. Surface Area Table

Elevation HSA(K) (ft MSL)	Surface Area SA(K) (acres)
2930.00	13.500
2925.00	13.500
2920.00	12.200
2915.00	10.900
2910.00	9.700
2900.00	7.000
2890.00	1.500
2880.00	0.000

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

Draft Final

```
DAM NUMBER :  1
---------------

RESERVOIR AND BREACH PARAMETERS :
---------------------------------

   Initial Elevation of Water Surface (YO, ft MSL)                    2925.00

   Breach Side Slope (Z)                                        1:       0.00

   Breach Bottom Elevation (YBMIN, ft MSL)                            2880.00

   Breach Base Width (BB, ft)                                          105.00

   Time of Breach Formation (TFH, hr)                                    0.50

RESERVOIR DESCRIPTION :
-----------------------

   Water Surface Elevation at Time of Breach (HF, ft MSL)             2925.00

   Top of Dam Crest Elevation (HD, ft MSL)                            2932.00

   Uncontrolled Spillway Crest Elevation (HSP, ft MSL)                   0.00

   Spillway Gate Center Elevation (HGT, ft MSL)                          0.00

   Uncontrolled Spillway Discharge Coefficient (CS)                      0.00

   Spillway Gate Discharge Coefficient (CG)                              0.00

   Piping Centerline Elevation (CDO, ft MSL)                          2897.00

   Turbine Discharge (QT, cfs)                                          10.00
```

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
BOUNDARY CONDITIONS :
---------------------

   Hydrograph Time Intervals (DHF, hr)                                   0.00

   Routing Period (TEH, hr)                                              1.00

   Breach Development Exponent (BREX)                                    0.00

   Mud/Debris Flow Parameter (MUD)                                          0

   Dry Bed Routing Parameter (IWF)                                          0
```

Draft Final

```
      Hydraulic Radius Computation Parameter (KPRES)                 0 (R=A/B)

      Landslide Simulation (KSL)                                      0 (none)

      Critical Flow Froude Number (DFR)                                   0.950

   INFLOW HYDROGRAPH DESCRIPTION :
   -------------------------------

      Time      Upstream
      Elapsed   Inflow
      TI(K)     QI(K)
      (hr)      (cfs)
      --------- ---------------
           0.00            10.0
           1.00            10.0
```

```
BOSS DAMBRK  version 3.00                                              PAGE   6
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   SUMMARY OF PROGRAM CONTROL PARAMETERS :
   ---------------------------------------

      Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

      Number of Cross-Sections Entered (NS)                    3

      Number of Top Widths Entered (NCS)                       4

      Number of Cross-Sectional Hydrographs to Plot (NTT)      2

      Flow Type Parameter (KSUPC)                              2  (mixed flow)

      Number of Lateral Inflow Hydrographs (LQ)                0

      Number of Points in Gate Control Curve (KCG)             0

   CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
   (maximum allowed = 6)
   ---------------------------------------------

          1    3

   CHANNEL-VALLEY BOUNDARY CONDITIONS :
   ------------------------------------

      Max Discharge at Downstream End (QMAXD, cfs)                        0.0

      Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)               0.0000

      Initial Time-Step Size (DTHM, hr)                                 0.0000
```

Draft Final

```
      Time at which Dam Starts to Fail (TFI, hr)                        0.0000

      Theta Weighting Factor (F1I)                                       0.000

      Stage Convergence Criterion (EPSY, ft)                             0.000

      Downstream Boundary Type Paramter (YDN)                             0.00

      Slope of Channel Downstream of Dam (SOM, ft/mi)                   0.0000
```

```
BOSS DAMBRK  version 3.00                                              PAGE   7
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   CROSS-SECTION NUMBER :   1
   --------------------------

      Cross-Section Location (XS(I), mi)                                 0.000

      Flooding Elevation (FSTG(I), ft MSL)                            2861.000

   DOWNSTREAM REACH NUMBER :   1
   -----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                      0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)     0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2860.00       5.0    0.0500       0.0
        2880.00     180.0    0.0500       0.0
        2920.00     420.0    0.0500       0.0
        2960.00     600.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                              PAGE   8
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   CROSS-SECTION NUMBER :   2
   --------------------------

      Cross-Section Location (XS(I), mi)                                 0.030

      Flooding Elevation (FSTG(I), ft MSL)                            2856.000
```

Draft Final

```
DOWNSTREAM REACH NUMBER :   2
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2855.00       5.0    0.0500       0.0
     2880.00     240.0    0.0500       0.0
     2920.00     440.0    0.0500       0.0
     2960.00     630.0    0.0500       0.0
```



```
CROSS-SECTION NUMBER :   3
---------------------------

   Cross-Section Location (XS(I), mi)                                   0.170

   Flooding Elevation (FSTG(I), ft MSL)                              2831.000

CROSS-SECTION DESCRIPTION :
---------------------------

   Elevation Channel   Storage
             Top       Top
             Width     Width
   HS(K,I)   BS(K,I)   BSS(K,I)
   (ft MSL)  (ft)      (ft)
   --------- --------- ---------
     2830.00       5.0       0.0
     2850.00     255.0       0.0
     2860.00     365.0       0.0
     2890.00     820.0       0.0
```



```
   NOTE: At cross-section reach   2 the distance between
```

Draft Final

```
            interpolated cross-sections (DXM) was changed to  0.035
            due to expansion/contraction criteria


BOSS DAMBRK  version 3.00                                          PAGE  11
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008

   DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
   (DXM) THAT WILL BE USED IN COMPUTATIONS      :
   ----------------------------------------------

      Down      Interp.
      Stream    Cross
      Reach     Section
      Number    Distance
      I=1,NS1   DXM(I)
                (mi)
      --------- ---------
              1  101.0000
              2    0.0350

      Total number of cross-sections (original+interpolated)                6

      Maximum number of cross-sections allowed                           2000


BOSS DAMBRK  version 3.00                                          PAGE  12
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008

OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross     Cross     Bottom    Reach     Reach     Reach
      Section   Section   Elevation Number    Length    Slope
      Number    Location
                (mi)      (ft MSL)            (mi)      (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     0.000  2860.000
              2     0.030  2855.000         1     0.030   166.667
              3     0.170  2830.000         2     0.140   178.571


BOSS DAMBRK  version 3.00                                          PAGE  13
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008

   RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :
```

Draft Final

```
   ----------------------------------------

      Dam/      Revised
      Bridge    Cross
                Section
                Number
      --------- ---------
              1         1

      Number of Intermediate Cross-Sections (NN(NS))                          6

      Number of Time Steps (NNU)                                              2
```

```
BOSS DAMBRK  version 3.00                                              PAGE  14
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   INITIAL CONDITIONS TABLE :
   --------------------------

Cross   Cross   Normal  Normal  Critical Critical  Froude  Iteration Iteration
Section Section  Flow    Flow    Flow    Flow     Indicator Count for Count for
Number   Location  Water    Depth    Water    Depth    (0 = sub) Computing
Computing
                    Elevation           Elevation           (1 = sup) Nrml Dpth
Crtl Dpth
I         XI        YN        DEPN      YC        DEPC      IFR       ITN
ITC
          (mi)      (ft MSL)  (ft)      (ft MSL)  (ft)
--------- --------- --------- --------- --------- --------- --------- ---------
---------
   1    0.000   2860.86     0.86   2860.44     0.44       0       14       14
   2    0.030   2855.48     0.48   2855.43     0.43       0       14       14
   3    0.065   2849.23     0.48   2849.18     0.43       0       14       14
   4    0.100   2842.98     0.48   2842.93     0.43       0       14       14
   5    0.135   2836.73     0.48   2836.67     0.42       0       14       14
   6    0.170   2830.47     0.47   2830.41     0.41       0       13       13
```

```
BOSS DAMBRK  version 3.00                                              PAGE  15
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :
   ---------------------------------------------------

      Cross-section Number at Downstream End of Model (IN)                    6
      Initial Water Surface Elev. at Downstream End (YNN, ft MSL)      2830.472
      Initial Flow Depth at Downstream End (DEP, ft)                      0.472

   COMPUTED STEP BACKWATER TABLE :
   -------------------------------
```

Draft Final

Cross Section Number I	Cross Section Location X (mi)	Flow QIL (cfs)	Backwater Water Surface Elevation YIL (ft MSL)	Backwater Water Depth DEP (ft)	Iteration Count for Computing Backwater ITB
5	0.135	10.0	2836.722	0.472	4
4	0.100	10.0	2842.981	0.481	4
3	0.065	10.0	2849.231	0.481	4
2	0.030	10.0	2855.489	0.489	3
1	0.000	10.0	2925.000	65.000	0

BOSS DAMBRK version 3.00 PAGE 16
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

INITIAL CONDITIONS :

Interp. Cross-Section I	Initial Water Elevation YI(I) (ft MSL)	Initial Flow QDI(I) (cfs)
1	2925.00	10.0
2	2855.49	10.0
3	2849.23	10.0
4	2842.98	10.0
5	2836.72	10.0
6	2830.47	10.0

BOSS DAMBRK version 3.00 PAGE 17
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :

Time to Failure (TFH, hr)	0.500
Time to Start of Rising Limb of Hydrograph (TFO, hr)	1.000
Time to Peak (TP, hr)	1.000
Time Step Size (DTHI, hr)	0.025

BOSS DAMBRK version 3.00 PAGE 18
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Draft Final

ROUTING COMPLETED :

WARNING: Results may be unreliable due to unstable downstream loop rating boundary, extend the model further downstream and use a single-valued rating boundary instead.

Number of Time Steps Used (KTIME) 44

Maximum Number of Time Steps Allowed 2999

Total Time of Flood Routing (TT, hr) 1.0

Flood Wave Arrival Time based upon a WSEL Increase of (ft) 1.00

CONSERVATION OF MASS RESULTS :

Should be close to 0.00%, a negative value denotes flow volume was lost during the routing, a positive value denotes flow volume was gained during the routing. Normalized as a percent of inflow volume, maximum change in conservation of mass during routing was 0.11

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.000	2925.00	20652	0.000	2.38	2861.00	0.00	0.00
0.030	2869.08	20652	0.200	20.61	2856.00	0.00	0.05
0.065	2862.14	20303	0.225	21.01	2849.75	0.00	0.05
0.100	2855.58	20176	0.225	20.46	2843.50	0.00	0.05
0.135	2848.99	20140	0.225	20.07	2837.25	0.00	0.05
0.170	2842.38	20080	0.225	19.69	2831.00	0.00	0.05

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Draft Final

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2925.00	2830.47				
3	0.050	2924.83	2833.47				
5	0.100	2923.74	2837.08				
7	0.150	2920.82	2839.88				
9	0.200	2915.05	2842.16				
11	0.250	2906.71	2842.18				
13	0.300	2897.37	2841.06				
15	0.350	2884.35	2837.01				
17	0.366	2880.98	2835.09				
19	0.372	2880.36	2834.26				
21	0.400	2880.03	2832.36				
23	0.450	2880.11	2830.69				
25	0.500	2880.10	2830.48				
27	0.550	2880.10	2830.48				
29	0.600	2880.10	2830.47				
31	0.650	2880.10	2830.47				
33	0.700	2880.10	2830.47				
35	0.750	2880.10	2830.47				
37	0.800	2880.10	2830.47				
39	0.850	2880.10	2830.47				
41	0.900	2880.10	2830.47				
43	0.950	2880.10	2830.47				

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01				
3	0.050	1.50	0.79				
5	0.100	5.86	4.75				
7	0.150	12.44	11.19				
9	0.200	20.65	19.26				
11	0.250	18.87	19.20				
13	0.300	14.00	14.86				
15	0.350	2.07	4.51				
17	0.366	0.23	1.99				

Draft Final

```
        19      0.372       0.05       1.27
        21      0.400       0.01       0.31
        23      0.450       0.01       0.02
        25      0.500       0.01       0.01
        27      0.550       0.01       0.01
        29      0.600       0.01       0.01
        31      0.650       0.01       0.01
        33      0.700       0.01       0.01
        35      0.750       0.01       0.01
        37      0.800       0.01       0.01
        39      0.850       0.01       0.01
        41      0.900       0.01       0.01
        43      0.950       0.01       0.01

END OF OUTPUT
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
                          ==============================
                           B O S S    D A M B R K (tm)
                          ==============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources


PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : CHR Enlargement Main Dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    :
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/30/2008
   TIME OF RUN    : 11:54 am
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	7	
Number of Dynamic Routing Reaches (KKN)	9	
Type of Reservoir Routing (KUI)	0	(storage routing)
Number of multiple dams/bridges (MULDAM)	0	
No. of Reservoir Inflow Hydrograph Points (ITEH)	13	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	1.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K)	Upstream Inflow QI(K)

Draft Final

(hr)	(cfs)
0.00	10.0
0.05	790.0
0.10	4750.0
0.15	11190.0
0.20	19260.0
0.25	19200.0
0.30	14860.0
0.35	4510.0
0.36	1990.0
0.37	1270.0
0.40	20.0
0.45	10.0
1.00	10.0

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

SUMMARY OF PROGRAM CONTROL PARAMETERS :

Problem Specification Option (KKN, KUI, MULDAM, IDAM)	7	
Number of Cross-Sections Entered (NS)	6	
Number of Top Widths Entered (NCS)	4	
Number of Cross-Sectional Hydrographs to Plot (NTT)	5	
Flow Type Parameter (KSUPC)	2	(mixed flow)
Number of Lateral Inflow Hydrographs (LQ)	0	
Number of Points in Gate Control Curve (KCG)	0	

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)

1 3 4 5 6

CHANNEL-VALLEY BOUNDARY CONDITIONS :

Max Discharge at Downstream End (QMAXD, cfs)	0.0
Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)	0.0000
Initial Time-Step Size (DTHM, hr)	0.0000
Time at which Dam Starts to Fail (TFI, hr)	0.0000

Draft Final

```
      Theta Weighting Factor (F1I)                                    0.000

      Stage Convergence Criterion (EPSY, ft)                          0.000

      Downstream Boundary Type Paramter (YDN)                          0.00

      Slope of Channel Downstream of Dam (SOM, ft/mi)                0.0000
```

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   CROSS-SECTION NUMBER :   1
   -------------------------

      Cross-Section Location (XS(I), mi)                              0.390

      Flooding Elevation (FSTG(I), ft MSL)                         2796.000

   DOWNSTREAM REACH NUMBER :   1
   ----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                   0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)  0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2795.00       5.0    0.0500       0.0
        2800.00     300.0    0.0500       0.0
        2810.00     800.0    0.0500       0.0
        2820.00    1285.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   CROSS-SECTION NUMBER :   2
   -------------------------

      Cross-Section Location (XS(I), mi)                              0.430

      Flooding Elevation (FSTG(I), ft MSL)                         2741.000
```

Draft Final

```
DOWNSTREAM REACH NUMBER :   2
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2740.00       5.0    0.0500       0.0
     2760.00     230.0    0.0500       0.0
     2770.00     500.0    0.0500       0.0
     2780.00     910.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   7
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
CROSS-SECTION NUMBER :   3
---------------------------

   Cross-Section Location (XS(I), mi)                                   0.570

   Flooding Elevation (FSTG(I), ft MSL)                              2696.000

DOWNSTREAM REACH NUMBER :   3
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2695.00       5.0    0.0500       0.0
     2700.00     150.0    0.0500       0.0
     2710.00     300.0    0.0500       0.0
     2730.00     500.0    0.0500       0.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   8
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBER : 4

Cross-Section Location (XS(I), mi) 0.610

Flooding Elevation (FSTG(I), ft MSL) 2681.000

DOWNSTREAM REACH NUMBER : 4

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
2680.00	5.0	0.0500	0.0
2690.00	230.0	0.0500	0.0
2700.00	350.0	0.0500	0.0
2710.00	920.0	0.0500	0.0

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBER : 5

Cross-Section Location (XS(I), mi) 0.670

Flooding Elevation (FSTG(I), ft MSL) 2656.000

DOWNSTREAM REACH NUMBER : 5

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Draft Final

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
2655.00	5.0	0.0500	0.0
2660.00	100.0	0.0500	0.0
2670.00	250.0	0.0500	0.0
2680.00	550.0	0.0500	0.0

BOSS DAMBRK version 3.00 PAGE 10
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

CROSS-SECTION NUMBER : 6

Cross-Section Location (XS(I), mi) 0.760

Flooding Elevation (FSTG(I), ft MSL) 2636.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
2635.00	5.0	0.0
2640.00	150.0	0.0
2650.00	400.0	0.0
2660.00	600.0	0.0

Draft Final

BOSS DAMBRK version 3.00 PAGE 11
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

NOTE: At cross-section reach 1 the distance between interpolated cross-sections (DXM) was changed to 0.008 due to expansion/contraction criteria

NOTE: At cross-section reach 2 the distance between interpolated cross-sections (DXM) was changed to 0.013 due to expansion/contraction criteria

NOTE: At cross-section reach 3 the distance between interpolated cross-sections (DXM) was changed to 0.008 due to expansion/contraction criteria

```
NOTE: At cross-section reach   4 the distance between
      interpolated cross-sections (DXM) was changed to  0.009
      due to expansion/contraction criteria

NOTE: At cross-section reach   5 the distance between
      interpolated cross-sections (DXM) was changed to  0.045
      due to expansion/contraction criteria
```

```
BOSS DAMBRK  version 3.00                                          PAGE  12
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
(DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	0.0080
2	0.0127
3	0.0080
4	0.0086
5	0.0450

Total number of cross-sections (original+interpolated) 31

Maximum number of cross-sections allowed 2000

```
BOSS DAMBRK  version 3.00                                          PAGE  13
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

OUTPUT DATA SUMMARY :

CROSS-SECTION and REACH SUMMARY :

Cross Section Number	Cross Section Location (mi)	Bottom Elevation (ft MSL)	Reach Number	Reach Length (mi)	Reach Slope (ft/mi)
1	0.390	2795.000			
2	0.430	2740.000	1	0.040	1374.999
3	0.570	2695.000	2	0.140	321.429
4	0.610	2680.000	3	0.040	375.000

Draft Final

```
              5     0.670  2655.000         4     0.060   416.667
              6     0.760  2635.000         5     0.090   222.222
```

```
BOSS DAMBRK  version 3.00                                          PAGE  14
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                               9/30/2008
```

SLOPE INFORMATION FOR CROSS-SECTION REACHES :

Reach Section Number I	Water Surface Elevation YQ (ft MSL)	Hydraulic Depth DA (ft)	Reach Bottom Slope SO (ft/m)	Dynamic Slope DS (ft/m)	Total Slope SOT (ft/m)	Critical Slope SC (ft/m)	Manning n CMN
1	2767.50	3.00	1375.00	2.19	1377.19	133.51	0.050
1	2780.00	5.87	1375.00	3.26	1378.26	106.70	0.050
1	2790.00	9.43	1375.00	4.33	1379.33	91.11	0.050
1	2800.00	13.55	1375.00	5.40	1380.40	80.75	0.050
2	2717.50	3.67	321.43	2.10	323.53	124.80	0.050
2	2730.00	7.20	321.43	2.92	324.35	99.67	0.050
2	2740.00	10.80	321.43	3.57	325.00	87.10	0.050
2	2755.00	16.80	321.43	4.49	325.91	75.16	0.050
3	2687.50	2.10	375.00	1.59	376.59	150.34	0.050
3	2695.00	4.11	375.00	2.21	377.21	120.16	0.050
3	2705.00	10.33	375.00	3.52	378.52	88.40	0.050
3	2720.00	14.83	375.00	4.25	379.25	78.35	0.050
4	2667.50	2.22	416.67	1.63	418.29	147.47	0.050
4	2675.00	4.36	416.67	2.27	418.94	117.87	0.050
4	2685.00	10.15	416.67	3.51	420.18	88.92	0.050
4	2695.00	11.18	416.67	3.70	420.36	86.08	0.050
5	2645.00	1.35	222.22	1.41	223.63	174.34	0.050
5	2650.00	2.60	222.22	1.88	224.10	139.99	0.050
5	2660.00	7.92	222.22	3.11	225.33	96.56	0.050
5	2670.00	12.30	222.22	3.83	226.06	83.38	0.050

Number of Intermediate Cross-Sections (NN(NS)) 31

Number of Time Steps (NNU) 13

```
BOSS DAMBRK  version 3.00                                          PAGE  15
  PROJECT TITLE  : CHR Enlargement Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                               9/30/2008
```

INITIAL CONDITIONS TABLE :

Cross Section Number	Cross Section Location	Normal Flow Water	Normal Depth	Critical Flow Water	Critical Flow Depth	Froude Indicator (0 = sub)	Iteration Count for Computing	Iteration Count for Computing

Draft Final

I	XI (mi)	Elevation YN (ft MSL)	DEPN (ft)	Elevation YC (ft MSL)	DEPC (ft)	(1 = sup) IFR	Nrml Dpth ITN	Crtl Dpth ITC
1	0.390	2795.22	0.22	2795.30	0.30	1	12	12
2	0.398	2784.24	0.24	2784.34	0.34	1	12	12
3	0.406	2773.25	0.25	2773.37	0.37	1	12	12
4	0.414	2762.26	0.26	2762.39	0.39	1	13	13
5	0.422	2751.27	0.27	2751.41	0.41	1	13	13
6	0.430	2740.41	0.41	2740.42	0.42	1	13	13
7	0.443	2736.32	0.41	2736.33	0.42	1	13	13
8	0.455	2732.22	0.40	2732.24	0.42	1	13	13
9	0.468	2728.13	0.40	2728.14	0.41	1	13	13
10	0.481	2724.03	0.40	2724.05	0.41	1	13	13
11	0.494	2719.94	0.39	2719.95	0.41	1	13	13
12	0.506	2715.85	0.39	2715.86	0.40	1	13	13
13	0.519	2711.75	0.39	2711.76	0.40	1	13	13
14	0.532	2707.66	0.38	2707.67	0.39	1	13	13
15	0.545	2703.56	0.38	2703.57	0.38	1	13	13
16	0.557	2699.46	0.37	2699.46	0.37	1	13	13
17	0.570	2695.34	0.34	2695.36	0.36	1	13	13
18	0.578	2692.35	0.35	2692.36	0.36	1	13	13
19	0.586	2689.35	0.35	2689.37	0.37	1	13	13
20	0.594	2686.36	0.36	2686.37	0.37	1	12	12
21	0.602	2683.35	0.35	2683.37	0.37	1	12	12
22	0.610	2680.35	0.35	2680.38	0.38	1	12	12
23	0.619	2676.78	0.35	2676.80	0.38	1	12	12
24	0.627	2673.20	0.35	2673.24	0.38	1	12	12
25	0.636	2669.64	0.35	2669.66	0.38	1	12	12
26	0.644	2666.06	0.35	2666.10	0.38	1	12	12
27	0.653	2662.49	0.35	2662.53	0.38	1	12	12
28	0.661	2658.93	0.35	2658.96	0.39	1	12	12
29	0.670	2655.42	0.42	2655.39	0.39	0	12	12
30	0.715	2645.40	0.40	2645.37	0.37	0	12	12
31	0.760	2635.39	0.39	2635.36	0.36	0	12	12

Draft Final

BOSS DAMBRK version 3.00 PAGE 16
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :

Cross-section Number at Downstream End of Model (IN) 31
Initial Water Surface Elev. at Downstream End (YNN, ft MSL) 2635.388
Initial Flow Depth at Downstream End (DEP, ft) 0.388

COMPUTED STEP BACKWATER TABLE :

Cross Section	Cross Section	Flow	Backwater Water	Backwater Water	Iteration Count for

Number I	Location X (mi)	QIL (cfs)	Surface Elevation YIL (ft MSL)	Depth DEP (ft)	Computing Backwater ITB
30	0.715	10.0	2645.400	0.400	5
29	0.670	10.0	2655.419	0.419	4

BOSS DAMBRK version 3.00 PAGE 17
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :

Cross-section Number at Downstream End of Model (IN)	28
Initial Water Surface Elev. at Downstream End (YNN, ft MSL)	2795.217
Initial Flow Depth at Downstream End (DEP, ft)	0.217

BOSS DAMBRK version 3.00 PAGE 18
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

INITIAL CONDITIONS :

Interp. Cross-Section I	Initial Water Elevation YI(I) (ft MSL)	Initial Flow QDI(I) (cfs)
1	2795.22	10.0
2	2784.24	10.0
3	2773.25	10.0
4	2762.26	10.0
5	2751.27	10.0
6	2740.28	10.0
7	2736.42	10.0
8	2732.10	10.0
9	2728.22	10.0
10	2723.93	10.0
11	2720.03	10.0
12	2715.75	10.0
13	2711.83	10.0
14	2707.57	10.0
15	2703.62	10.0
16	2699.39	10.0
17	2695.41	10.0
18	2692.27	10.0
19	2689.42	10.0
20	2686.28	10.0

Draft Final

21	2683.42	10.0
22	2680.29	10.0
23	2676.83	10.0
24	2673.15	10.0
25	2669.68	10.0
26	2666.01	10.0
27	2662.54	10.0
28	2658.88	10.0
29	2655.42	10.0
30	2645.40	10.0
31	2635.39	10.0

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :

Time to Failure (TFH, hr)	0.200
Time to Start of Rising Limb of Hydrograph (TFO, hr)	0.000
Time to Peak (TP, hr)	0.200
Time Step Size (DTHI, hr)	0.010

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

ROUTING COMPLETED :

Number of Time Steps Used (KTIME)	87
Maximum Number of Time Steps Allowed	2999
Total Time of Flood Routing (TT, hr)	1.0
Flood Wave Arrival Time based upon a WSEL Increase of (ft)	1.00

CONSERVATION OF MASS RESULTS :

Should be close to 0.00%, a negative value denotes flow volume was lost during the routing, a positive value denotes flow volume was gained during the routing. Normalized as a percent of inflow volume, maximum change in conservation of mass during routing was -0.01

BOSS DAMBRK version 3.00 PAGE 21

Draft Final

PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.390	2800.14	19260	0.250	24.19	2796.00	0.03	0.04
0.398	2790.25	19244	0.220	26.83	2785.00	0.02	0.04
0.406	2780.10	19241	0.210	29.72	2774.00	0.02	0.04
0.414	2769.85	19237	0.220	32.29	2763.00	0.02	0.02
0.422	2759.55	19235	0.220	34.58	2752.00	0.02	0.02
0.430	2749.22	19235	0.220	36.67	2741.00	0.02	0.02
0.443	2745.84	19234	0.220	30.72	2736.91	0.00	0.02
0.455	2742.17	19233	0.220	27.31	2732.82	0.02	0.02
0.468	2738.22	19231	0.220	25.44	2728.73	0.00	0.02
0.481	2734.08	19227	0.220	24.43	2724.64	0.02	0.02
0.494	2729.82	19225	0.230	23.84	2720.55	0.02	0.02
0.506	2725.48	19224	0.230	23.41	2716.45	0.02	0.04
0.519	2721.08	19223	0.230	23.03	2712.36	0.02	0.04
0.532	2716.63	19222	0.230	22.62	2708.27	0.03	0.04
0.545	2712.11	19220	0.230	22.23	2704.18	0.03	0.04
0.557	2707.52	19217	0.240	21.93	2700.09	0.03	0.04
0.570	2702.89	19216	0.240	21.75	2696.00	0.03	0.04
0.578	2700.10	19216	0.240	21.51	2693.00	0.04	0.04
0.586	2697.29	19216	0.240	21.34	2690.00	0.04	0.04
0.594	2694.47	19216	0.240	21.17	2687.00	0.04	0.04
0.602	2691.66	19215	0.240	21.03	2684.00	0.04	0.04
0.610	2688.80	19214	0.240	21.02	2681.00	0.04	0.04
0.619	2685.12	19213	0.240	21.73	2677.43	0.04	0.06
0.627	2681.55	19212	0.240	22.07	2673.86	0.04	0.06
0.636	2678.01	19211	0.240	22.33	2670.29	0.04	0.06
0.644	2674.51	19209	0.240	22.62	2666.71	0.04	0.06
0.653	2671.04	19209	0.250	22.89	2663.14	0.04	0.06
0.661	2667.63	19209	0.250	23.12	2659.57	0.05	0.06
0.670	2664.26	19209	0.250	23.30	2656.00	0.04	0.06
0.715	2654.29	19205	0.250	51.71	2646.00	0.06	0.06
0.760	2643.56	19196	0.250	17.78	2636.00	0.05	0.08

Draft Final

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : CHR Enlargement Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step	Elapsed Time	Station 1 Water	Station 2 Water	Station 3 Water	Station 4 Water	Station 5 Water	Station 6 Water

Count K	TTP(K) (hr)	Surface Elevation YC(K,1) (ft MSL)	Surface Elevation YC(K,2) (ft MSL)	Surface Elevation YC(K,3) (ft MSL)	Surface Elevation YC(K,4) (ft MSL)	Surface Elevation YC(K,5) (ft MSL)	Surface Elevation YC(K,6) (ft MSL)
1	0.000	2795.22	2695.41	2680.29	2655.42	2635.39	
3	0.020	2795.97	2695.66	2680.38	2655.45	2635.39	
5	0.040	2796.29	2696.50	2681.30	2656.14	2635.45	
7	0.060	2796.85	2697.28	2682.23	2656.98	2635.85	
9	0.080	2797.45	2698.37	2683.44	2658.25	2637.17	
11	0.100	2797.89	2699.25	2684.51	2659.46	2638.54	
13	0.120	2798.44	2700.06	2685.46	2660.48	2639.67	
15	0.140	2798.89	2700.78	2686.35	2661.45	2640.67	
17	0.160	2799.32	2701.43	2687.13	2662.30	2641.52	
19	0.180	2799.74	2702.08	2687.87	2663.11	2642.30	
21	0.200	2800.11	2702.68	2688.52	2663.84	2643.01	
23	0.220	2800.13	2702.88	2688.77	2664.20	2643.44	
25	0.240	2800.14	2702.89	2688.80	2664.26	2643.55	
27	0.260	2800.05	2702.82	2688.74	2664.21	2643.53	
29	0.280	2799.86	2702.56	2688.48	2663.95	2643.34	
31	0.300	2799.65	2702.25	2688.16	2663.60	2643.05	
33	0.320	2799.08	2701.63	2687.53	2662.99	2642.56	
35	0.340	2798.36	2700.74	2686.56	2662.02	2641.78	
37	0.360	2797.09	2699.56	2685.26	2660.77	2640.75	
39	0.380	2796.47	2698.29	2683.84	2659.36	2639.57	
41	0.400	2795.30	2697.34	2682.76	2658.21	2638.51	
43	0.420	2795.27	2696.56	2681.90	2657.30	2637.66	
45	0.441	2795.24	2696.01	2681.25	2656.60	2637.00	
47	0.462	2795.22	2695.69	2680.82	2656.10	2636.49	
49	0.483	2795.22	2695.52	2680.55	2655.79	2636.12	
51	0.505	2795.22	2695.45	2680.40	2655.59	2635.85	
53	0.527	2795.22	2695.42	2680.33	2655.49	2635.67	
55	0.549	2795.22	2695.41	2680.30	2655.43	2635.54	
57	0.573	2795.22	2695.41	2680.29	2655.41	2635.47	
59	0.596	2795.22	2695.41	2680.29	2655.40	2635.41	
61	0.620	2795.22	2695.41	2680.29	2655.40	2635.39	
63	0.645	2795.22	2695.41	2680.29	2655.40	2635.39	
65	0.670	2795.22	2695.41	2680.29	2655.40	2635.39	
67	0.695	2795.22	2695.41	2680.29	2655.40	2635.39	
69	0.721	2795.22	2695.41	2680.29	2655.40	2635.39	
71	0.748	2795.22	2695.41	2680.29	2655.40	2635.39	
73	0.775	2795.22	2695.41	2680.29	2655.40	2635.39	
75	0.803	2795.22	2695.41	2680.29	2655.40	2635.39	
77	0.831	2795.22	2695.41	2680.29	2655.40	2635.39	
79	0.860	2795.22	2695.41	2680.29	2655.40	2635.39	
81	0.889	2795.22	2695.41	2680.29	2655.40	2635.39	
83	0.919	2795.22	2695.41	2680.29	2655.40	2635.39	
85	0.949	2795.22	2695.41	2680.29	2655.40	2635.39	
87	0.980	2795.22	2695.41	2680.29	2655.40	2635.39	

Draft Final

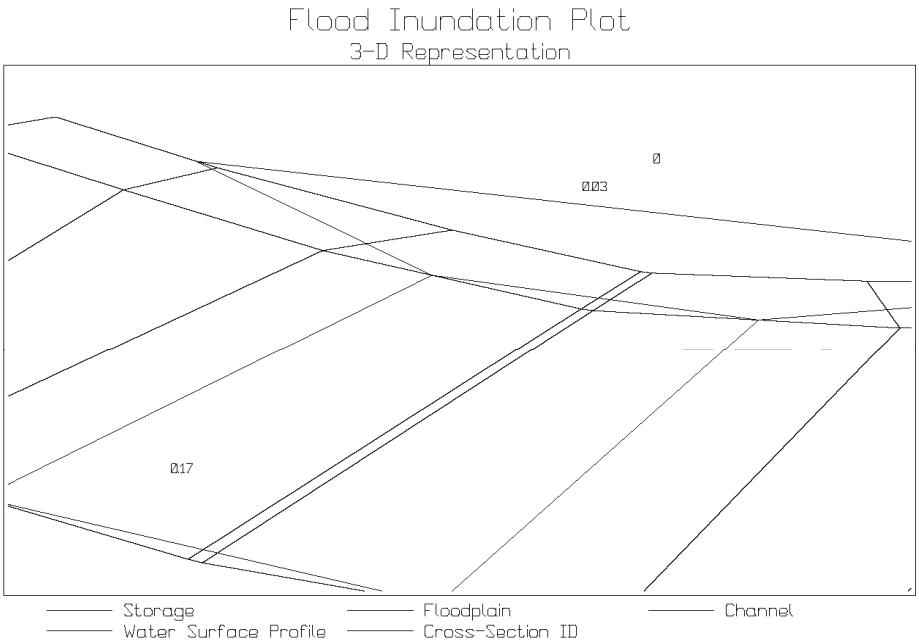
COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

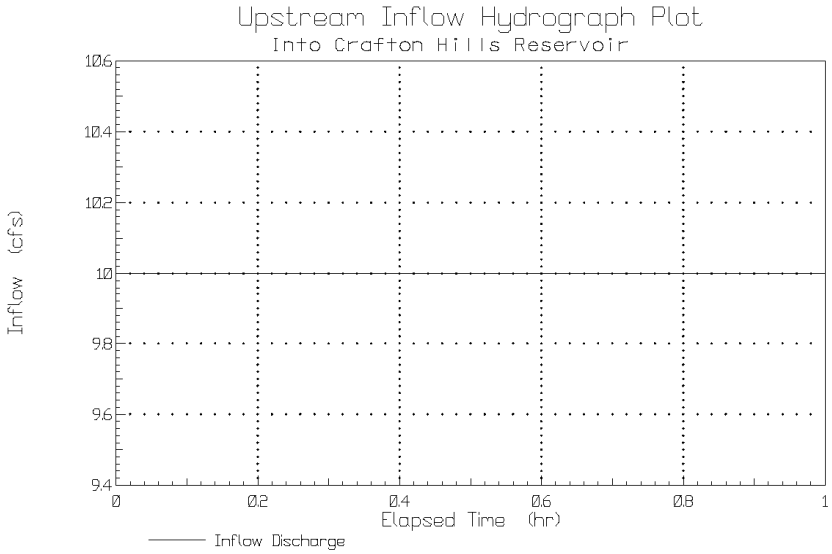
Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01	0.01	0.01	0.01	
3	0.020	0.32	0.03	0.02	0.01	0.01	
5	0.040	0.63	0.26	0.17	0.09	0.01	
7	0.060	1.58	0.75	0.61	0.42	0.12	
9	0.080	3.17	2.07	1.78	1.40	0.76	
11	0.100	4.75	3.78	3.49	3.07	2.26	
13	0.120	7.33	6.02	5.66	5.18	4.32	
15	0.140	9.90	8.67	8.31	7.80	6.91	
17	0.160	12.80	11.48	11.13	10.63	9.76	
19	0.180	16.03	14.71	14.36	13.83	12.93	
21	0.200	19.26	18.01	17.68	17.17	16.31	
23	0.220	19.24	19.15	19.09	18.94	18.57	
25	0.240	19.21	19.22	19.21	19.20	19.15	
27	0.260	18.33	18.79	18.86	18.95	19.04	
29	0.280	16.60	17.26	17.41	17.64	17.98	
31	0.300	14.86	15.55	15.72	15.98	16.40	
33	0.320	10.72	12.37	12.74	13.26	14.02	
35	0.340	6.58	8.47	8.94	9.60	10.64	
37	0.360	1.99	4.51	5.09	5.84	7.03	
39	0.380	0.85	1.91	2.30	2.87	3.93	
41	0.400	0.02	0.80	1.01	1.34	2.04	
43	0.420	0.02	0.29	0.41	0.59	1.02	
45	0.441	0.01	0.10	0.15	0.25	0.50	
47	0.462	0.01	0.04	0.06	0.11	0.24	
49	0.483	0.01	0.02	0.03	0.05	0.12	
51	0.505	0.01	0.01	0.02	0.03	0.06	
53	0.527	0.01	0.01	0.01	0.02	0.04	
55	0.549	0.01	0.01	0.01	0.01	0.02	
57	0.573	0.01	0.01	0.01	0.01	0.02	
59	0.596	0.01	0.01	0.01	0.01	0.01	
61	0.620	0.01	0.01	0.01	0.01	0.01	
63	0.645	0.01	0.01	0.01	0.01	0.01	
65	0.670	0.01	0.01	0.01	0.01	0.01	
67	0.695	0.01	0.01	0.01	0.01	0.01	
69	0.721	0.01	0.01	0.01	0.01	0.01	
71	0.748	0.01	0.01	0.01	0.01	0.01	
73	0.775	0.01	0.01	0.01	0.01	0.01	
75	0.803	0.01	0.01	0.01	0.01	0.01	
77	0.831	0.01	0.01	0.01	0.01	0.01	
79	0.860	0.01	0.01	0.01	0.01	0.01	
81	0.889	0.01	0.01	0.01	0.01	0.01	
83	0.919	0.01	0.01	0.01	0.01	0.01	
85	0.949	0.01	0.01	0.01	0.01	0.01	
87	0.980	0.01	0.01	0.01	0.01	0.01	

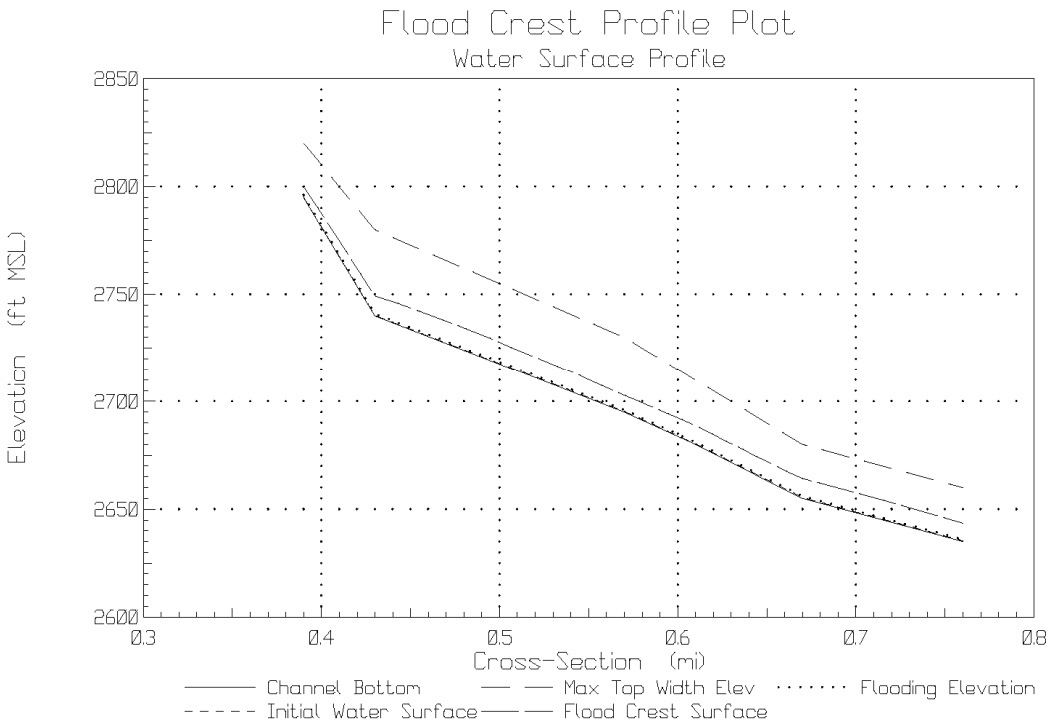
END OF OUTPUT

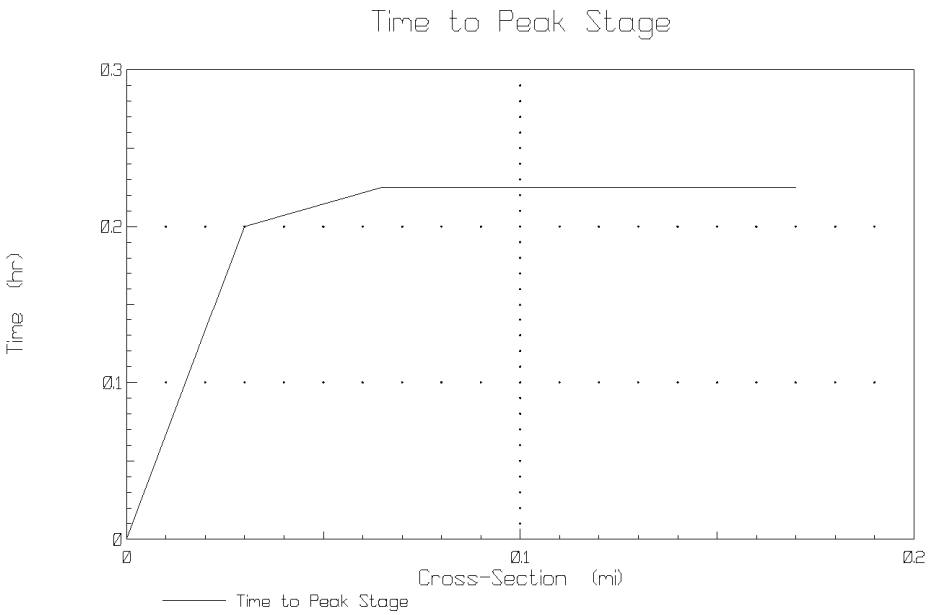
Draft Final

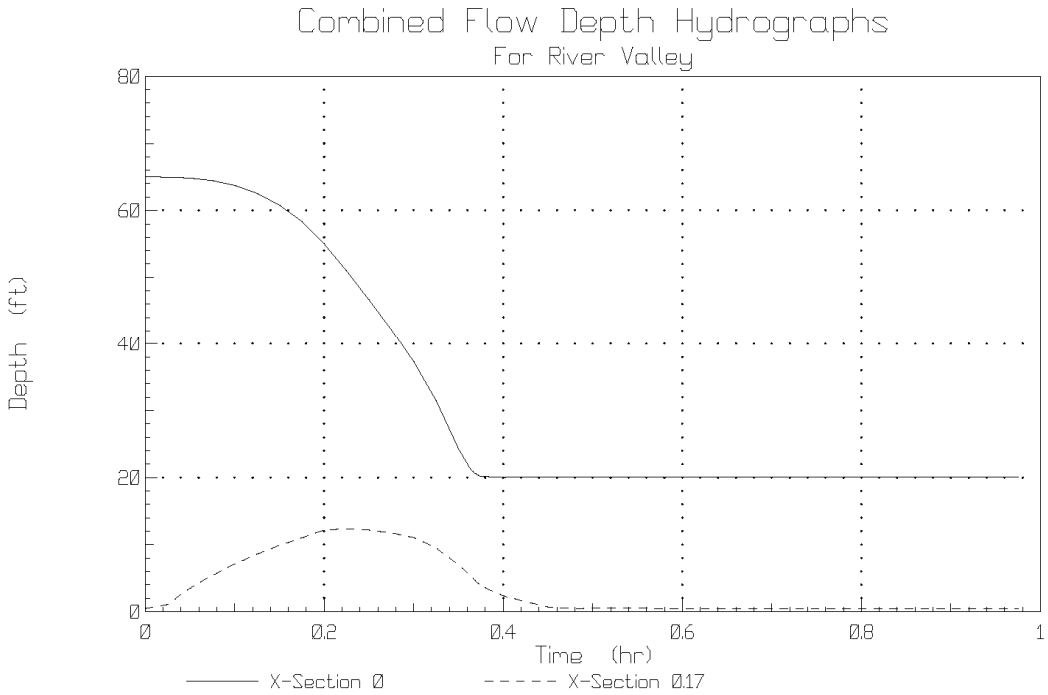
6.3 APPENDIX C: ECH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH BETWEEN CRAFTON HILLS RESERVOIR AND YUCAIPA RESERVOIR NO.2

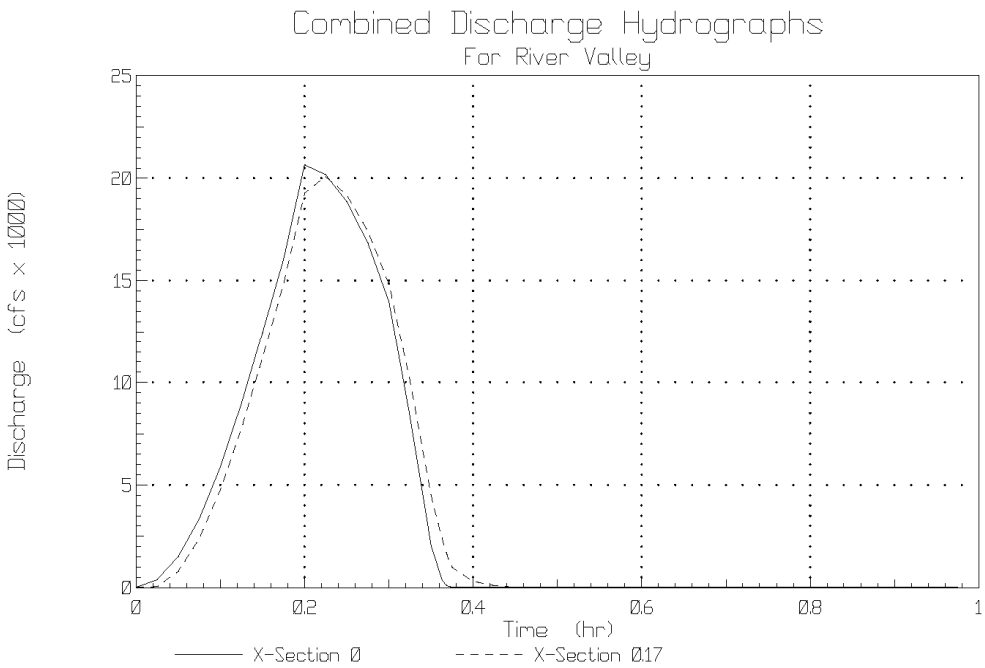


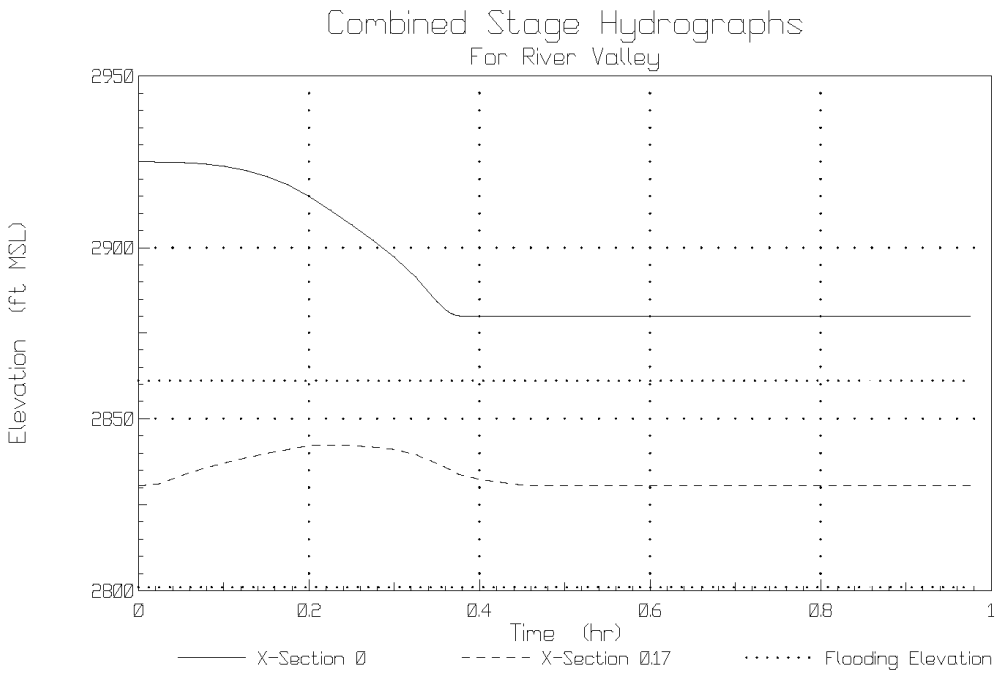


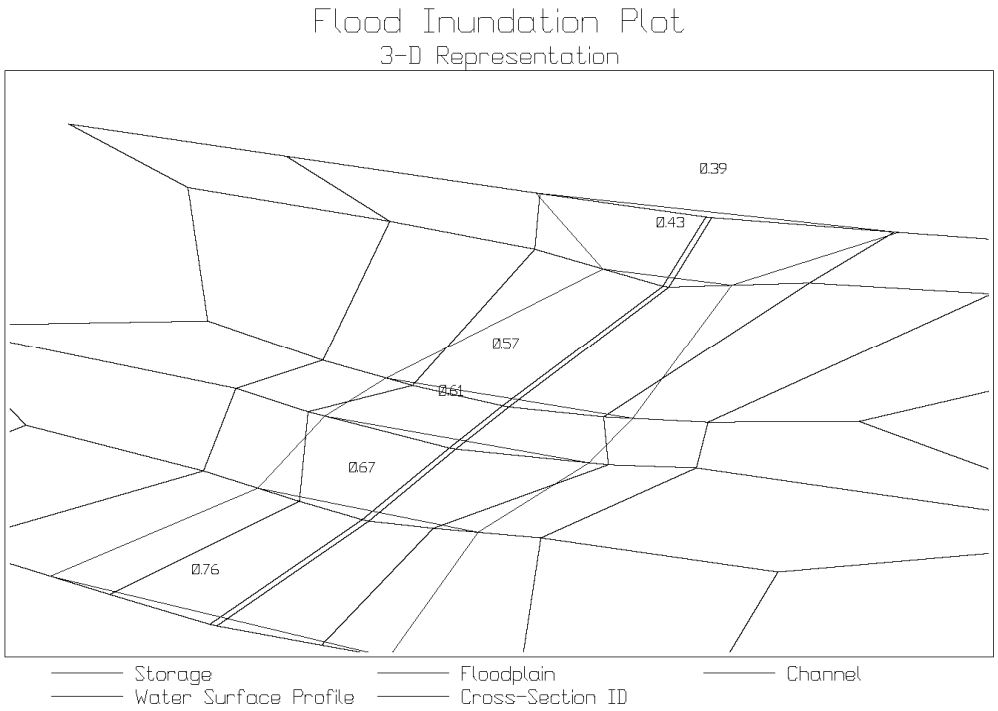

Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
2850
2800
2750
2700
2650
2600
0.3
0.4
0.5
0.6
0.7
0.8
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface

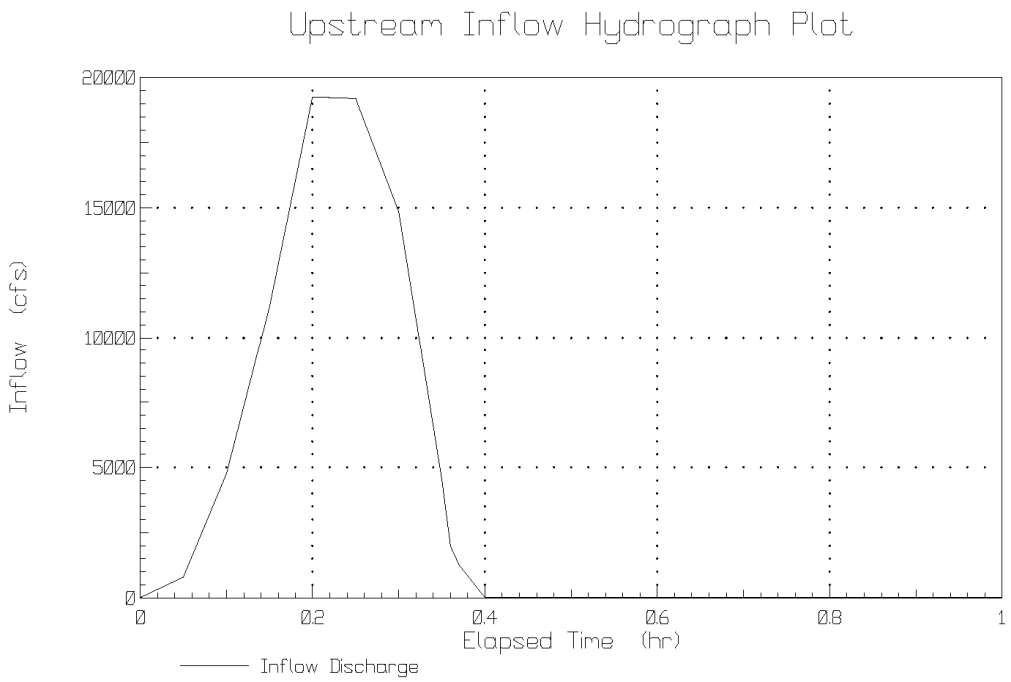

Time to Peak Stage
Time (hr)
0.3
0.2
0.1
0
0
0.1
0.2
Cross-Section (mi)
Time to Peak Stage

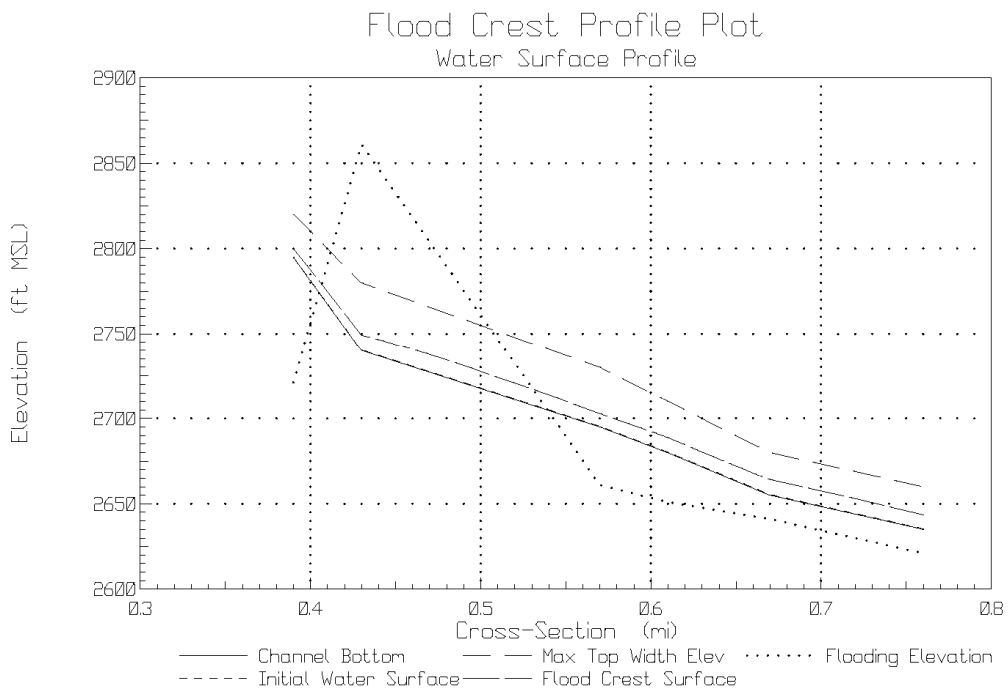

Combined Flow Depth Hydrographs
For River Valley
Depth (ft)
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0
X-Section 0.17

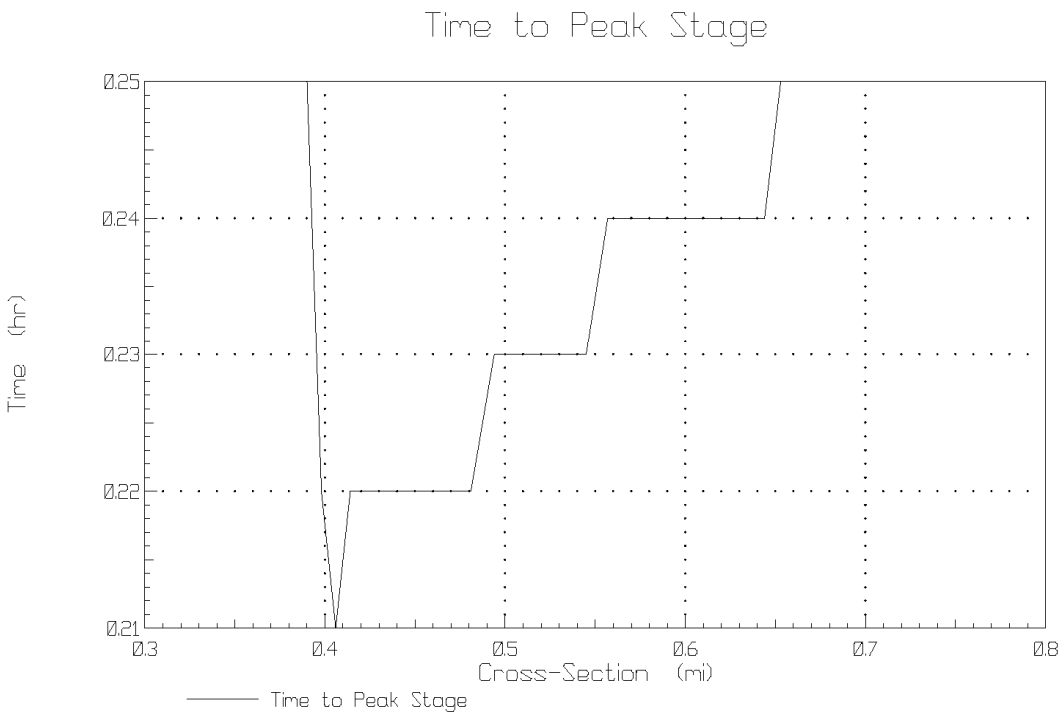

Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
25
20
15
10
5
0
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0
X-Section 0.17

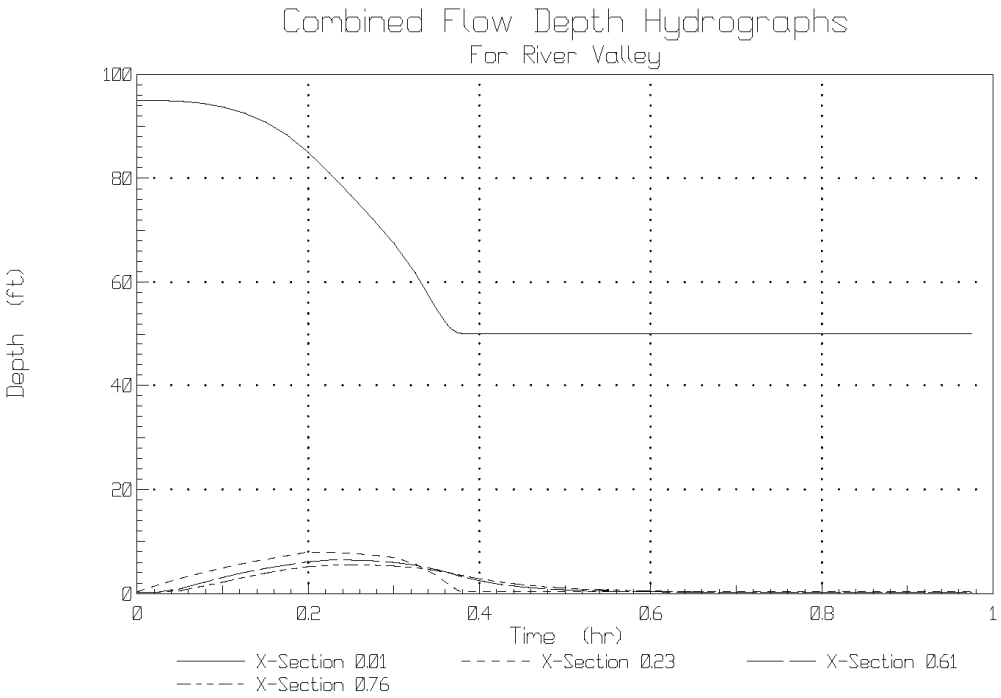

Combined Stage Hydrographs
For River Valley
2950
2900
2850
2800
Elevation (ft MSL)
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0
X-Section 0.17
Flooding Elevation

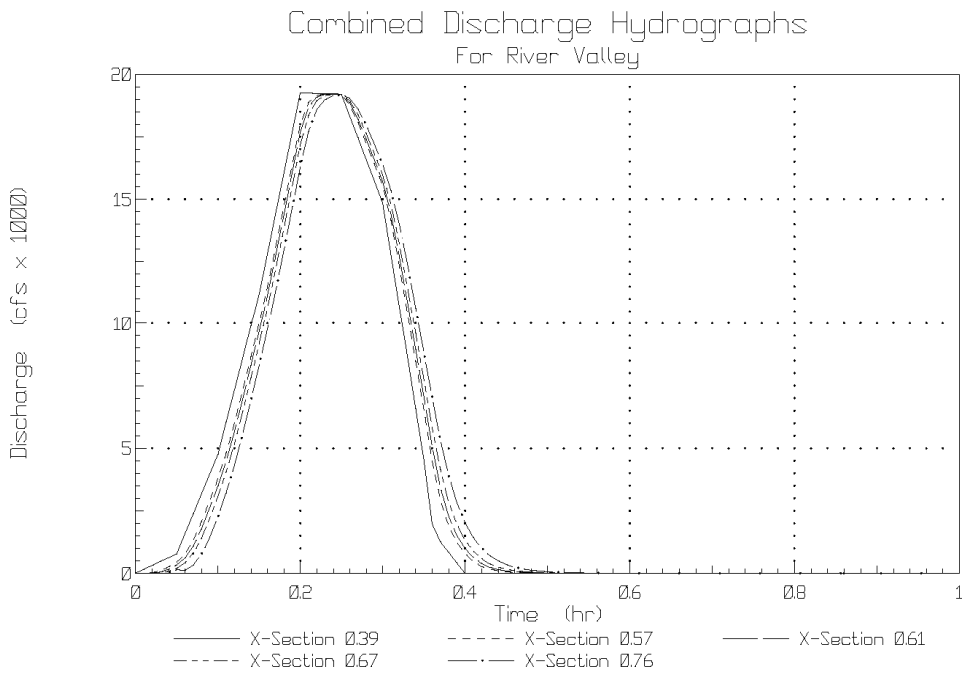

Flood Inundation Plot
3-D Representation
0.39
0.43
0.57
0.61
0.67
0.76
Storage
Water Surface Profile
Floodplain
Cross-Section ID
Channel

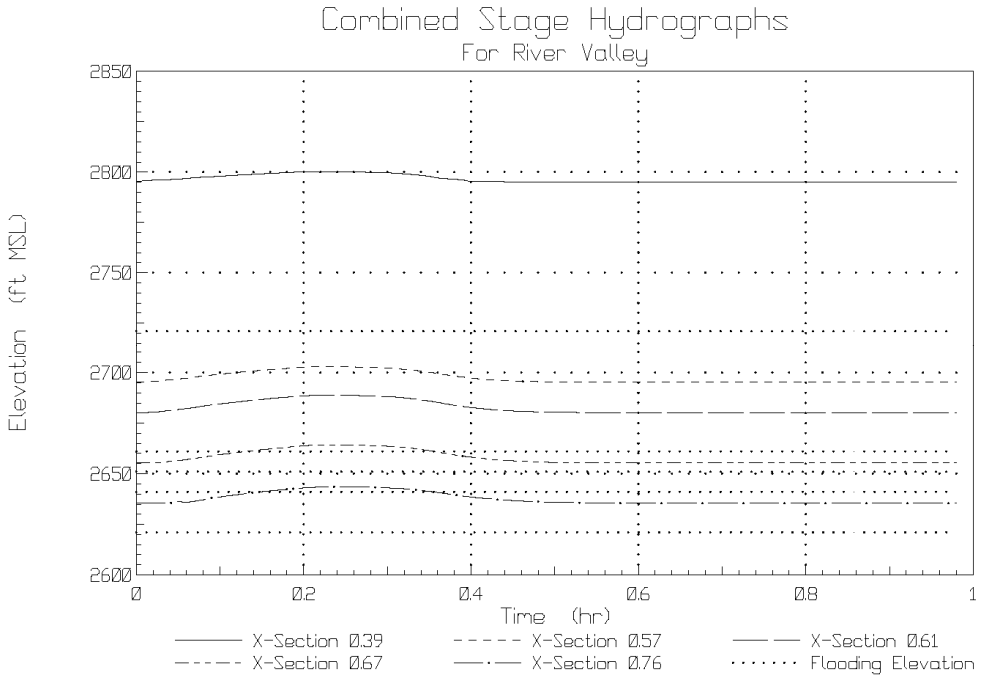

Upstream Inflow Hydrograph Plot
20000
15000
10000
5000
0
Inflow (cfs)
0
0.2
0.4
0.6
0.8
1
Elapsed Time (hr)
Inflow Discharge


Flood Crest Profile Plot
Water Surface Profile
2900
2850
2800
2750
2700
2650
2600
Elevation (ft MSL)
0.3
0.4
0.5
0.6
0.7
0.8
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface


Time to Peak Stage
0.25
0.24
0.23
0.22
0.21
Time (hr)
0.3
0.4
0.5
0.6
0.7
0.8
Cross-Section (mi)
Time to Peak Stage


Combined Flow Depth Hydrographs
For River Valley
100
80
60
40
20
0
Depth (ft)
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.01
X-Section 0.23
X-Section 0.61
X-Section 0.76


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
20
15
10
5
0
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.39
X-Section 0.57
X-Section 0.61
X-Section 0.67
X-Section 0.76


Combined Stage Hydrographs
For River Valley
Elevation (ft MSL)
2850
2800
2750
2700
2650
2600
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.39
X-Section 0.57
X-Section 0.61
X-Section 0.67
X-Section 0.76
Flooding Elevation

6.4 APPENDIX D: ECH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH BETWEEN YUCAIPA RESERVOIR NO.2 AND YUCIPA RESERVOIR NO.1

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
_____________________________________________________________________________

                          ============================
                           B O S S    D A M B R K (tm)
                          ============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 0010000.200


PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    : Routing through Yucaipa Reservoir No. 2
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  7/08/2008
   TIME OF RUN    :  2:32 pm
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
INPUT DATA SUMMARY :
--------------------

   INPUT CONTROL PARAMETERS :
   --------------------------

      Problem Specification Option                        13

      Number of Dynamic Routing Reaches (KKN)              1

      Type of Reservoir Routing (KUI)                      1  (dynamic routing)

      Number of multiple dams/bridges (MULDAM)             1

      No. of Reservoir Inflow Hydrograph Points (ITEH)    28

      No. of Informational Cross-Sections (NPRT)           0

      Flood-Plain Routing (KFLP)                           0  (no)
```

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
   CROSS-SECTION NUMBERS COINCIDENT
   WITH UPSTREAM DAM FACE (IDAM)    :
   ---------------------------------

               1

   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation vs. Surface Area Table

      Elevation Surface
                Area
      HSA(K)    SA(K)
      (ft MSL)  (acres)
      --------- ---------------
        2625.00          22.300
        2620.00          16.000
        2615.00           9.800
        2610.00           6.000
        2605.00           4.000
        2600.00           2.300
        2595.00           1.200
        2590.00           0.000
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

DAM NUMBER : 1

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		2615.00
Breach Side Slope (Z)	1:	0.50
Breach Bottom Elevation (YBMIN, ft MSL)		2590.00
Breach Base Width (BB, ft)		0.00
Time of Breach Formation (TFH, hr)		0.50

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	2622.00
Top of Dam Crest Elevation (HD, ft MSL)	2622.00
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	2615.00
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	2600.00
Turbine Discharge (QT, cfs)	10.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
1.00	85.0
2.00	241.0
3.00	443.0
4.00	682.0
5.00	953.0
6.00	1253.0
7.00	1579.0

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	10.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	10.0
0.06	160.0
0.08	720.0
0.10	2150.0
0.12	4200.0
0.14	6780.0
0.16	9650.0
0.18	12830.0
0.20	16220.0
0.22	18540.0
0.24	19150.0
0.26	19060.0
0.28	18010.0
0.30	16440.0
0.32	14090.0
0.34	10750.0
0.36	7180.0
0.38	4070.0
0.40	2130.0
0.42	1080.0
0.44	530.0
0.46	260.0
0.48	130.0

Draft Final

```
          0.50            70.0
          0.52            40.0
          0.60            10.0
          1.00            10.0
         10.00            10.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
   SUMMARY OF PROGRAM CONTROL PARAMETERS :
   ---------------------------------------

      Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

      Number of Cross-Sections Entered (NS)                    3

      Number of Top Widths Entered (NCS)                       4

      Number of Cross-Sectional Hydrographs to Plot (NTT)      3

      Flow Type Parameter (KSUPC)                              2  (mixed flow)

      Number of Lateral Inflow Hydrographs (LQ)                0

      Number of Points in Gate Control Curve (KCG)             0


   CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
   (maximum allowed = 6)
   -------------------------------------------

          1    2    3

   CHANNEL-VALLEY BOUNDARY CONDITIONS :
   ------------------------------------

      Max Discharge at Downstream End (QMAXD, cfs)                     0.0

      Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)           0.0000

      Initial Time-Step Size (DTHM, hr)                             0.0000

      Time at which Dam Starts to Fail (TFI, hr)                    0.0000

      Theta Weighting Factor (F1I)                                   0.000

      Stage Convergence Criterion (EPSY, ft)                         0.000

      Downstream Boundary Type Paramter (YDN)                         0.00

      Slope of Channel Downstream of Dam (SOM, ft/mi)               0.0000
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   7
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

CROSS-SECTION NUMBER : 1 Downstream end of Yucaipa

Cross-Section Location (XS(I), mi) 0.970

Flooding Elevation (FSTG(I), ft MSL) 2591.000

DOWNSTREAM REACH NUMBER : 1

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
2590.00	0.0	0.0500	0.0
2610.00	432.0	0.0500	0.0
2630.00	652.0	0.0500	0.0
2650.00	760.0	0.0500	0.0

```
BOSS DAMBRK  version 3.00                                          PAGE   8
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

CROSS-SECTION NUMBER : 2 Upstream end of Yucaipa R

Cross-Section Location (XS(I), mi) 1.020

Flooding Elevation (FSTG(I), ft MSL) 2571.000

DOWNSTREAM REACH NUMBER : 2

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Draft Final

```
      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2570.00       0.0    0.0500       0.0
        2590.00     392.0    0.0500       0.0
        2610.00     597.0    0.0500       0.0
        2630.00     781.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
   CROSS-SECTION NUMBER :   3    Middle of Yucaipa Reservo
   -------------------------

      Cross-Section Location (XS(I), mi)                              1.120

      Flooding Elevation (FSTG(I), ft MSL)                         2551.000

   CROSS-SECTION DESCRIPTION :
   --------------------------

      Elevation Channel   Storage
                Top       Top
                Width     Width
      HS(K,I)   BS(K,I)   BSS(K,I)
      (ft MSL)  (ft)      (ft)
      --------- --------- ---------
        2550.00       0.0       0.0
        2570.00     277.0       0.0
        2590.00     603.0       0.0
        2610.00     739.0       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
      NOTE: At cross-section reach   2 the distance between
            interpolated cross-sections (DXM) was changed to  0.136
            due to (WAVE SPEED * DT) criteria
```

```
BOSS DAMBRK  version 3.00                                          PAGE  11
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
   DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
   (DXM) THAT WILL BE USED IN COMPUTATIONS      :
   ---------------------------------------------
```

Draft Final

```
      Down      Interp.
      Stream    Cross
      Reach     Section
      Number    Distance
      I=1,NS1   DXM(I)
                (mi)
      --------- ---------
              1  101.0000
              2    0.1361

      Total number of cross-sections (original+interpolated)                 3

      Maximum number of cross-sections allowed                             300


BOSS DAMBRK  version 3.00                                            PAGE  12
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                 7/08/2008


OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross     Cross     Bottom    Reach     Reach     Reach
      Section   Section   Elevation Number    Length    Slope
      Number    Location
                (mi)      (ft MSL)            (mi)      (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     0.970  2590.000
              2     1.020  2570.000         1     0.050   400.000
              3     1.120  2550.000         2     0.100   200.000


BOSS DAMBRK  version 3.00                                            PAGE  13
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                 7/08/2008


   RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :
   ---------------------------------------

      Dam/      Revised
      Bridge    Cross
                Section
                Number
      --------- ---------
              1         1

      Number of Intermediate Cross-Sections (NN(NS))                         3

      Number of Time Steps (NNU)                                            28
```

Draft Final

```
BOSS DAMBRK  version 3.00                                                PAGE  14
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                   7/08/2008
```

INITIAL CONDITIONS TABLE :

Cross Section Number I	Cross Section Location XI (mi)	Normal Flow Water Elevation YN (ft MSL)	Normal Flow Depth DEPN (ft)	Critical Flow Water Elevation YC (ft MSL)	Critical Flow Depth DEPC (ft)	Froude Indicator (0 = sub) (1 = sup) IFR	Iteration Count for Computing Nrml Dpth ITN	Iteration Count for Computing Crtl Dpth ITC
1	0.970	2590.92	0.92	2590.55	0.55	0	13	13
2	1.020	2570.62	0.62	2570.57	0.57	0	13	13
3	1.120	2550.71	0.71	2550.66	0.66	0	13	13

```
BOSS DAMBRK  version 3.00                                                PAGE  15
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                   7/08/2008
```

SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :

Cross-section Number at Downstream End of Model (IN)	3
Initial Water Surface Elev. at Downstream End (YNN, ft MSL)	2550.707
Initial Flow Depth at Downstream End (DEP, ft)	0.707

COMPUTED STEP BACKWATER TABLE :

Cross Section Number I	Cross Section Location X (mi)	Flow QIL (cfs)	Backwater Water Surface Elevation YIL (ft MSL)	Backwater Water Depth DEP (ft)	Iteration Count for Computing Backwater ITB
1	0.970	10.0	2615.000	25.000	0

```
BOSS DAMBRK  version 3.00                                                PAGE  16
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                   7/08/2008
```

Draft Final

```
   INITIAL CONDITIONS :
   --------------------

      Interp.   Initial   Initial
      Cross-    Water     Flow
      Section   Elevation
      I         YI(I)     QDI(I)
                (ft MSL)  (cfs)
      --------- --------- ---------------
              1   2615.00            10.0
              2   2570.62            10.0
              3   2550.71            10.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE  17
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
   DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :
   ----------------------------------------

      Time to Failure (TFH, hr)                                       0.500

      Time to Start of Rising Limb of Hydrograph (TFO, hr)           10.000

      Time to Peak (TP, hr)                                           0.240

      Time Step Size (DTHI, hr)                                       0.025
```

```
BOSS DAMBRK  version 3.00                                          PAGE  18
  PROJECT TITLE  : CHR Enlargement, inflow from Main Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              7/08/2008
```

```
ROUTING COMPLETED :
-------------------

      Number of Time Steps Used (KTIME)                                211

      Maximum Number of Time Steps Allowed                            1199

      Total Time of Flood Routing (TT, hr)                            10.1

      Flood Wave Arrival Time based upon a WSEL Increase of (ft)      1.00

   CONSERVATION OF MASS RESULTS :
   ------------------------------

      Should be close to 0.00%, a negative value denotes flow volume was lost
      during the routing, a positive value denotes flow volume was gained
      during the routing. Normalized as a percent of inflow volume, maximum
      change in conservation of mass during routing was       0.02
```

Draft Final

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.970	2628.28	10802	0.365	0.93	2591.00	0.00	0.14
1.020	2578.51	10802	0.540	15.23	2571.00	0.11	0.14
1.120	2559.82	10246	0.540	15.35	2551.00	0.12	0.17

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2615.00	2570.62	2550.71			
3	0.024	2615.01	2570.62	2550.71			
5	0.048	2615.02	2570.67	2550.71			
7	0.072	2615.07	2570.74	2550.72			
9	0.096	2615.28	2570.98	2550.75			
11	0.120	2615.84	2571.36	2551.05			
13	0.144	2616.81	2571.98	2551.68			
15	0.168	2618.16	2572.67	2552.54			
17	0.192	2619.80	2573.36	2553.42			
19	0.216	2621.61	2574.02	2554.26			
21	0.240	2623.36	2574.56	2554.99			
23	0.290	2626.32	2575.49	2556.19			
25	0.340	2628.01	2576.27	2557.17			
27	0.390	2628.20	2576.91	2557.98			
29	0.440	2627.34	2577.50	2558.70			
31	0.490	2625.99	2577.77	2559.12			
33	0.540	2624.32	2578.51	2559.82			
35	0.590	2622.31	2577.93	2559.46			
37	0.640	2620.41	2577.36	2558.78			
39	0.690	2618.64	2576.82	2558.12			
41	0.740	2616.96	2576.31	2557.51			
43	0.790	2615.34	2575.86	2556.96			

Draft Final

45	0.840	2613.74	2575.50	2556.51
47	0.890	2612.19	2575.16	2556.11
49	0.940	2610.68	2574.83	2555.72
51	0.990	2609.19	2574.50	2555.33
53	1.040	2607.82	2574.20	2554.97
55	1.090	2606.55	2573.92	2554.64
57	1.140	2605.38	2573.66	2554.33
59	1.190	2604.30	2573.42	2554.04
61	1.240	2603.32	2573.20	2553.78
63	1.290	2602.40	2572.99	2553.53
65	1.342	2601.55	2572.80	2553.30
67	1.394	2600.75	2572.62	2553.09
69	1.447	2599.99	2572.44	2552.88
71	1.502	2599.29	2572.28	2552.69
73	1.557	2598.66	2572.14	2552.52
75	1.614	2598.08	2572.00	2552.36
77	1.671	2597.56	2571.88	2552.22
79	1.730	2597.08	2571.77	2552.08
81	1.790	2596.64	2571.67	2551.96
83	1.852	2596.24	2571.57	2551.85
85	1.914	2595.88	2571.49	2551.75
87	1.978	2595.54	2571.41	2551.65
89	2.043	2595.24	2571.33	2551.57
91	2.110	2594.96	2571.27	2551.49
93	2.177	2594.70	2571.21	2551.40

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
95	2.246	2594.47	2571.16	2551.34			
97	2.317	2594.25	2571.10	2551.28			
99	2.389	2594.05	2571.05	2551.22			
101	2.462	2593.87	2571.01	2551.17			
103	2.537	2593.70	2570.97	2551.12			
105	2.613	2593.55	2570.93	2551.08			
107	2.691	2593.41	2570.90	2551.04			
109	2.771	2593.29	2570.87	2551.00			
111	2.852	2593.18	2570.84	2550.97			
113	2.934	2593.07	2570.81	2550.94			
115	3.019	2592.98	2570.79	2550.91			
117	3.105	2592.90	2570.77	2550.89			
119	3.192	2592.82	2570.75	2550.86			
121	3.282	2592.75	2570.73	2550.84			
123	3.373	2592.70	2570.72	2550.83			
125	3.466	2592.64	2570.71	2550.81			
127	3.561	2592.60	2570.70	2550.80			

Draft Final

129	3.658	2592.56	2570.68	2550.78
131	3.757	2592.52	2570.68	2550.77
133	3.858	2592.49	2570.67	2550.76
135	3.961	2592.46	2570.66	2550.75
137	4.066	2592.44	2570.66	2550.75
139	4.173	2592.42	2570.65	2550.74
141	4.282	2592.40	2570.65	2550.74
143	4.393	2592.38	2570.64	2550.73
145	4.507	2592.37	2570.64	2550.73
147	4.623	2592.36	2570.64	2550.72
149	4.741	2592.35	2570.63	2550.72
151	4.862	2592.34	2570.63	2550.72
153	4.985	2592.34	2570.63	2550.72
155	5.110	2592.33	2570.63	2550.71
157	5.238	2592.33	2570.63	2550.71
159	5.369	2592.32	2570.63	2550.71
161	5.502	2592.32	2570.63	2550.71
163	5.638	2592.32	2570.62	2550.71
165	5.777	2592.31	2570.62	2550.71
167	5.918	2592.31	2570.62	2550.71
169	6.062	2592.31	2570.62	2550.71
171	6.209	2592.31	2570.62	2550.71
173	6.360	2592.31	2570.62	2550.71
175	6.513	2592.31	2570.62	2550.71
177	6.669	2592.31	2570.62	2550.71
179	6.828	2592.31	2570.62	2550.71
181	6.991	2592.31	2570.62	2550.71
183	7.157	2592.31	2570.62	2550.71
185	7.326	2592.31	2570.62	2550.71
187	7.499	2592.31	2570.62	2550.71
189	7.675	2592.31	2570.62	2550.71
191	7.854	2592.31	2570.62	2550.71
193	8.037	2592.31	2570.62	2550.71
195	8.224	2592.31	2570.62	2550.71

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
197	8.415	2592.31	2570.62	2550.71			
199	8.609	2592.31	2570.62	2550.71			
201	8.808	2592.31	2570.62	2550.71			
203	9.010	2592.31	2570.62	2550.71			
205	9.217	2592.31	2570.62	2550.71			
207	9.427	2592.31	2570.62	2550.71			
209	9.642	2592.31	2570.62	2550.71			
211	9.861	2592.31	2570.62	2550.71			

Draft Final

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01	0.01			
3	0.024	0.01	0.01	0.01			
5	0.048	0.01	0.01	0.01			
7	0.072	0.02	0.02	0.01			
9	0.096	0.03	0.03	0.01			
11	0.120	0.08	0.08	0.03			
13	0.144	0.22	0.22	0.10			
15	0.168	0.49	0.49	0.30			
17	0.192	0.91	0.91	0.66			
19	0.216	1.46	1.46	1.17			
21	0.240	2.05	2.05	1.77			
23	0.290	3.37	3.37	3.10			
25	0.340	4.79	4.79	4.53			
27	0.390	6.21	6.21	5.96			
29	0.440	7.70	7.70	7.46			
31	0.490	8.49	8.49	8.41			
33	0.540	10.80	10.80	10.25			
35	0.590	8.96	8.96	9.21			
37	0.640	7.33	7.33	7.58			
39	0.690	5.98	5.98	6.19			
41	0.740	4.86	4.86	5.05			
43	0.790	3.99	3.99	4.14			
45	0.840	3.37	3.37	3.48			
47	0.890	2.85	2.85	2.95			
49	0.940	2.39	2.39	2.48			
51	0.990	1.98	1.98	2.06			
53	1.040	1.64	1.64	1.72			
55	1.090	1.37	1.37	1.43			
57	1.140	1.14	1.14	1.19			
59	1.190	0.95	0.95	1.00			
61	1.240	0.79	0.79	0.83			
63	1.290	0.67	0.67	0.70			
65	1.342	0.56	0.56	0.59			
67	1.394	0.46	0.46	0.49			
69	1.447	0.39	0.39	0.41			
71	1.502	0.32	0.32	0.34			
73	1.557	0.27	0.27	0.29			
75	1.614	0.23	0.23	0.24			
77	1.671	0.19	0.19	0.20			
79	1.730	0.16	0.16	0.17			

Draft Final

81	1.790	0.14	0.14	0.15
83	1.852	0.12	0.12	0.13
85	1.914	0.10	0.10	0.11
87	1.978	0.09	0.09	0.09
89	2.043	0.08	0.08	0.08
91	2.110	0.07	0.07	0.07
93	2.177	0.06	0.06	0.06
95	2.246	0.05	0.05	0.05

BOSS DAMBRK version 3.00 PAGE 23
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
97	2.317	0.05	0.05	0.05			
99	2.389	0.04	0.04	0.04			
101	2.462	0.04	0.04	0.04			
103	2.537	0.03	0.03	0.03			
105	2.613	0.03	0.03	0.03			
107	2.691	0.03	0.03	0.03			
109	2.771	0.02	0.02	0.03			
111	2.852	0.02	0.02	0.02			
113	2.934	0.02	0.02	0.02			
115	3.019	0.02	0.02	0.02			
117	3.105	0.02	0.02	0.02			
119	3.192	0.02	0.02	0.02			
121	3.282	0.02	0.02	0.02			
123	3.373	0.01	0.01	0.02			
125	3.466	0.01	0.01	0.01			
127	3.561	0.01	0.01	0.01			
129	3.658	0.01	0.01	0.01			
131	3.757	0.01	0.01	0.01			
133	3.858	0.01	0.01	0.01			
135	3.961	0.01	0.01	0.01			
137	4.066	0.01	0.01	0.01			
139	4.173	0.01	0.01	0.01			
141	4.282	0.01	0.01	0.01			
143	4.393	0.01	0.01	0.01			
145	4.507	0.01	0.01	0.01			
147	4.623	0.01	0.01	0.01			
149	4.741	0.01	0.01	0.01			
151	4.862	0.01	0.01	0.01			
153	4.985	0.01	0.01	0.01			
155	5.110	0.01	0.01	0.01			
157	5.238	0.01	0.01	0.01			
159	5.369	0.01	0.01	0.01			
161	5.502	0.01	0.01	0.01			
163	5.638	0.01	0.01	0.01			
165	5.777	0.01	0.01	0.01			
167	5.918	0.01	0.01	0.01			
169	6.062	0.01	0.01	0.01			

Draft Final

171	6.209	0.01	0.01	0.01
173	6.360	0.01	0.01	0.01
175	6.513	0.01	0.01	0.01
177	6.669	0.01	0.01	0.01
179	6.828	0.01	0.01	0.01
181	6.991	0.01	0.01	0.01
183	7.157	0.01	0.01	0.01
185	7.326	0.01	0.01	0.01
187	7.499	0.01	0.01	0.01
189	7.675	0.01	0.01	0.01
191	7.854	0.01	0.01	0.01
193	8.037	0.01	0.01	0.01
195	8.224	0.01	0.01	0.01
197	8.415	0.01	0.01	0.01

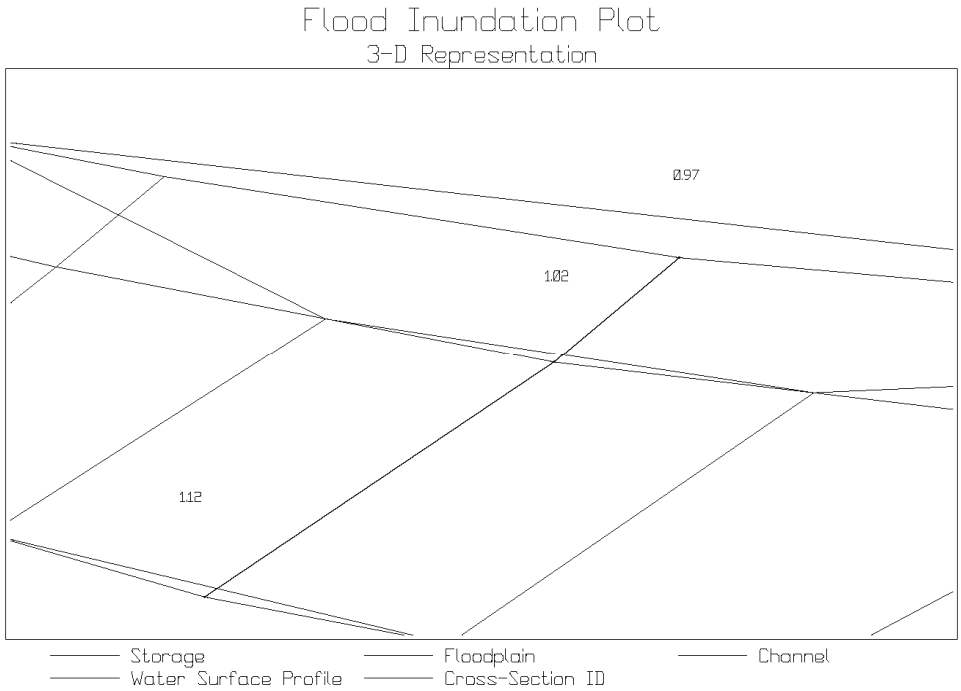
BOSS DAMBRK version 3.00 PAGE 24
PROJECT TITLE : CHR Enlargement, inflow from Main Dam
PROJECT NUMBER : DWR Dam No. 1-091 7/08/2008

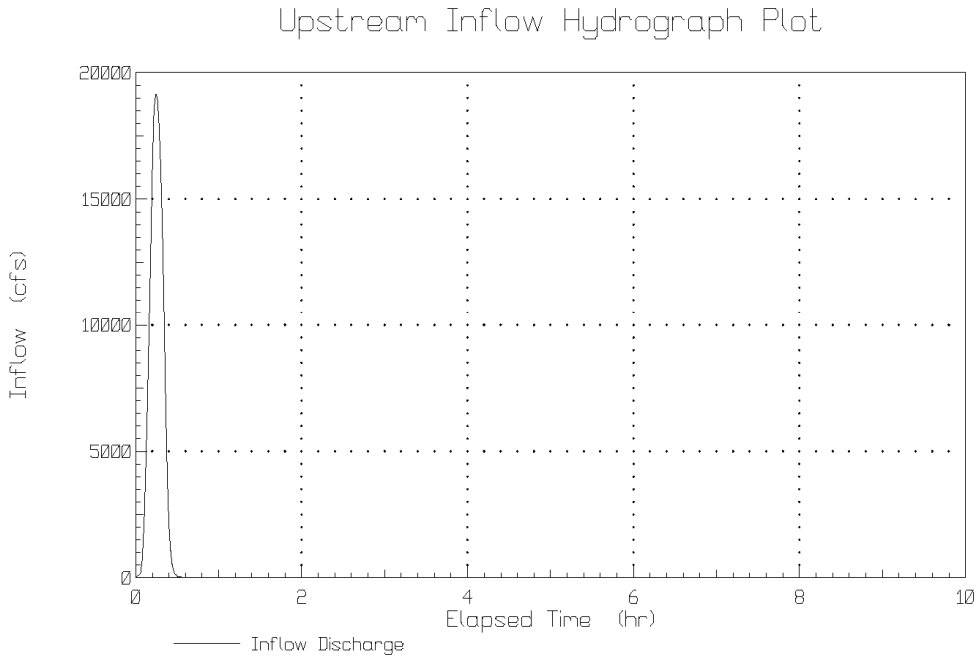
Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
199	8.609	0.01	0.01	0.01			
201	8.808	0.01	0.01	0.01			
203	9.010	0.01	0.01	0.01			
205	9.217	0.01	0.01	0.01			
207	9.427	0.01	0.01	0.01			
209	9.642	0.01	0.01	0.01			
211	9.861	0.01	0.01	0.01			

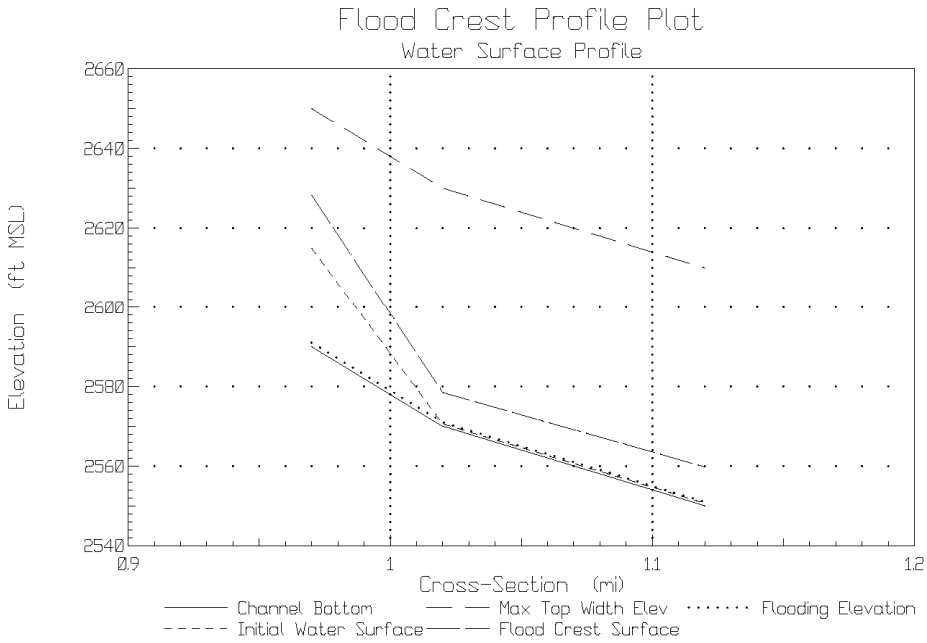
END OF OUTPUT

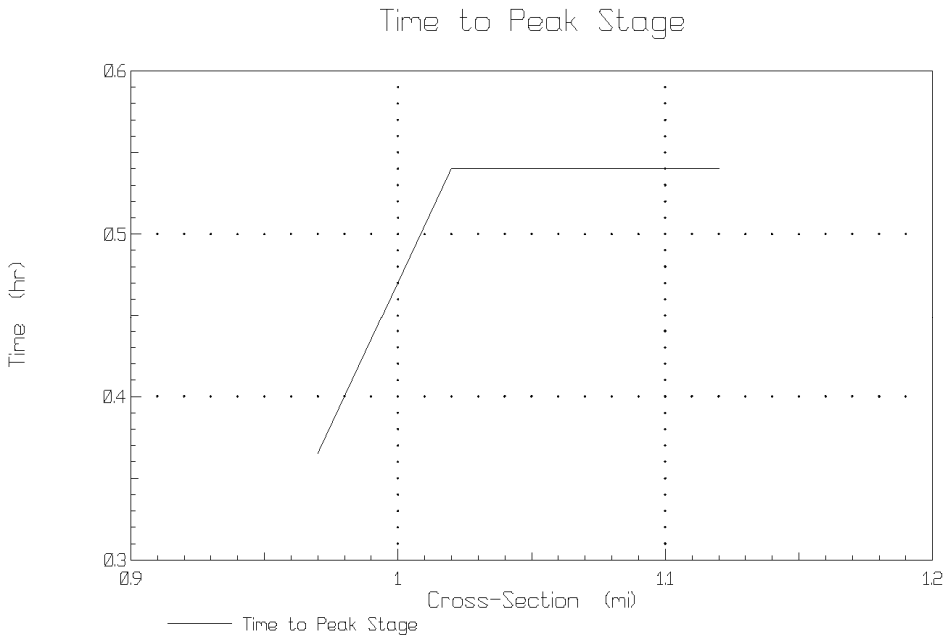
Draft Final

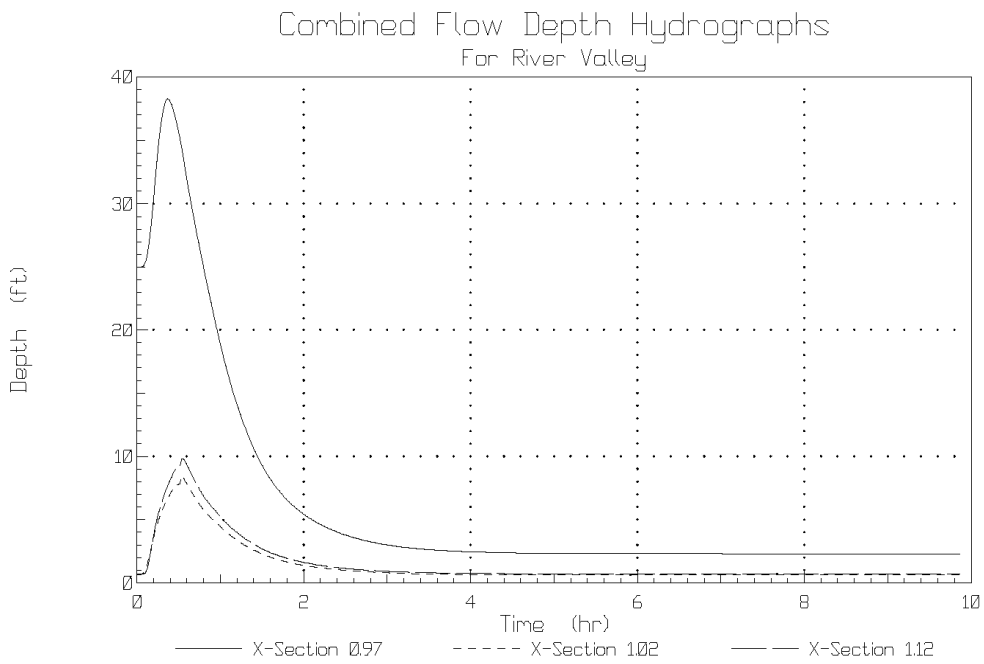
6.5 APPENDIX E: ECH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH BETWEEN YUCAIPA RESERVOIR NO.2 AND YUCAIPA RESERVOIR NO. 1

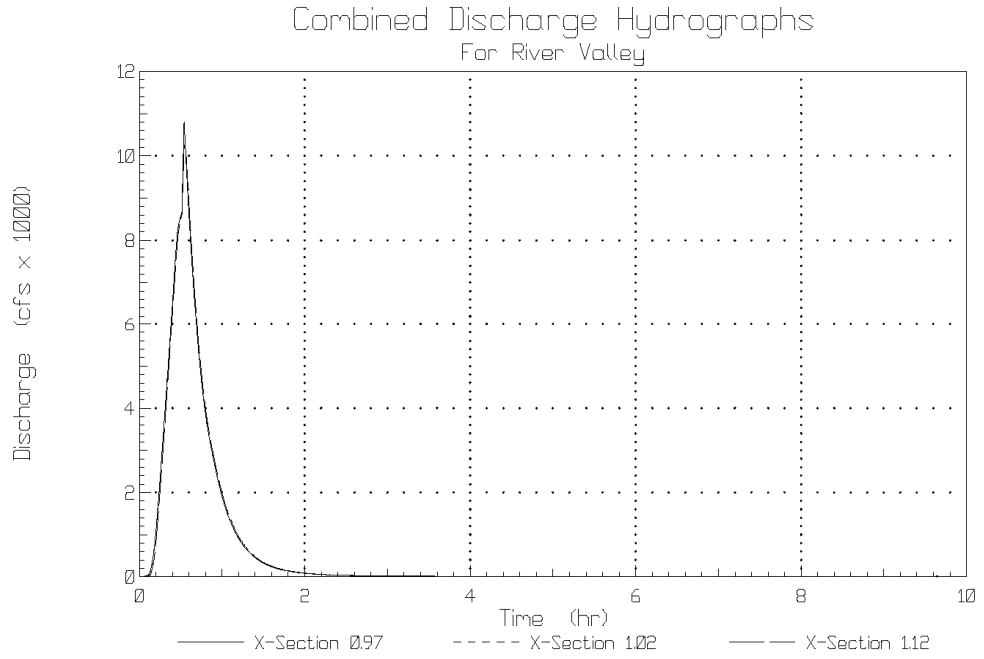


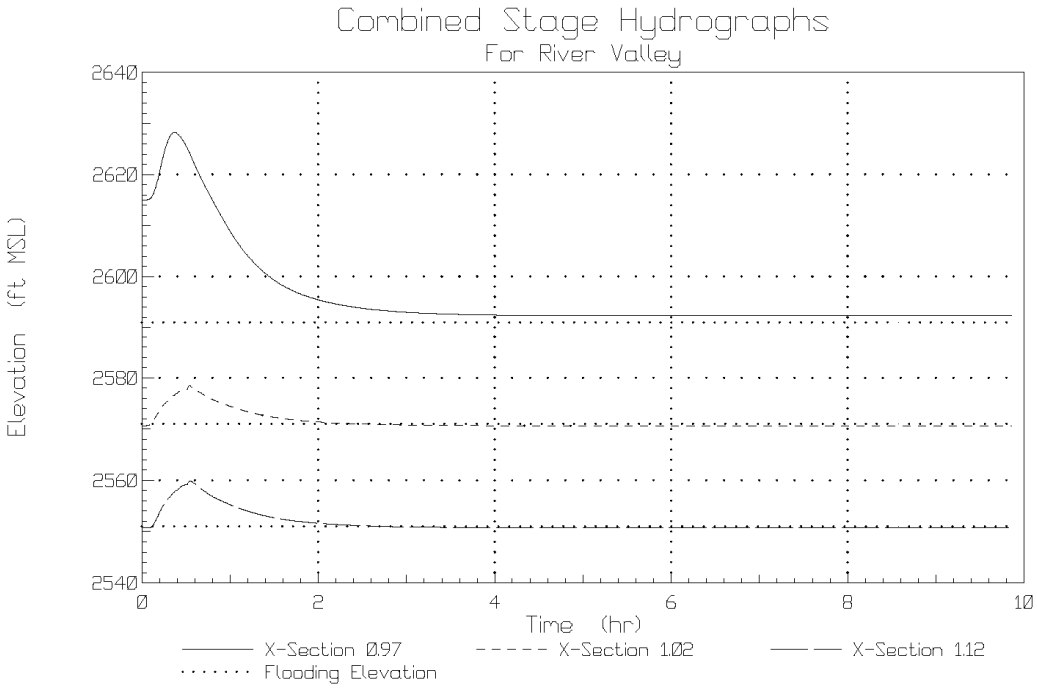



Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
2660
2640
2620
2600
2580
2560
2540
0.9
1
1.1
1.2
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface


Time to Peak Stage
Time (hr)
0.6
0.5
0.4
0.3
0.9
1
1.1
1.2
Cross-Section (mi)
Time to Peak Stage


Combined Flow Depth Hydrographs
For River Valley
Depth (ft)
40
30
20
10
0
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
12
10
8
6
4
2
0
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12


Combined Stage Hydrographs
For River Valley
Elevation (ft MSL)
2640
2620
2600
2580
2560
2540
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12
Flooding Elevation

Draft F

6.6 APPENDIX F: ECH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH DOWNSTREAM OF YUCAIPA RESERVOIR NO.1

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
_____________________________________________________________________________

                          ==============================
                           B O S S    D A M B R K (tm)
                          ==============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources

PROGRAM ORIGIN :
----------------
   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    : Routing through Yucaipa Reservoir No. 1
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/25/2008
   TIME OF RUN    :  2:17 pm
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
INPUT DATA SUMMARY :
--------------------

   INPUT CONTROL PARAMETERS :
   --------------------------

      Problem Specification Option                        13

      Number of Dynamic Routing Reaches (KKN)              1

      Type of Reservoir Routing (KUI)                      1  (dynamic routing)

      Number of multiple dams/bridges (MULDAM)             1

      No. of Reservoir Inflow Hydrograph Points (ITEH)    19

      No. of Informational Cross-Sections (NPRT)           0

      Flood-Plain Routing (KFLP)                           0  (no)
```

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   CROSS-SECTION NUMBERS COINCIDENT
   WITH UPSTREAM DAM FACE (IDAM)    :
   ---------------------------------

               1

   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation vs. Surface Area Table

      Elevation Surface
                Area
      HSA(K)    SA(K)
      (ft MSL)  (acres)
      --------- ---------------
        2583.50          12.000
        2580.00           8.800
        2575.00           6.900
        2570.00           4.400
        2565.00           3.300
        2560.00           2.300
        2555.00           1.500
        2550.00           0.000
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

DAM NUMBER : 1

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		2575.00
Breach Side Slope (Z)	1:	0.50
Breach Bottom Elevation (YBMIN, ft MSL)		2550.00
Breach Base Width (BB, ft)		0.00
Time of Breach Formation (TFH, hr)		0.50

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	2583.50
Top of Dam Crest Elevation (HD, ft MSL)	2583.50
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	2576.00
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	2555.00
Turbine Discharge (QT, cfs)	10.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
2.00	298.0
4.00	843.0
6.00	1549.0
8.00	2385.0
0.00	0.0
0.00	0.0
0.00	0.0

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	4.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	10.0
0.09	50.0
0.14	100.0
0.19	660.0
0.21	1170.0
0.24	1770.0
0.34	4530.0
0.44	7460.0
0.54	10250.0
0.59	9210.0
0.69	6190.0
0.79	4140.0
0.89	2950.0
1.00	1720.0
1.19	1000.0
1.56	290.0
2.04	80.0
3.50	10.0
10.00	10.0

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
```

```
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

```
   SUMMARY OF PROGRAM CONTROL PARAMETERS :
   ---------------------------------------

      Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

      Number of Cross-Sections Entered (NS)                    5

      Number of Top Widths Entered (NCS)                       4

      Number of Cross-Sectional Hydrographs to Plot (NTT)      5

      Flow Type Parameter (KSUPC)                              2  (mixed flow)

      Number of Lateral Inflow Hydrographs (LQ)                0

      Number of Points in Gate Control Curve (KCG)             0

   CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
   (maximum allowed = 6)
   --------------------------------------------

          1    2    3    4    5

   CHANNEL-VALLEY BOUNDARY CONDITIONS :
   ------------------------------------

      Max Discharge at Downstream End (QMAXD, cfs)                        0.0

      Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)               0.0000

      Initial Time-Step Size (DTHM, hr)                                 0.0000

      Time at which Dam Starts to Fail (TFI, hr)                        0.0000

      Theta Weighting Factor (F1I)                                       0.000

      Stage Convergence Criterion (EPSY, ft)                             0.000

      Downstream Boundary Type Paramter (YDN)                             0.00

      Slope of Channel Downstream of Dam (SOM, ft/mi)                   0.0000
```

```
BOSS DAMBRK  version 3.00                                              PAGE   7
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

```
   CROSS-SECTION NUMBER :   1    Downstream end of Yucaipa
   --------------------------

      Cross-Section Location (XS(I), mi)                                1.190
```

Draft Final

```
      Flooding Elevation (FSTG(I), ft MSL)                              2551.000

   DOWNSTREAM REACH NUMBER :   1
   ----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                        0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2550.00      50.0    0.0500       0.0
        2560.00     260.0    0.0500       0.0
        2570.00     510.0    0.0500       0.0
        2590.00     645.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                              PAGE   8
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008

   CROSS-SECTION NUMBER :   2
   --------------------------

      Cross-Section Location (XS(I), mi)                                   1.360

      Flooding Elevation (FSTG(I), ft MSL)                              2521.000

   DOWNSTREAM REACH NUMBER :   2
   ----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                        0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2520.00     110.0    0.0500       0.0
        2540.00     260.0    0.0500       0.0
        2560.00     520.0    0.0500       0.0
        2580.00    1100.0    0.0500       0.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

CROSS-SECTION NUMBER : 3

Cross-Section Location (XS(I), mi) 1.650

Flooding Elevation (FSTG(I), ft MSL) 2481.000

DOWNSTREAM REACH NUMBER : 3

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
2480.00	80.0	0.0500	0.0
2500.00	760.0	0.0500	0.0
2520.00	2000.0	0.0500	0.0
2540.00	3085.0	0.0500	0.0

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

CROSS-SECTION NUMBER : 4

Cross-Section Location (XS(I), mi) 1.870

Flooding Elevation (FSTG(I), ft MSL) 2441.000

DOWNSTREAM REACH NUMBER : 4

Reach Contraction-Expansion Coefficient (FKC) 0.000

Minimum Distance Between Interpolated Cross-Sections (DXM, mi) 0.000

CROSS-SECTION and REACH DESCRIPTION :

Draft Final

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Channel Manning n CM(K,I)	Storage Top Width BSS(K,I) (ft)
2440.00	110.0	0.0500	0.0
2460.00	550.0	0.0500	0.0
2480.00	1100.0	0.0500	0.0
2500.00	3065.0	0.0500	0.0

BOSS DAMBRK version 3.00 PAGE 11
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

CROSS-SECTION NUMBER : 5

Cross-Section Location (XS(I), mi) 2.100

Flooding Elevation (FSTG(I), ft MSL) 2401.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
2400.00	180.0	0.0
2420.00	435.0	0.0
2440.00	870.0	0.0
2460.00	2975.0	0.0

BOSS DAMBRK version 3.00 PAGE 12
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

NOTE: At cross-section reach 2 the distance between interpolated cross-sections (DXM) was changed to 0.058 due to expansion/contraction criteria

NOTE: At cross-section reach 3 the distance between interpolated cross-sections (DXM) was changed to 0.110 due to expansion/contraction criteria

NOTE: At cross-section reach 4 the distance between interpolated cross-sections (DXM) was changed to 0.194 due to (WAVE SPEED * DT) criteria

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE  13
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
(DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.0580
3	0.1100
4	0.1941

Total number of cross-sections (original+interpolated) 10

Maximum number of cross-sections allowed 2000

```
BOSS DAMBRK  version 3.00                                          PAGE  14
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

OUTPUT DATA SUMMARY :

CROSS-SECTION and REACH SUMMARY :

Cross Section Number	Cross Section Location (mi)	Bottom Elevation (ft MSL)	Reach Number	Reach Length (mi)	Reach Slope (ft/mi)
1	1.190	2550.000			
2	1.360	2520.000	1	0.170	176.471
3	1.650	2480.000	2	0.290	137.931
4	1.870	2440.000	3	0.220	181.818
5	2.100	2400.000	4	0.230	173.913

```
BOSS DAMBRK  version 3.00                                          PAGE  15
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :

Draft Final

Dam/ Bridge	Revised Cross Section Number
1	1

Number of Intermediate Cross-Sections (NN(NS)) 10

Number of Time Steps (NNU) 19

BOSS DAMBRK version 3.00 PAGE 16
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

INITIAL CONDITIONS TABLE :

Cross Section Number I	Cross Section Location XI (mi)	Normal Flow Water Elevation YN (ft MSL)	Normal Flow Depth DEPN (ft)	Critical Flow Water Elevation YC (ft MSL)	Critical Flow Depth DEPC (ft)	Froude Indicator (0 = sub) (1 = sup) IFR	Iteration Count for Computing Nrml Dpth ITN	Iteration Count for Computing Crtl Dpth ITC
1	1.190	2550.26	0.26	2550.10	0.10	0	13	13
2	1.360	2520.09	0.09	2520.06	0.06	0	13	13
3	1.418	2512.10	0.10	2512.06	0.06	0	13	13
4	1.476	2504.10	0.10	2504.07	0.07	0	13	13
5	1.534	2496.11	0.11	2496.07	0.07	0	13	13
6	1.592	2488.11	0.11	2488.08	0.08	0	13	13
7	1.650	2480.10	0.10	2480.08	0.08	0	13	13
8	1.760	2460.09	0.09	2460.07	0.07	0	13	13
9	1.870	2440.08	0.08	2440.06	0.06	0	13	13
10	2.100	2400.06	0.06	2400.05	0.05	1	13	13

BOSS DAMBRK version 3.00 PAGE 17
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :

Cross-section Number at Downstream End of Model (IN) 10
Initial Water Surface Elev. at Downstream End (YNN, ft MSL) 2400.062
Initial Flow Depth at Downstream End (DEP, ft) 0.062

Draft Final

COMPUTED STEP BACKWATER TABLE :

Cross Section Number I	Cross Section Location X (mi)	Flow QIL (cfs)	Backwater Water Surface Elevation YIL (ft MSL)	Backwater Water Depth DEP (ft)	Iteration Count for Computing Backwater ITB
8	1.760	10.0	2460.086	0.086	8
7	1.650	10.0	2480.110	0.110	6
6	1.592	10.0	2488.108	0.108	7
5	1.534	10.0	2496.102	0.102	6
4	1.476	10.0	2504.100	0.100	6
3	1.418	10.0	2512.094	0.094	8
2	1.360	10.0	2520.092	0.092	14
1	1.190	10.0	2575.000	25.000	0

BOSS DAMBRK version 3.00 PAGE 18
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

INITIAL CONDITIONS :

Interp. Cross-Section I	Initial Water Elevation YI(I) (ft MSL)	Initial Flow QDI(I) (cfs)
1	2575.00	10.0
2	2520.09	10.0
3	2512.09	10.0
4	2504.10	10.0
5	2496.10	10.0
6	2488.11	10.0
7	2480.11	10.0
8	2460.09	10.0
9	2440.09	10.0
10	2400.06	10.0

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :

Time to Failure (TFH, hr) 0.500

Draft Final

Time to Start of Rising Limb of Hydrograph (TFO, hr) 4.000

Time to Peak (TP, hr) 0.540

Time Step Size (DTHI, hr) 0.025

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

ROUTING COMPLETED :

Number of Time Steps Used (KTIME) 130

Maximum Number of Time Steps Allowed 2999

Total Time of Flood Routing (TT, hr) 4.0

Flood Wave Arrival Time based upon a WSEL Increase of (ft) 1.00

CONSERVATION OF MASS RESULTS :

Should be close to 0.00%, a negative value denotes flow volume was lost during the routing, a positive value denotes flow volume was gained during the routing. Normalized as a percent of inflow volume, maximum change in conservation of mass during routing was -2.88

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.190	2588.23	11722	0.659	0.85	2551.00	0.03	0.27
1.360	2526.10	11722	0.809	14.46	2521.00	0.35	0.35
1.418	2517.80	11433	0.809	13.96	2513.00	0.35	0.35
1.476	2509.80	11159	0.809	12.77	2505.00	0.38	0.39
1.534	2501.58	10898	0.809	12.41	2497.00	0.38	0.39
1.592	2493.56	10776	0.834	11.68	2489.00	0.38	0.39
1.650	2485.45	10728	0.834	11.40	2481.00	0.39	0.41
1.760	2464.73	10577	0.834	13.88	2461.00	0.41	0.41
1.870	2445.11	10393	0.834	12.23	2441.00	0.43	0.46
2.100	2403.76	10274	0.859	13.39	2401.00	0.48	0.51

Draft Final

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2575.00	2520.10	2480.11	2440.09	2400.07	
3	0.054	2575.01	2520.10	2480.11	2440.09	2400.07	
5	0.108	2575.03	2520.10	2480.11	2440.09	2400.07	
7	0.162	2575.12	2520.10	2480.11	2440.09	2400.07	
9	0.216	2575.58	2520.10	2480.11	2440.09	2400.07	
11	0.270	2576.71	2520.43	2480.11	2440.09	2400.07	
13	0.324	2578.46	2520.88	2480.12	2440.09	2400.07	
15	0.353	2579.56	2521.20	2480.11	2440.09	2400.12	
17	0.392	2581.16	2521.66	2481.08	2440.16	2400.09	
19	0.408	2581.77	2521.82	2481.35	2440.52	2400.07	
21	0.459	2583.78	2522.13	2482.36	2441.79	2400.37	
23	0.509	2585.62	2523.02	2482.73	2442.18	2401.14	
25	0.559	2587.16	2523.85	2483.44	2442.84	2401.66	
27	0.609	2588.04	2524.37	2484.04	2443.52	2402.22	
29	0.659	2588.23	2524.80	2484.46	2444.02	2402.70	
31	0.709	2587.77	2525.14	2484.79	2444.39	2403.05	
33	0.759	2586.75	2525.41	2485.04	2444.68	2403.32	
35	0.809	2585.03	2526.10	2485.37	2444.96	2403.56	
37	0.859	2582.72	2525.36	2485.33	2445.11	2403.76	
39	0.909	2580.58	2524.68	2484.86	2444.75	2403.61	
41	0.959	2578.63	2524.09	2484.36	2444.27	2403.25	
43	1.009	2576.89	2523.62	2483.92	2443.81	2402.87	
45	1.059	2575.35	2523.27	2483.57	2443.42	2402.55	
47	1.109	2573.94	2523.00	2483.30	2443.12	2402.29	
49	1.159	2572.58	2522.76	2483.07	2442.89	2402.09	
51	1.209	2571.24	2522.52	2482.85	2442.67	2401.92	
53	1.259	2569.97	2522.30	2482.64	2442.47	2401.77	
55	1.309	2568.80	2522.10	2482.15	2442.02	2401.81	
57	1.359	2567.74	2522.02	2482.06	2441.91	2401.60	
59	1.409	2566.77	2521.91	2481.97	2441.81	2401.45	
61	1.459	2565.87	2521.75	2481.83	2441.68	2401.35	
63	1.509	2565.00	2521.61	2481.70	2441.56	2401.26	
65	1.560	2564.14	2521.48	2481.58	2441.44	2401.16	
67	1.612	2563.33	2521.35	2481.46	2441.33	2401.07	
69	1.664	2562.59	2521.24	2481.35	2441.23	2400.99	
71	1.718	2561.93	2521.14	2481.25	2441.13	2400.91	
73	1.773	2561.31	2521.05	2481.16	2441.05	2400.84	
75	1.829	2560.73	2520.97	2481.08	2440.97	2400.78	
77	1.886	2560.19	2520.90	2481.00	2440.90	2400.72	

Draft Final

79	1.945	2559.67	2520.83	2480.93	2440.84	2400.67
81	2.004	2559.17	2520.77	2480.87	2440.78	2400.62
83	2.065	2558.68	2520.71	2480.81	2440.72	2400.58
85	2.127	2558.23	2520.65	2480.75	2440.67	2400.54
87	2.190	2557.84	2520.61	2480.69	2440.62	2400.50
89	2.255	2557.48	2520.57	2480.65	2440.58	2400.46
91	2.320	2557.16	2520.53	2480.61	2440.54	2400.43

BOSS DAMBRK version 3.00 PAGE 23
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
93	2.387	2556.87	2520.50	2480.57	2440.50	2400.40	
95	2.456	2556.61	2520.47	2480.54	2440.47	2400.38	
97	2.526	2556.36	2520.44	2480.51	2440.45	2400.35	
99	2.597	2556.14	2520.42	2480.48	2440.42	2400.33	
101	2.669	2555.93	2520.40	2480.46	2440.40	2400.31	
103	2.743	2555.73	2520.38	2480.43	2440.38	2400.30	
105	2.819	2555.54	2520.36	2480.41	2440.36	2400.28	
107	2.896	2555.36	2520.34	2480.39	2440.34	2400.27	
109	2.975	2555.19	2520.33	2480.37	2440.33	2400.26	
111	3.055	2555.02	2520.31	2480.36	2440.31	2400.24	
113	3.137	2554.85	2520.29	2480.34	2440.30	2400.23	
115	3.220	2554.67	2520.28	2480.32	2440.28	2400.22	
117	3.305	2554.50	2520.26	2480.31	2440.27	2400.21	
119	3.392	2554.32	2520.25	2480.29	2440.26	2400.20	
121	3.481	2554.13	2520.23	2480.28	2440.24	2400.19	
123	3.571	2553.95	2520.22	2480.26	2440.23	2400.18	
125	3.663	2553.78	2520.20	2480.24	2440.22	2400.17	
127	3.757	2553.62	2520.19	2480.23	2440.20	2400.16	
129	3.853	2553.48	2520.18	2480.21	2440.19	2400.15	

Draft Final

BOSS DAMBRK version 3.00 PAGE 24
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)

1	0.000	0.01	0.01	0.01	0.01	0.01	
3	0.054	0.01	0.01	0.01	0.01	0.01	
5	0.108	0.01	0.01	0.01	0.01	0.01	
7	0.162	0.01	0.01	0.01	0.01	0.01	
9	0.216	0.01	0.01	0.01	0.01	0.01	
11	0.270	0.12	0.12	0.01	0.01	0.01	
13	0.324	0.43	0.43	0.01	0.01	0.01	
15	0.353	0.73	0.73	0.01	0.01	0.03	
17	0.392	1.26	1.26	0.60	0.03	0.02	
19	0.408	1.48	1.48	0.87	0.22	0.01	
21	0.459	2.30	2.30	1.68	1.18	0.19	
23	0.509	3.51	3.51	2.63	2.07	1.43	
25	0.559	5.27	5.27	4.19	3.41	2.65	
27	0.609	6.56	6.56	5.78	5.08	4.29	
29	0.659	7.71	7.71	7.08	6.53	5.91	
31	0.709	8.70	8.70	8.18	7.74	7.26	
33	0.759	9.50	9.50	9.10	8.75	8.37	
35	0.809	11.72	11.72	10.44	9.84	9.39	
37	0.859	9.36	9.36	10.19	10.38	10.27	
39	0.909	7.39	7.39	8.36	9.03	9.53	
41	0.959	5.85	5.85	6.68	7.33	7.96	
43	1.009	4.73	4.73	5.37	5.91	6.47	
45	1.059	3.97	3.97	4.43	4.84	5.29	
47	1.109	3.44	3.44	3.79	4.09	4.43	
49	1.159	2.97	2.97	3.28	3.53	3.80	
51	1.209	2.55	2.55	2.84	3.06	3.30	
53	1.259	2.19	2.19	2.45	2.66	2.87	
55	1.309	1.88	1.88	2.09	2.29	2.50	
57	1.359	1.63	1.63	1.78	1.93	2.14	
59	1.409	1.41	1.41	1.60	1.71	1.85	
61	1.459	1.23	1.23	1.39	1.51	1.65	
63	1.509	1.07	1.07	1.22	1.32	1.45	
65	1.560	0.92	0.92	1.06	1.16	1.27	
67	1.612	0.80	0.80	0.92	1.01	1.12	
69	1.664	0.69	0.69	0.80	0.88	0.97	
71	1.718	0.60	0.60	0.69	0.76	0.85	
73	1.773	0.53	0.53	0.61	0.66	0.74	
75	1.829	0.46	0.46	0.53	0.58	0.65	
77	1.886	0.41	0.41	0.47	0.51	0.57	
79	1.945	0.36	0.36	0.41	0.45	0.50	
81	2.004	0.31	0.31	0.36	0.40	0.45	
83	2.065	0.27	0.27	0.32	0.35	0.39	
85	2.127	0.24	0.24	0.28	0.31	0.35	
87	2.190	0.21	0.21	0.25	0.27	0.31	
89	2.255	0.19	0.19	0.22	0.24	0.27	
91	2.320	0.17	0.17	0.19	0.21	0.24	
93	2.387	0.15	0.15	0.17	0.19	0.21	

Draft Final

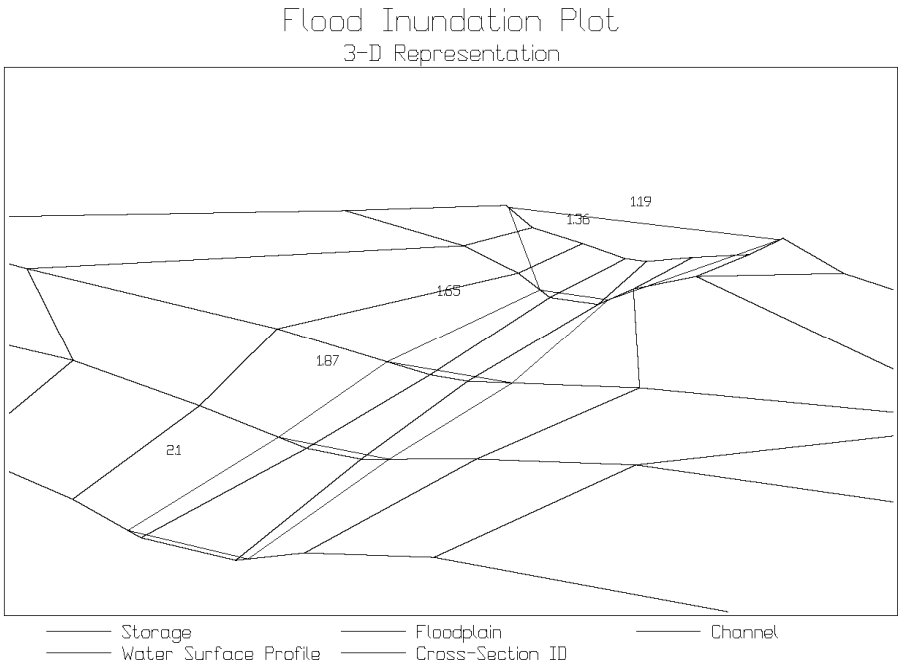
Time Elapsed Station 1 Station 2 Station 3 Station 4 Station 5 Station 6

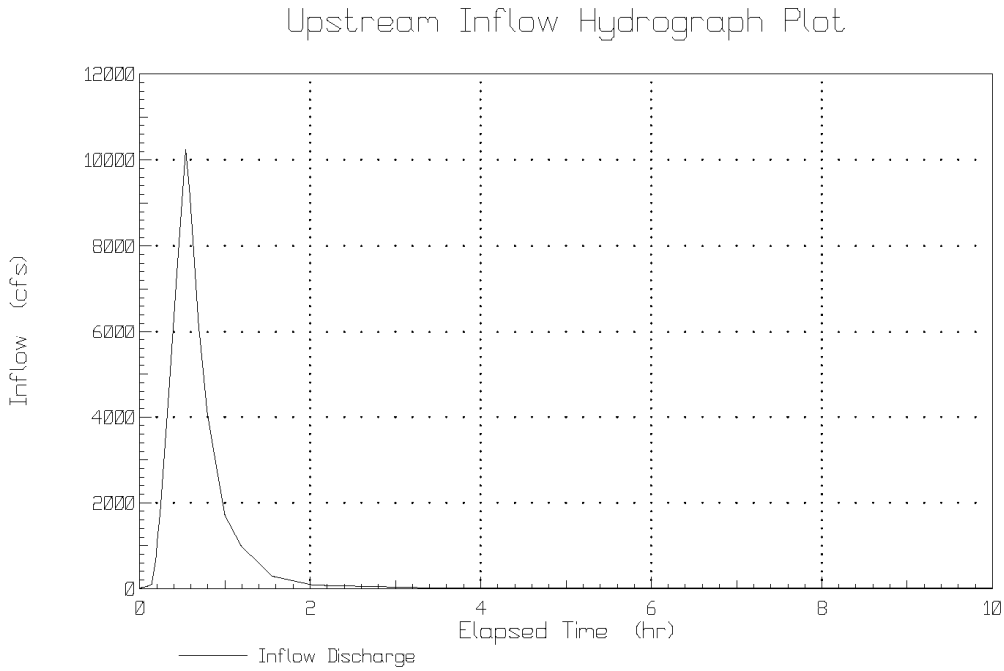
Step Count K	Time (x 1000) TTP(K) (hr)	Discharge (x 1000) QC(K,1) (cfs)	Discharge (x 1000) QC(K,2) (cfs)	Discharge (x 1000) QC(K,3) (cfs)	Discharge (x 1000) QC(K,4) (cfs)	Discharge (x 1000) QC(K,5) (cfs)	Discharge (x 1000) QC(K,6) (cfs)
95	2.456	0.14	0.14	0.16	0.17	0.19	
97	2.526	0.13	0.13	0.14	0.16	0.17	
99	2.597	0.11	0.11	0.13	0.14	0.16	
101	2.669	0.11	0.11	0.12	0.13	0.14	
103	2.743	0.10	0.10	0.11	0.12	0.13	
105	2.819	0.09	0.09	0.10	0.11	0.12	
107	2.896	0.08	0.08	0.09	0.10	0.11	
109	2.975	0.08	0.08	0.08	0.09	0.10	
111	3.055	0.07	0.07	0.08	0.08	0.09	
113	3.137	0.06	0.06	0.07	0.08	0.09	
115	3.220	0.06	0.06	0.07	0.07	0.08	
117	3.305	0.05	0.05	0.06	0.07	0.07	
119	3.392	0.05	0.05	0.06	0.06	0.07	
121	3.481	0.04	0.04	0.05	0.06	0.06	
123	3.571	0.04	0.04	0.05	0.05	0.06	
125	3.663	0.03	0.03	0.04	0.05	0.05	
127	3.757	0.03	0.03	0.04	0.04	0.05	
129	3.853	0.03	0.03	0.03	0.04	0.04	

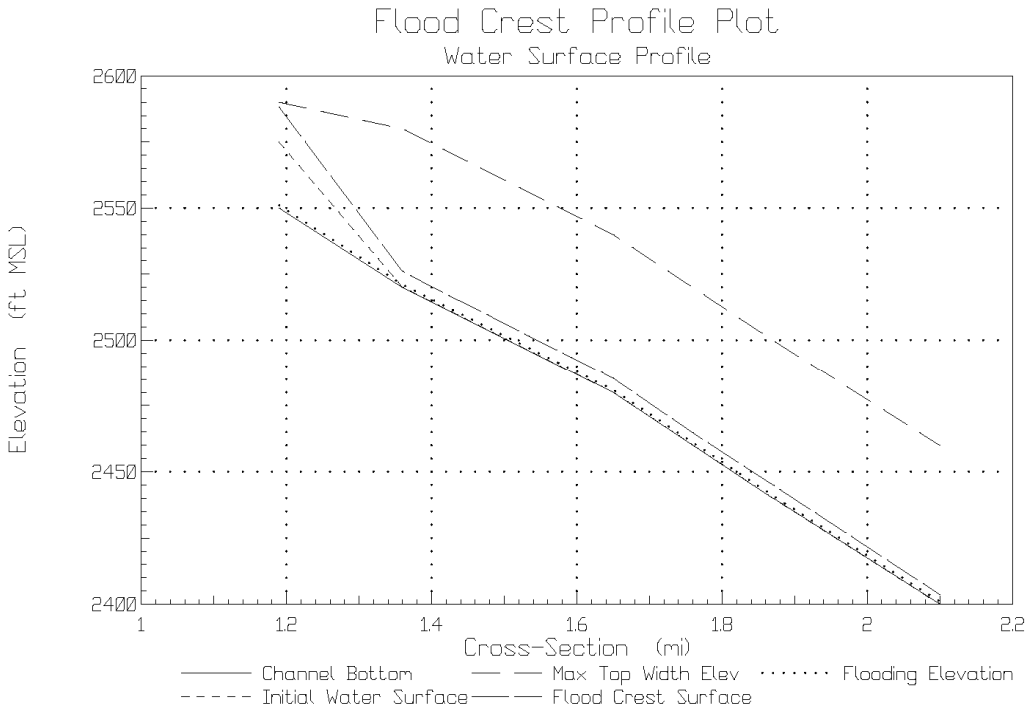
END OF OUTPUT

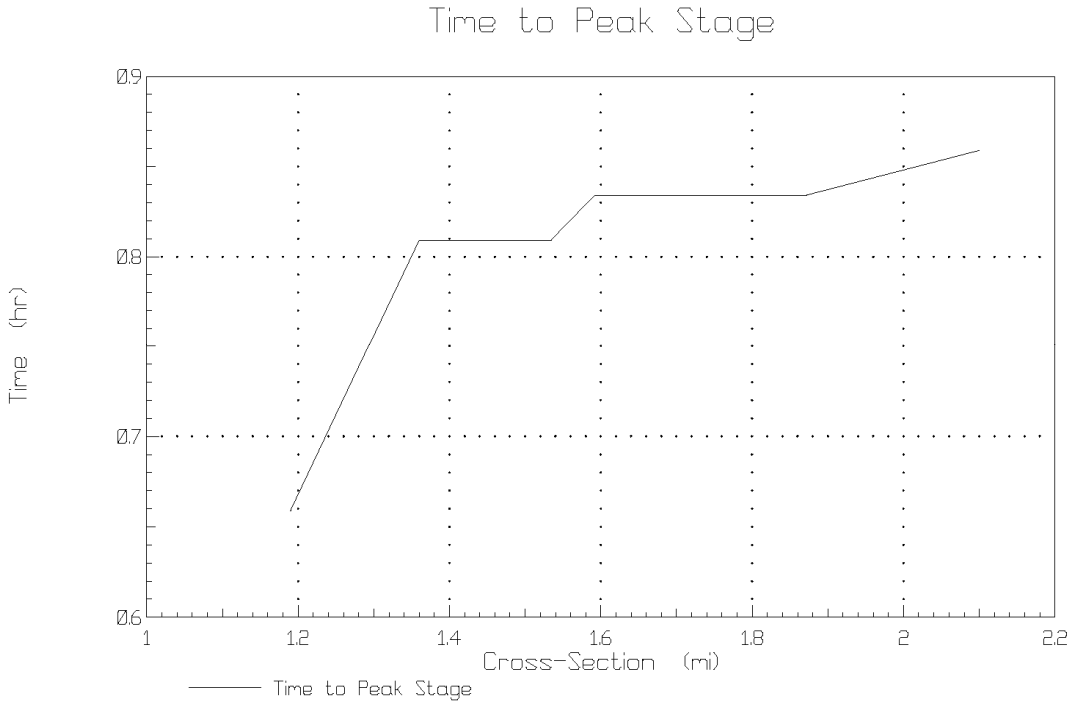
Draft Final

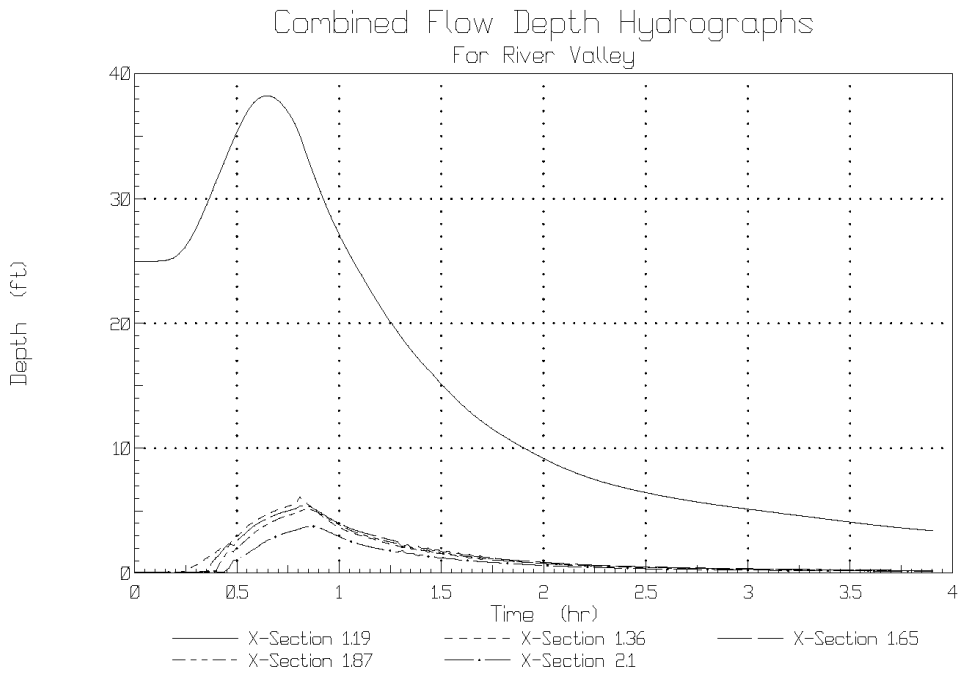
6.7 APPENDIX G: ECH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH DOWNSTREAM OF YUCAIPA RESERVOIR NO.1

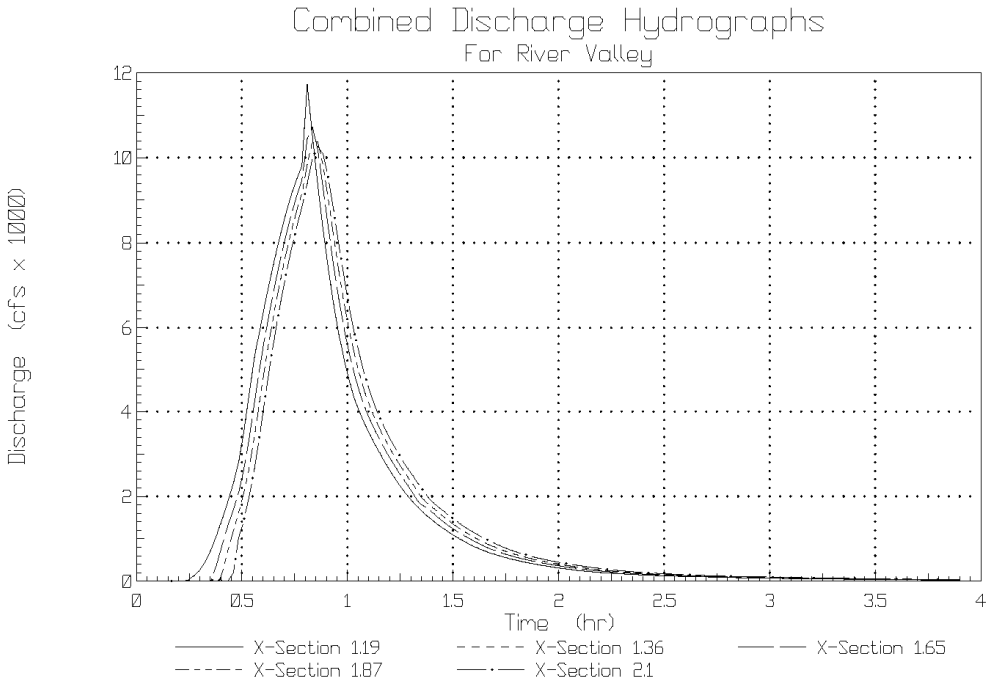


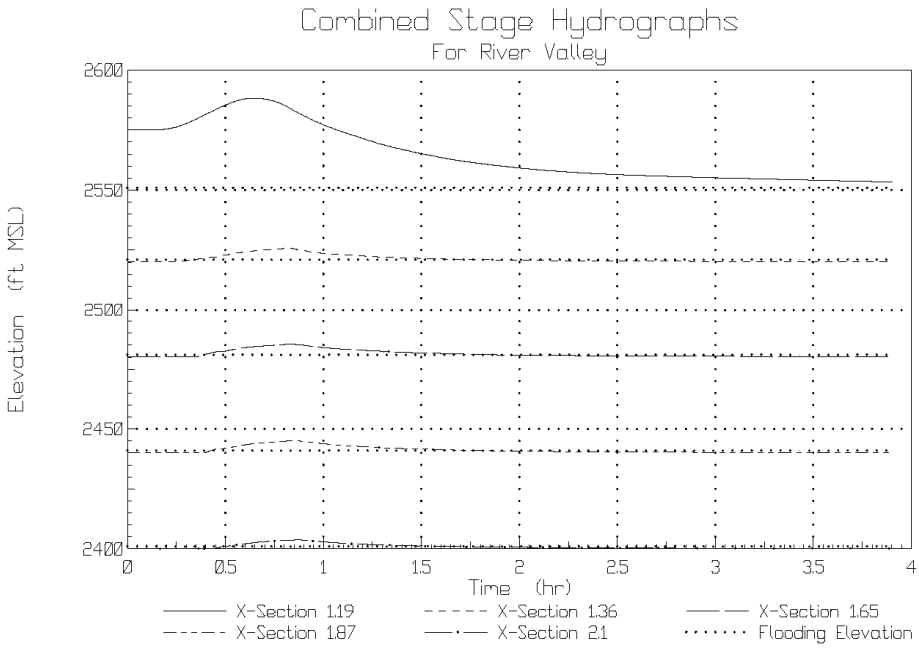



Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
2600
2550
2500
2450
2400
1
1.2
1.4
1.6
1.8
2
2.2
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface


Time to Peak Stage
Time (hr)
0.9
0.8
0.7
0.6
1
1.2
1.4
1.6
1.8
2
2.2
Cross-Section (mi)
Time to Peak Stage


Combined Flow Depth Hydrographs
For River Valley
Depth (ft)
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1


Combined Stage Hydrographs
For River Valley
Elevation (ft MSL)
2600
2550
2500
2450
2400
0
0.5
1
1.5
2
2.5
3
3.5
4
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1
Flooding Elevation

Draft Fi

6.8 APPENDIX H: WCH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH BETWEEN CRAFTON HILLS RESERVOIR AND YUCAIPA RESERVOIR NO.2

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
____________________________________________________________________________

                          ============================
                           B O S S    D A M B R K (tm)
                          ============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources

PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    : Routing through Yucaipa Reservoir No. 1
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/25/2008
```

Draft Final

```
   TIME OF RUN     :  2:17 pm


BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
INPUT DATA SUMMARY :
--------------------

   INPUT CONTROL PARAMETERS :
   --------------------------

      Problem Specification Option                        13

      Number of Dynamic Routing Reaches (KKN)              1

      Type of Reservoir Routing (KUI)                      1  (dynamic routing)

      Number of multiple dams/bridges (MULDAM)             1

      No. of Reservoir Inflow Hydrograph Points (ITEH)    19

      No. of Informational Cross-Sections (NPRT)           0

      Flood-Plain Routing (KFLP)                           0  (no)
```

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   CROSS-SECTION NUMBERS COINCIDENT
   WITH UPSTREAM DAM FACE (IDAM)    :
   ---------------------------------

               1

   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation vs. Surface Area Table

      Elevation Surface
                Area
      HSA(K)    SA(K)
      (ft MSL)  (acres)
      --------- ---------------
        2583.50          12.000
        2580.00           8.800
        2575.00           6.900
        2570.00           4.400
        2565.00           3.300
        2560.00           2.300
```

Draft Final

```
        2555.00          1.500
        2550.00          0.000
```

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   DAM NUMBER :  1
   ---------------

   RESERVOIR AND BREACH PARAMETERS :
   ---------------------------------

      Initial Elevation of Water Surface (YO, ft MSL)                2575.00

      Breach Side Slope (Z)                                  1:        0.50

      Breach Bottom Elevation (YBMIN, ft MSL)                        2550.00

      Breach Base Width (BB, ft)                                        0.00

      Time of Breach Formation (TFH, hr)                                0.50

   RESERVOIR DESCRIPTION :
   -----------------------

      Water Surface Elevation at Time of Breach (HF, ft MSL)         2583.50

      Top of Dam Crest Elevation (HD, ft MSL)                        2583.50

      Uncontrolled Spillway Crest Elevation (HSP, ft MSL)            2576.00

      Spillway Gate Center Elevation (HGT, ft MSL)                      0.00

      Uncontrolled Spillway Discharge Coefficient (CS)                  0.00

      Spillway Gate Discharge Coefficient (CG)                          0.00

      Piping Centerline Elevation (CDO, ft MSL)                      2555.00

      Turbine Discharge (QT, cfs)                                      10.00

   SPILLWAY/GATE RATING CURVE :
   ----------------------------

      Head       Flow
      HEAD( 1)   QSPILL( 1)
      (ft)       (cfs)
      --------- ---------------
           0.00             0.0
           2.00           298.0
           4.00           843.0
           6.00          1549.0
           8.00          2385.0
```

Draft Final

```
          0.00              0.0
          0.00              0.0
          0.00              0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   BOUNDARY CONDITIONS :
   ---------------------

      Hydrograph Time Intervals (DHF, hr)                              0.00

      Routing Period (TEH, hr)                                         4.00

      Breach Development Exponent (BREX)                               1.00

      Mud/Debris Flow Parameter (MUD)                                     0

      Dry Bed Routing Parameter (IWF)                                     0

      Hydraulic Radius Computation Parameter (KPRES)             0 (R=A/B)

      Landslide Simulation (KSL)                                  0 (none)

      Critical Flow Froude Number (DFR)                              0.950

   INFLOW HYDROGRAPH DESCRIPTION :
   -------------------------------

      Time      Upstream
      Elapsed   Inflow
      TI(K)     QI(K)
      (hr)      (cfs)
      --------- --------------
           0.00            10.0
           0.09            50.0
           0.14           100.0
           0.19           660.0
           0.21          1170.0
           0.24          1770.0
           0.34          4530.0
           0.44          7460.0
           0.54         10250.0
           0.59          9210.0
           0.69          6190.0
           0.79          4140.0
           0.89          2950.0
           1.00          1720.0
           1.19          1000.0
           1.56           290.0
           2.04            80.0
           3.50            10.0
          10.00            10.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   SUMMARY OF PROGRAM CONTROL PARAMETERS :
   ---------------------------------------

      Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

      Number of Cross-Sections Entered (NS)                    5

      Number of Top Widths Entered (NCS)                       4

      Number of Cross-Sectional Hydrographs to Plot (NTT)      5

      Flow Type Parameter (KSUPC)                              2  (mixed flow)

      Number of Lateral Inflow Hydrographs (LQ)                0

      Number of Points in Gate Control Curve (KCG)             0

   CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
   (maximum allowed = 6)
   --------------------------------------------

         1    2    3    4    5

   CHANNEL-VALLEY BOUNDARY CONDITIONS :
   ------------------------------------

      Max Discharge at Downstream End (QMAXD, cfs)                     0.0

      Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)            0.0000

      Initial Time-Step Size (DTHM, hr)                              0.0000

      Time at which Dam Starts to Fail (TFI, hr)                     0.0000

      Theta Weighting Factor (F1I)                                    0.000

      Stage Convergence Criterion (EPSY, ft)                          0.000

      Downstream Boundary Type Paramter (YDN)                          0.00

      Slope of Channel Downstream of Dam (SOM, ft/mi)                0.0000
```

```
BOSS DAMBRK  version 3.00                                          PAGE   7
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   CROSS-SECTION NUMBER :   1    Downstream end of Yucaipa
   --------------------------
```

Draft Final

```
      Cross-Section Location (XS(I), mi)                                  1.190

      Flooding Elevation (FSTG(I), ft MSL)                             2551.000

   DOWNSTREAM REACH NUMBER :   1
   ----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                       0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)      0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2550.00      50.0    0.0500       0.0
        2560.00     260.0    0.0500       0.0
        2570.00     510.0    0.0500       0.0
        2590.00     645.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                              PAGE   8
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

```
   CROSS-SECTION NUMBER :   2
   --------------------------

      Cross-Section Location (XS(I), mi)                                  1.360

      Flooding Elevation (FSTG(I), ft MSL)                             2521.000

   DOWNSTREAM REACH NUMBER :   2
   ----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                       0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)      0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2520.00     110.0    0.0500       0.0
```

Draft Final

```
        2540.00     260.0    0.0500       0.0
        2560.00     520.0    0.0500       0.0
        2580.00    1100.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   CROSS-SECTION NUMBER :   3
   --------------------------

      Cross-Section Location (XS(I), mi)                              1.650

      Flooding Elevation (FSTG(I), ft MSL)                         2481.000

   DOWNSTREAM REACH NUMBER :   3
   -----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                   0.000

      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)  0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2480.00      80.0    0.0500       0.0
        2500.00     760.0    0.0500       0.0
        2520.00    2000.0    0.0500       0.0
        2540.00    3085.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
```

```
   CROSS-SECTION NUMBER :   4
   --------------------------

      Cross-Section Location (XS(I), mi)                              1.870

      Flooding Elevation (FSTG(I), ft MSL)                         2441.000

   DOWNSTREAM REACH NUMBER :   4
   -----------------------------

      Reach Contraction-Expansion Coefficient (FKC)                   0.000
```

Draft Final

```
      Minimum Distance Between Interpolated Cross-Sections (DXM, mi)      0.000

   CROSS-SECTION and REACH DESCRIPTION :
   -------------------------------------

      Elevation Channel   Channel   Storage
                Top       Manning   Top
                Width     n         Width
      HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
      (ft MSL)  (ft)                (ft)
      --------- --------- --------- ---------
        2440.00     110.0    0.0500       0.0
        2460.00     550.0    0.0500       0.0
        2480.00    1100.0    0.0500       0.0
        2500.00    3065.0    0.0500       0.0


BOSS DAMBRK  version 3.00                                          PAGE  11
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
-------------------------------------------------------------------------------

   CROSS-SECTION NUMBER :   5
   --------------------------

      Cross-Section Location (XS(I), mi)                                2.100

      Flooding Elevation (FSTG(I), ft MSL)                           2401.000

   CROSS-SECTION DESCRIPTION :
   ---------------------------

      Elevation Channel   Storage
                Top       Top
                Width     Width
      HS(K,I)   BS(K,I)   BSS(K,I)
      (ft MSL)  (ft)      (ft)
      --------- --------- ---------
        2400.00     180.0       0.0
        2420.00     435.0       0.0
        2440.00     870.0       0.0
        2460.00    2975.0       0.0


BOSS DAMBRK  version 3.00                                          PAGE  12
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
-------------------------------------------------------------------------------

      NOTE: At cross-section reach   2 the distance between
            interpolated cross-sections (DXM) was changed to  0.058
            due to expansion/contraction criteria

      NOTE: At cross-section reach   3 the distance between
            interpolated cross-sections (DXM) was changed to  0.110
            due to expansion/contraction criteria
```

Draft Final

```
      NOTE: At cross-section reach   4 the distance between
            interpolated cross-sections (DXM) was changed to  0.194
            due to (WAVE SPEED * DT) criteria


BOSS DAMBRK  version 3.00                                          PAGE  13
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
____________________________________________________________________________

   DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS
   (DXM) THAT WILL BE USED IN COMPUTATIONS      :
   ----------------------------------------------

      Down      Interp.
      Stream    Cross
      Reach     Section
      Number    Distance
      I=1,NS1   DXM(I)
                (mi)
      --------- ---------
              1  101.0000
              2    0.0580
              3    0.1100
              4    0.1941

      Total number of cross-sections (original+interpolated)                10

      Maximum number of cross-sections allowed                            2000


BOSS DAMBRK  version 3.00                                          PAGE  14
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/25/2008
____________________________________________________________________________

OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross     Cross     Bottom    Reach     Reach     Reach
      Section   Section   Elevation Number    Length    Slope
      Number    Location
                (mi)      (ft MSL)            (mi)      (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     1.190  2550.000
              2     1.360  2520.000         1     0.170   176.471
              3     1.650  2480.000         2     0.290   137.931
              4     1.870  2440.000         3     0.220   181.818
              5     2.100  2400.000         4     0.230   173.913


BOSS DAMBRK  version 3.00                                          PAGE  15
```

Draft Final

```
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :

Dam/ Bridge	Revised Cross Section Number
1	1

Number of Intermediate Cross-Sections (NN(NS)) 10

Number of Time Steps (NNU) 19

```
BOSS DAMBRK  version 3.00                                              PAGE  16
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

INITIAL CONDITIONS TABLE :

Cross Section Number I	Cross Section Location XI (mi)	Normal Flow Water Elevation YN (ft MSL)	Normal Flow Depth DEPN (ft)	Critical Flow Water Elevation YC (ft MSL)	Critical Flow Depth DEPC (ft)	Froude Indicator (0 = sub) (1 = sup) IFR	Iteration Count for Computing Nrml Dpth ITN	Iteration Count for Computing Crtl Dpth ITC
1	1.190	2550.26	0.26	2550.10	0.10	0	13	13
2	1.360	2520.09	0.09	2520.06	0.06	0	13	13
3	1.418	2512.10	0.10	2512.06	0.06	0	13	13
4	1.476	2504.10	0.10	2504.07	0.07	0	13	13
5	1.534	2496.11	0.11	2496.07	0.07	0	13	13
6	1.592	2488.11	0.11	2488.08	0.08	0	13	13
7	1.650	2480.10	0.10	2480.08	0.08	0	13	13
8	1.760	2460.09	0.09	2460.07	0.07	0	13	13

Draft Final

```
        9     1.870   2440.08      0.08   2440.06      0.06         0        13
13
       10     2.100   2400.06      0.06   2400.05      0.05         1        13
13
```

```
BOSS DAMBRK  version 3.00                                              PAGE  17
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

```
   SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :
   ---------------------------------------------------

      Cross-section Number at Downstream End of Model (IN)                 10
      Initial Water Surface Elev. at Downstream End (YNN, ft MSL)      2400.062
      Initial Flow Depth at Downstream End (DEP, ft)                      0.062

   COMPUTED STEP BACKWATER TABLE :
   -------------------------------

      Cross      Cross      Flow           Backwater Backwater Iteration
      Section    Section                   Water     Water     Count for
      Number     Location                  Surface   Depth     Computing
                                           Elevation           Backwater
      I          X          QIL            YIL       DEP       ITB
                 (mi)       (cfs)          (ft MSL)  (ft)
      --------- --------- -------------- --------- --------- ---------
              8     1.760           10.0  2460.086     0.086         8
              7     1.650           10.0  2480.110     0.110         6
              6     1.592           10.0  2488.108     0.108         7
              5     1.534           10.0  2496.102     0.102         6
              4     1.476           10.0  2504.100     0.100         6
              3     1.418           10.0  2512.094     0.094         8
              2     1.360           10.0  2520.092     0.092        14
              1     1.190           10.0  2575.000    25.000         0
```

```
BOSS DAMBRK  version 3.00                                              PAGE  18
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/25/2008
```

```
   INITIAL CONDITIONS :
   --------------------

      Interp.    Initial    Initial
      Cross-     Water      Flow
      Section    Elevation
      I          YI(I)      QDI(I)
                 (ft MSL)   (cfs)
      --------- --------- ---------------
              1   2575.00            10.0
              2   2520.09            10.0
              3   2512.09            10.0
              4   2504.10            10.0
```

Draft Final

```
          5   2496.10          10.0
          6   2488.11          10.0
          7   2480.11          10.0
          8   2460.09          10.0
          9   2440.09          10.0
         10   2400.06          10.0
```

```
BOSS DAMBRK  version 3.00                                        PAGE  19
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                            9/25/2008
```

```
   DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :
   ----------------------------------------

      Time to Failure (TFH, hr)                                    0.500

      Time to Start of Rising Limb of Hydrograph (TFO, hr)         4.000

      Time to Peak (TP, hr)                                        0.540

      Time Step Size (DTHI, hr)                                    0.025
```

```
BOSS DAMBRK  version 3.00                                        PAGE  20
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                            9/25/2008
```

```
ROUTING COMPLETED :
-------------------

      Number of Time Steps Used (KTIME)                             130

      Maximum Number of Time Steps Allowed                         2999

      Total Time of Flood Routing (TT, hr)                          4.0

      Flood Wave Arrival Time based upon a WSEL Increase of (ft)   1.00

   CONSERVATION OF MASS RESULTS :
   ------------------------------

      Should be close to 0.00%, a negative value denotes flow volume was lost
      during the routing, a positive value denotes flow volume was gained
      during the routing. Normalized as a percent of inflow volume, maximum
      change in conservation of mass during routing was      -2.88
```

```
BOSS DAMBRK  version 3.00                                        PAGE  21
  PROJECT TITLE  : inflow from Yucaipa 2, CHR main dam
  PROJECT NUMBER : DWR Dam No. 1-091                            9/25/2008
```

```
   FLOOD CREST SUMMARY :
```

Draft Final

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
1.190	2588.23	11722	0.659	0.85	2551.00	0.03	0.27
1.360	2526.10	11722	0.809	14.46	2521.00	0.35	0.35
1.418	2517.80	11433	0.809	13.96	2513.00	0.35	0.35
1.476	2509.80	11159	0.809	12.77	2505.00	0.38	0.39
1.534	2501.58	10898	0.809	12.41	2497.00	0.38	0.39
1.592	2493.56	10776	0.834	11.68	2489.00	0.38	0.39
1.650	2485.45	10728	0.834	11.40	2481.00	0.39	0.41
1.760	2464.73	10577	0.834	13.88	2461.00	0.41	0.41
1.870	2445.11	10393	0.834	12.23	2441.00	0.43	0.46
2.100	2403.76	10274	0.859	13.39	2401.00	0.48	0.51

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2575.00	2520.10	2480.11	2440.09	2400.07	
3	0.054	2575.01	2520.10	2480.11	2440.09	2400.07	
5	0.108	2575.03	2520.10	2480.11	2440.09	2400.07	
7	0.162	2575.12	2520.10	2480.11	2440.09	2400.07	
9	0.216	2575.58	2520.10	2480.11	2440.09	2400.07	
11	0.270	2576.71	2520.43	2480.11	2440.09	2400.07	
13	0.324	2578.46	2520.88	2480.12	2440.09	2400.07	
15	0.353	2579.56	2521.20	2480.11	2440.09	2400.12	
17	0.392	2581.16	2521.66	2481.08	2440.16	2400.09	
19	0.408	2581.77	2521.82	2481.35	2440.52	2400.07	
21	0.459	2583.78	2522.13	2482.36	2441.79	2400.37	
23	0.509	2585.62	2523.02	2482.73	2442.18	2401.14	
25	0.559	2587.16	2523.85	2483.44	2442.84	2401.66	
27	0.609	2588.04	2524.37	2484.04	2443.52	2402.22	
29	0.659	2588.23	2524.80	2484.46	2444.02	2402.70	
31	0.709	2587.77	2525.14	2484.79	2444.39	2403.05	
33	0.759	2586.75	2525.41	2485.04	2444.68	2403.32	
35	0.809	2585.03	2526.10	2485.37	2444.96	2403.56	
37	0.859	2582.72	2525.36	2485.33	2445.11	2403.76	
39	0.909	2580.58	2524.68	2484.86	2444.75	2403.61	
41	0.959	2578.63	2524.09	2484.36	2444.27	2403.25	

Draft Final

43	1.009	2576.89	2523.62	2483.92	2443.81	2402.87
45	1.059	2575.35	2523.27	2483.57	2443.42	2402.55
47	1.109	2573.94	2523.00	2483.30	2443.12	2402.29
49	1.159	2572.58	2522.76	2483.07	2442.89	2402.09
51	1.209	2571.24	2522.52	2482.85	2442.67	2401.92
53	1.259	2569.97	2522.30	2482.64	2442.47	2401.77
55	1.309	2568.80	2522.10	2482.15	2442.02	2401.81
57	1.359	2567.74	2522.02	2482.06	2441.91	2401.60
59	1.409	2566.77	2521.91	2481.97	2441.81	2401.45
61	1.459	2565.87	2521.75	2481.83	2441.68	2401.35
63	1.509	2565.00	2521.61	2481.70	2441.56	2401.26
65	1.560	2564.14	2521.48	2481.58	2441.44	2401.16
67	1.612	2563.33	2521.35	2481.46	2441.33	2401.07
69	1.664	2562.59	2521.24	2481.35	2441.23	2400.99
71	1.718	2561.93	2521.14	2481.25	2441.13	2400.91
73	1.773	2561.31	2521.05	2481.16	2441.05	2400.84
75	1.829	2560.73	2520.97	2481.08	2440.97	2400.78
77	1.886	2560.19	2520.90	2481.00	2440.90	2400.72
79	1.945	2559.67	2520.83	2480.93	2440.84	2400.67
81	2.004	2559.17	2520.77	2480.87	2440.78	2400.62
83	2.065	2558.68	2520.71	2480.81	2440.72	2400.58
85	2.127	2558.23	2520.65	2480.75	2440.67	2400.54
87	2.190	2557.84	2520.61	2480.69	2440.62	2400.50
89	2.255	2557.48	2520.57	2480.65	2440.58	2400.46
91	2.320	2557.16	2520.53	2480.61	2440.54	2400.43

BOSS DAMBRK version 3.00 PAGE 23
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
93	2.387	2556.87	2520.50	2480.57	2440.50	2400.40	
95	2.456	2556.61	2520.47	2480.54	2440.47	2400.38	
97	2.526	2556.36	2520.44	2480.51	2440.45	2400.35	
99	2.597	2556.14	2520.42	2480.48	2440.42	2400.33	
101	2.669	2555.93	2520.40	2480.46	2440.40	2400.31	
103	2.743	2555.73	2520.38	2480.43	2440.38	2400.30	
105	2.819	2555.54	2520.36	2480.41	2440.36	2400.28	
107	2.896	2555.36	2520.34	2480.39	2440.34	2400.27	
109	2.975	2555.19	2520.33	2480.37	2440.33	2400.26	
111	3.055	2555.02	2520.31	2480.36	2440.31	2400.24	
113	3.137	2554.85	2520.29	2480.34	2440.30	2400.23	
115	3.220	2554.67	2520.28	2480.32	2440.28	2400.22	
117	3.305	2554.50	2520.26	2480.31	2440.27	2400.21	
119	3.392	2554.32	2520.25	2480.29	2440.26	2400.20	
121	3.481	2554.13	2520.23	2480.28	2440.24	2400.19	
123	3.571	2553.95	2520.22	2480.26	2440.23	2400.18	
125	3.663	2553.78	2520.20	2480.24	2440.22	2400.17	
127	3.757	2553.62	2520.19	2480.23	2440.20	2400.16	
129	3.853	2553.48	2520.18	2480.21	2440.19	2400.15	

Draft Final

BOSS DAMBRK version 3.00 PAGE 24
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01	0.01	0.01	0.01	
3	0.054	0.01	0.01	0.01	0.01	0.01	
5	0.108	0.01	0.01	0.01	0.01	0.01	
7	0.162	0.01	0.01	0.01	0.01	0.01	
9	0.216	0.01	0.01	0.01	0.01	0.01	
11	0.270	0.12	0.12	0.01	0.01	0.01	
13	0.324	0.43	0.43	0.01	0.01	0.01	
15	0.353	0.73	0.73	0.01	0.01	0.03	
17	0.392	1.26	1.26	0.60	0.03	0.02	
19	0.408	1.48	1.48	0.87	0.22	0.01	
21	0.459	2.30	2.30	1.68	1.18	0.19	
23	0.509	3.51	3.51	2.63	2.07	1.43	
25	0.559	5.27	5.27	4.19	3.41	2.65	
27	0.609	6.56	6.56	5.78	5.08	4.29	
29	0.659	7.71	7.71	7.08	6.53	5.91	
31	0.709	8.70	8.70	8.18	7.74	7.26	
33	0.759	9.50	9.50	9.10	8.75	8.37	
35	0.809	11.72	11.72	10.44	9.84	9.39	
37	0.859	9.36	9.36	10.19	10.38	10.27	
39	0.909	7.39	7.39	8.36	9.03	9.53	
41	0.959	5.85	5.85	6.68	7.33	7.96	
43	1.009	4.73	4.73	5.37	5.91	6.47	
45	1.059	3.97	3.97	4.43	4.84	5.29	
47	1.109	3.44	3.44	3.79	4.09	4.43	
49	1.159	2.97	2.97	3.28	3.53	3.80	
51	1.209	2.55	2.55	2.84	3.06	3.30	
53	1.259	2.19	2.19	2.45	2.66	2.87	
55	1.309	1.88	1.88	2.09	2.29	2.50	
57	1.359	1.63	1.63	1.78	1.93	2.14	
59	1.409	1.41	1.41	1.60	1.71	1.85	
61	1.459	1.23	1.23	1.39	1.51	1.65	
63	1.509	1.07	1.07	1.22	1.32	1.45	
65	1.560	0.92	0.92	1.06	1.16	1.27	
67	1.612	0.80	0.80	0.92	1.01	1.12	
69	1.664	0.69	0.69	0.80	0.88	0.97	
71	1.718	0.60	0.60	0.69	0.76	0.85	
73	1.773	0.53	0.53	0.61	0.66	0.74	
75	1.829	0.46	0.46	0.53	0.58	0.65	
77	1.886	0.41	0.41	0.47	0.51	0.57	
79	1.945	0.36	0.36	0.41	0.45	0.50	

Draft Final

81	2.004	0.31	0.31	0.36	0.40	0.45
83	2.065	0.27	0.27	0.32	0.35	0.39
85	2.127	0.24	0.24	0.28	0.31	0.35
87	2.190	0.21	0.21	0.25	0.27	0.31
89	2.255	0.19	0.19	0.22	0.24	0.27
91	2.320	0.17	0.17	0.19	0.21	0.24
93	2.387	0.15	0.15	0.17	0.19	0.21

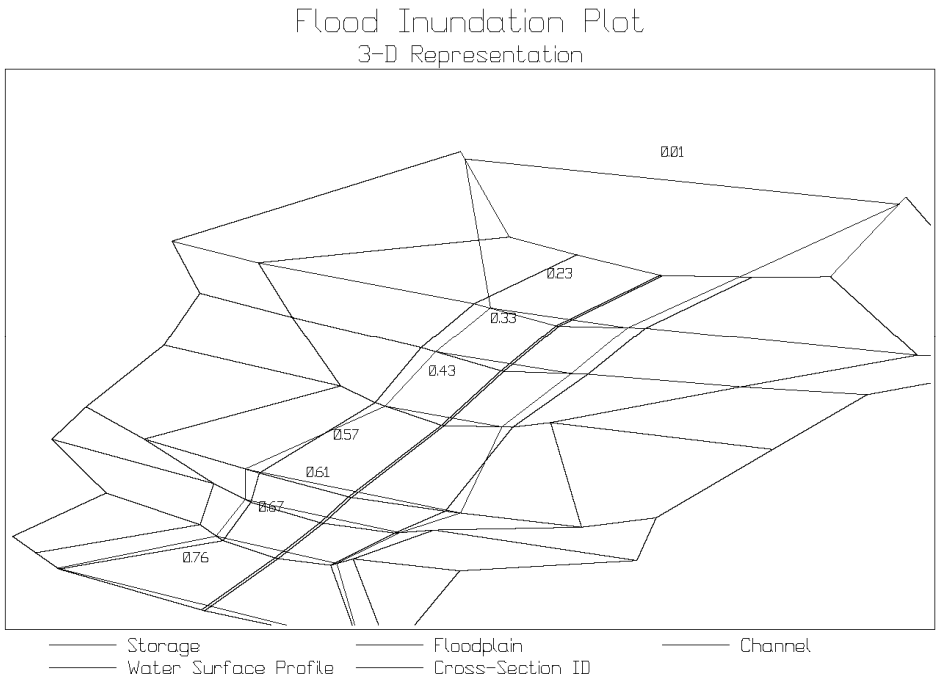
BOSS DAMBRK version 3.00 PAGE 25
PROJECT TITLE : inflow from Yucaipa 2, CHR main dam
PROJECT NUMBER : DWR Dam No. 1-091 9/25/2008

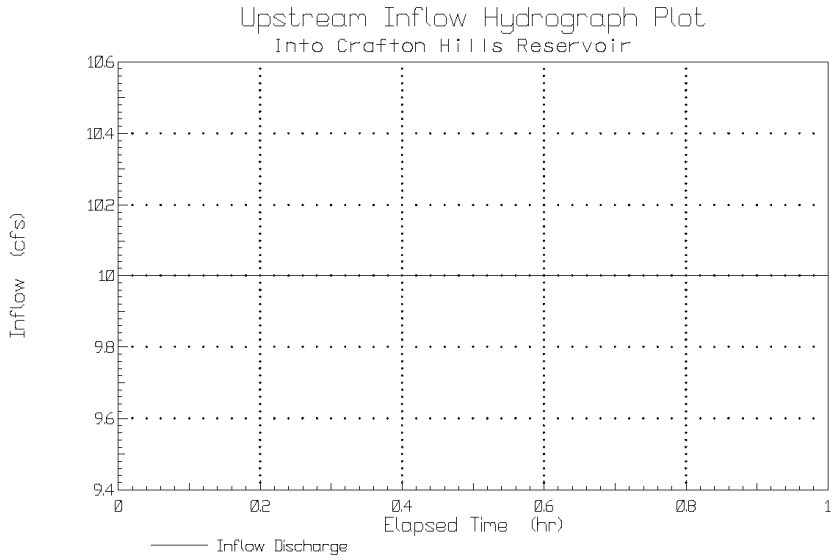
Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
95	2.456	0.14	0.14	0.16	0.17	0.19	
97	2.526	0.13	0.13	0.14	0.16	0.17	
99	2.597	0.11	0.11	0.13	0.14	0.16	
101	2.669	0.11	0.11	0.12	0.13	0.14	
103	2.743	0.10	0.10	0.11	0.12	0.13	
105	2.819	0.09	0.09	0.10	0.11	0.12	
107	2.896	0.08	0.08	0.09	0.10	0.11	
109	2.975	0.08	0.08	0.08	0.09	0.10	
111	3.055	0.07	0.07	0.08	0.08	0.09	
113	3.137	0.06	0.06	0.07	0.08	0.09	
115	3.220	0.06	0.06	0.07	0.07	0.08	
117	3.305	0.05	0.05	0.06	0.07	0.07	
119	3.392	0.05	0.05	0.06	0.06	0.07	
121	3.481	0.04	0.04	0.05	0.06	0.06	
123	3.571	0.04	0.04	0.05	0.05	0.06	
125	3.663	0.03	0.03	0.04	0.05	0.05	
127	3.757	0.03	0.03	0.04	0.04	0.05	
129	3.853	0.03	0.03	0.03	0.04	0.04	

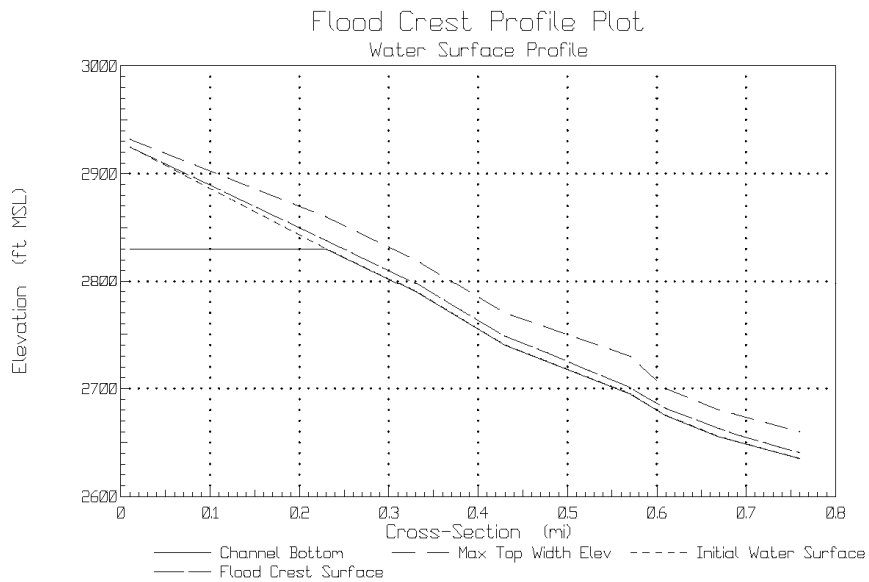
END OF OUTPUT

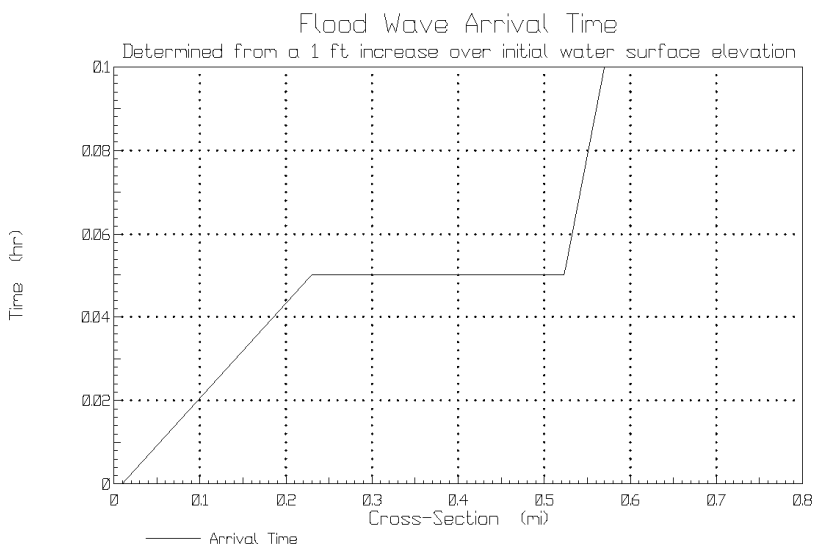
Draft Final

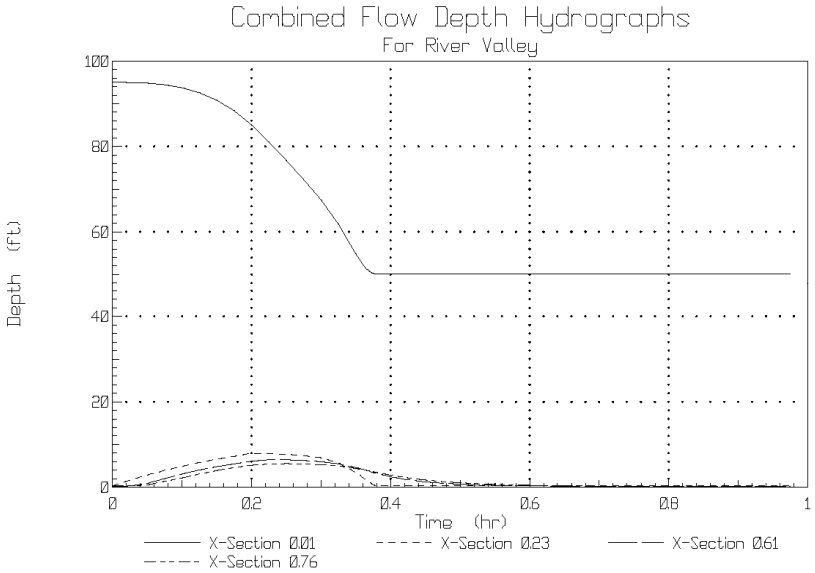
6.9 APPENDIX I: WCH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH BETWEEN CRAFTON HILLS RESERVOIR AND YUCAIPA RESERVOIR NO.2

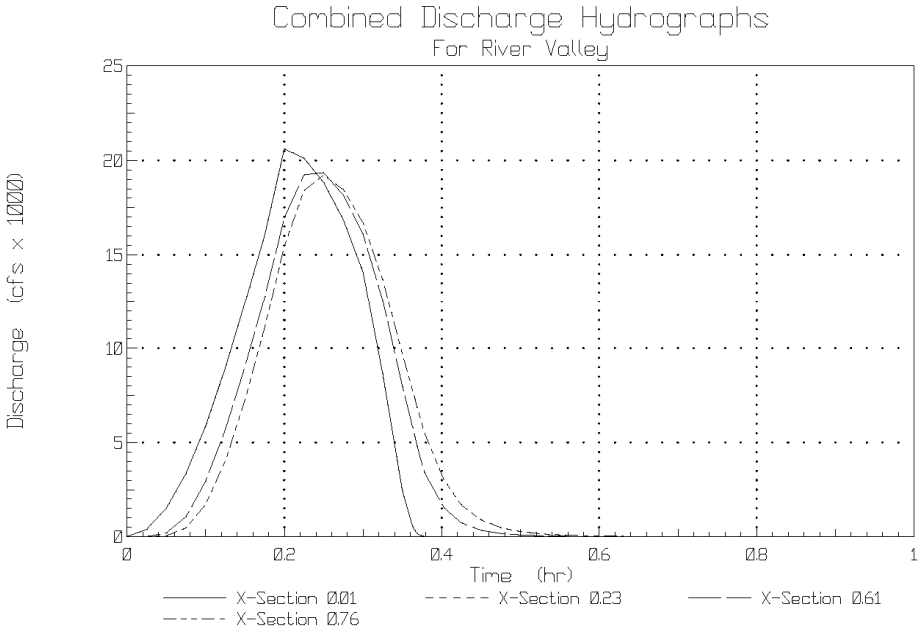


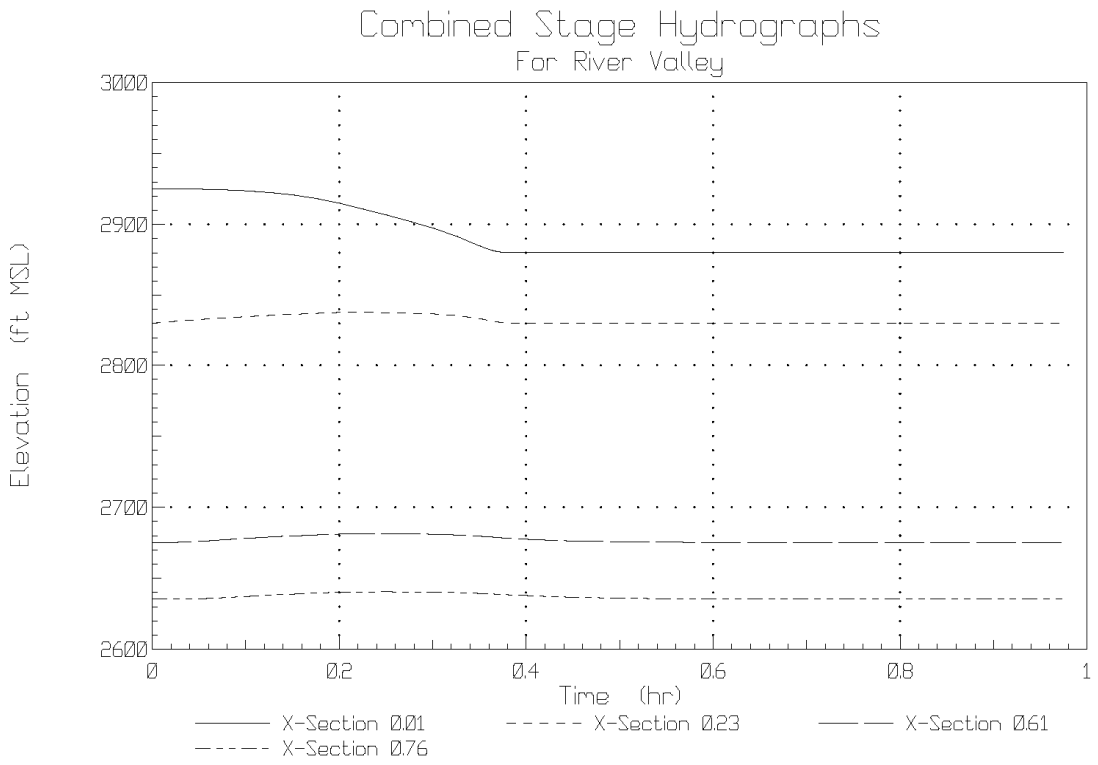



Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
3000
2900
2800
2700
2600
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Initial Water Surface
Flood Crest Surface


Flood Wave Arrival Time
Determined from a 1 ft increase over initial water surface elevation
Time (hr)
0.1
0.08
0.06
0.04
0.02
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
Cross-Section (mi)
Arrival Time


Combined Flow Depth Hydrographs
For River Valley
Depth (ft)
100
80
60
40
20
0
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.01
X-Section 0.23
X-Section 0.61
X-Section 0.76


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
25
20
15
10
5
0
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.01
X-Section 0.23
X-Section 0.61
X-Section 0.76


Combined Stage Hydrographs
For River Valley
3000
2900
2800
2700
2600
Elevation (ft MSL)
0
0.2
0.4
0.6
0.8
1
Time (hr)
X-Section 0.01
X-Section 0.23
X-Section 0.61
X-Section 0.76

Draft

6.10 APPENDIX J: WCH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH BETWEEN YUCAIPA RESERVOIR NO.2 AND YUCAIPA RESERVOIR NO. 1

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
____________________________________________________________________________

                          ============================
                           B O S S    D A M B R K (tm)
                          ============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources

PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    : Routing through Yucaipa Reservoir No. 2
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/30/2008
   TIME OF RUN    : 11:58 am
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
INPUT DATA SUMMARY :
--------------------

   INPUT CONTROL PARAMETERS :
   --------------------------

      Problem Specification Option                        13

      Number of Dynamic Routing Reaches (KKN)              1

      Type of Reservoir Routing (KUI)                      1  (dynamic routing)

      Number of multiple dams/bridges (MULDAM)             1

      No. of Reservoir Inflow Hydrograph Points (ITEH)    17

      No. of Informational Cross-Sections (NPRT)           0

      Flood-Plain Routing (KFLP)                           0  (no)
```

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   CROSS-SECTION NUMBERS COINCIDENT
   WITH UPSTREAM DAM FACE (IDAM)    :
   ---------------------------------

               1

   RESERVOIR VOLUME DESCRIPTION :
   ------------------------------

      Elevation vs. Surface Area Table

      Elevation Surface
                Area
      HSA(K)    SA(K)
      (ft MSL)  (acres)
      --------- ---------------
        2625.00          22.300
        2620.00          16.000
        2615.00           9.800
        2610.00           6.000
        2605.00           4.000
        2600.00           2.300
        2595.00           1.200
        2590.00           0.000
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

DAM NUMBER : 1

RESERVOIR AND BREACH PARAMETERS :

Initial Elevation of Water Surface (YO, ft MSL)		2615.00
Breach Side Slope (Z)	1:	0.50
Breach Bottom Elevation (YBMIN, ft MSL)		2590.00
Breach Base Width (BB, ft)		0.00
Time of Breach Formation (TFH, hr)		0.50

RESERVOIR DESCRIPTION :

Water Surface Elevation at Time of Breach (HF, ft MSL)	2622.00
Top of Dam Crest Elevation (HD, ft MSL)	2622.00
Uncontrolled Spillway Crest Elevation (HSP, ft MSL)	2615.00
Spillway Gate Center Elevation (HGT, ft MSL)	0.00
Uncontrolled Spillway Discharge Coefficient (CS)	0.00
Spillway Gate Discharge Coefficient (CG)	0.00
Piping Centerline Elevation (CDO, ft MSL)	2600.00
Turbine Discharge (QT, cfs)	10.00

SPILLWAY/GATE RATING CURVE :

Head HEAD(1) (ft)	Flow QSPILL(1) (cfs)
0.00	0.0
1.00	85.0
2.00	241.0
3.00	443.0
4.00	682.0
5.00	953.0
6.00	1253.0
7.00	1579.0

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	10.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	10.0
0.06	50.0
0.10	1700.0
0.14	7280.0
0.20	15460.0
0.26	19210.0
0.30	16720.0
0.34	9690.0
0.36	7290.0
0.38	6400.0
0.40	5520.0
0.42	1690.0
0.48	490.0
0.52	160.0
0.60	30.0
0.72	10.0
10.00	10.0

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

Draft Final

```
SUMMARY OF PROGRAM CONTROL PARAMETERS :
---------------------------------------

   Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

   Number of Cross-Sections Entered (NS)                    3

   Number of Top Widths Entered (NCS)                       4

   Number of Cross-Sectional Hydrographs to Plot (NTT)      3

   Flow Type Parameter (KSUPC)                              2  (mixed flow)

   Number of Lateral Inflow Hydrographs (LQ)                0

   Number of Points in Gate Control Curve (KCG)             0

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)
--------------------------------------------

       1    2    3

CHANNEL-VALLEY BOUNDARY CONDITIONS :
------------------------------------

   Max Discharge at Downstream End (QMAXD, cfs)                        0.0

   Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)                0.0000

   Initial Time-Step Size (DTHM, hr)                                  0.0000

   Time at which Dam Starts to Fail (TFI, hr)                         0.0000

   Theta Weighting Factor (F1I)                                        0.000

   Stage Convergence Criterion (EPSY, ft)                              0.000

   Downstream Boundary Type Paramter (YDN)                              0.00

   Slope of Channel Downstream of Dam (SOM, ft/mi)                    0.0000
```

```
BOSS DAMBRK  version 3.00                                          PAGE   7
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
CROSS-SECTION NUMBER :   1    Downstream end of Yucaipa
--------------------------

   Cross-Section Location (XS(I), mi)                                0.970

   Flooding Elevation (FSTG(I), ft MSL)                           2591.000
```

Draft Final

```
DOWNSTREAM REACH NUMBER :   1
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2590.00       0.0    0.0500       0.0
     2610.00     432.0    0.0500       0.0
     2630.00     652.0    0.0500       0.0
     2650.00     760.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   8
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
CROSS-SECTION NUMBER :   2    Upstream end of Yucaipa R
--------------------------

   Cross-Section Location (XS(I), mi)                                   1.020

   Flooding Elevation (FSTG(I), ft MSL)                             2571.000

DOWNSTREAM REACH NUMBER :   2
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2570.00       0.0    0.0500       0.0
     2590.00     392.0    0.0500       0.0
     2610.00     597.0    0.0500       0.0
     2630.00     781.0    0.0500       0.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBER : 3 Middle of Yucaipa Reservo

Cross-Section Location (XS(I), mi) 1.120

Flooding Elevation (FSTG(I), ft MSL) 2551.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
2550.00	0.0	0.0
2570.00	277.0	0.0
2590.00	603.0	0.0
2610.00	739.0	0.0

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

NOTE: At cross-section reach 2 the distance between interpolated cross-sections (DXM) was changed to 0.147 due to (WAVE SPEED * DT) criteria

```
BOSS DAMBRK  version 3.00                                          PAGE  11
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS (DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.1474

Draft Final

```
      Total number of cross-sections (original+interpolated)                 3

      Maximum number of cross-sections allowed                            2000
```

```
BOSS DAMBRK  version 3.00                                              PAGE  12
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross      Cross      Bottom     Reach      Reach      Reach
      Section    Section    Elevation  Number     Length     Slope
      Number     Location
                 (mi)       (ft MSL)              (mi)       (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     0.970  2590.000
              2     1.020  2570.000         1     0.050   400.000
              3     1.120  2550.000         2     0.100   200.000
```

```
BOSS DAMBRK  version 3.00                                              PAGE  13
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :
   ---------------------------------------

      Dam/       Revised
      Bridge     Cross
                 Section
                 Number
      --------- ---------
              1         1

      Number of Intermediate Cross-Sections (NN(NS))                         3

      Number of Time Steps (NNU)                                            17
```

```
BOSS DAMBRK  version 3.00                                              PAGE  14
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   INITIAL CONDITIONS TABLE :
   --------------------------
```

Draft Final

Cross Section Number I	Cross Section Location XI (mi)	Normal Flow Water Elevation YN (ft MSL)	Normal Flow Depth DEPN (ft)	Critical Flow Water Elevation YC (ft MSL)	Critical Flow Depth DEPC (ft)	Froude Indicator (0 = sub) (1 = sup) IFR	Iteration Count for Computing Nrml Dpth ITN	Iteration Count for Computing Crtl Dpth ITC
1	0.970	2590.92	0.92	2590.55	0.55	0	13	13
2	1.020	2570.62	0.62	2570.57	0.57	0	13	13
3	1.120	2550.71	0.71	2550.66	0.66	0	13	13

BOSS DAMBRK version 3.00 PAGE 15
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :

Cross-section Number at Downstream End of Model (IN) 3
Initial Water Surface Elev. at Downstream End (YNN, ft MSL) 2550.707
Initial Flow Depth at Downstream End (DEP, ft) 0.707

COMPUTED STEP BACKWATER TABLE :

Cross Section Number I	Cross Section Location X (mi)	Flow QIL (cfs)	Backwater Water Surface Elevation YIL (ft MSL)	Backwater Water Depth DEP (ft)	Iteration Count for Computing Backwater ITB
1	0.970	10.0	2615.000	25.000	0

BOSS DAMBRK version 3.00 PAGE 16
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

INITIAL CONDITIONS :

Interp. Initial Initial
Cross- Water Flow

Draft Final

Section I	Elevation YI(I) (ft MSL)	QDI(I) (cfs)
1	2615.00	10.0
2	2570.62	10.0
3	2550.71	10.0

BOSS DAMBRK version 3.00 PAGE 17
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :

Time to Failure (TFH, hr)	0.500
Time to Start of Rising Limb of Hydrograph (TFO, hr)	10.000
Time to Peak (TP, hr)	0.260
Time Step Size (DTHI, hr)	0.025

BOSS DAMBRK version 3.00 PAGE 18
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

ROUTING COMPLETED :

Number of Time Steps Used (KTIME)	210
Maximum Number of Time Steps Allowed	2999
Total Time of Flood Routing (TT, hr)	10.1
Flood Wave Arrival Time based upon a WSEL Increase of (ft)	1.00

CONSERVATION OF MASS RESULTS :

Should be close to 0.00%, a negative value denotes flow volume was lost during the routing, a positive value denotes flow volume was gained during the routing. Normalized as a percent of inflow volume, maximum change in conservation of mass during routing was 0.03

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Draft Final

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.970	2628.13	10566	0.385	0.92	2591.00	0.00	0.13
1.020	2578.44	10566	0.560	15.14	2571.00	0.10	0.16
1.120	2559.78	10116	0.560	15.29	2551.00	0.13	0.16

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2615.00	2570.62	2550.71			
3	0.026	2615.00	2570.62	2550.71			
5	0.052	2615.01	2570.62	2550.71			
7	0.078	2615.08	2570.75	2550.71			
9	0.104	2615.38	2571.07	2550.79			
11	0.130	2616.17	2571.59	2551.19			
13	0.156	2617.50	2572.36	2552.10			
15	0.182	2619.15	2573.10	2553.09			
17	0.208	2620.97	2573.80	2554.00			
19	0.234	2622.76	2574.38	2554.78			
21	0.260	2624.46	2574.88	2555.43			
23	0.310	2627.00	2575.74	2556.51			
25	0.360	2628.03	2576.43	2557.39			
27	0.410	2628.03	2577.08	2558.18			
29	0.460	2627.12	2577.68	2558.92			
31	0.510	2625.76	2577.84	2559.20			
33	0.560	2624.07	2578.44	2559.78			
35	0.610	2622.08	2577.86	2559.38			
37	0.660	2620.20	2577.29	2558.70			
39	0.710	2618.44	2576.75	2558.05			
41	0.760	2616.77	2576.25	2557.44			
43	0.810	2615.15	2575.81	2556.90			
45	0.860	2613.56	2575.46	2556.46			
47	0.910	2612.02	2575.12	2556.06			
49	0.960	2610.50	2574.79	2555.67			
51	1.010	2609.03	2574.47	2555.29			
53	1.060	2607.67	2574.17	2554.93			

Draft Final

55	1.110	2606.41	2573.89	2554.60
57	1.160	2605.26	2573.63	2554.29
59	1.210	2604.19	2573.39	2554.01
61	1.260	2603.21	2573.17	2553.75
63	1.311	2602.30	2572.97	2553.50
65	1.363	2601.44	2572.77	2553.27
67	1.415	2600.64	2572.59	2553.06
69	1.469	2599.89	2572.42	2552.86
71	1.524	2599.19	2572.26	2552.67
73	1.580	2598.57	2572.11	2552.49
75	1.637	2597.99	2571.98	2552.34
77	1.696	2597.47	2571.86	2552.19
79	1.755	2597.00	2571.75	2552.06
81	1.816	2596.57	2571.65	2551.94
83	1.878	2596.17	2571.56	2551.83
85	1.941	2595.81	2571.47	2551.73
87	2.006	2595.48	2571.39	2551.63
89	2.071	2595.18	2571.32	2551.55
91	2.138	2594.90	2571.26	2551.46

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
93	2.207	2594.65	2571.20	2551.39			
95	2.277	2594.42	2571.14	2551.32			
97	2.348	2594.20	2571.09	2551.26			
99	2.420	2594.01	2571.04	2551.21			
101	2.494	2593.83	2571.00	2551.16			
103	2.570	2593.67	2570.96	2551.11			
105	2.647	2593.52	2570.92	2551.07			
107	2.726	2593.38	2570.89	2551.03			
109	2.806	2593.26	2570.86	2550.99			
111	2.888	2593.15	2570.83	2550.96			
113	2.971	2593.05	2570.81	2550.93			
115	3.056	2592.96	2570.79	2550.90			
117	3.143	2592.87	2570.76	2550.88			
119	3.232	2592.80	2570.75	2550.86			
121	3.322	2592.74	2570.73	2550.84			
123	3.414	2592.68	2570.72	2550.82			
125	3.508	2592.63	2570.70	2550.80			
127	3.604	2592.58	2570.69	2550.79			
129	3.702	2592.54	2570.68	2550.78			
131	3.802	2592.51	2570.67	2550.77			
133	3.904	2592.48	2570.67	2550.76			
135	4.008	2592.45	2570.66	2550.75			
137	4.114	2592.43	2570.65	2550.75			

Draft Final

139	4.222	2592.41	2570.65	2550.74
141	4.332	2592.39	2570.64	2550.73
143	4.445	2592.38	2570.64	2550.73
145	4.559	2592.37	2570.64	2550.73
147	4.677	2592.36	2570.63	2550.72
149	4.796	2592.35	2570.63	2550.72
151	4.918	2592.34	2570.63	2550.72
153	5.042	2592.33	2570.63	2550.72
155	5.169	2592.33	2570.63	2550.71
157	5.298	2592.32	2570.63	2550.71
159	5.430	2592.32	2570.63	2550.71
161	5.565	2592.32	2570.63	2550.71
163	5.702	2592.32	2570.62	2550.71
165	5.842	2592.31	2570.62	2550.71
167	5.985	2592.31	2570.62	2550.71
169	6.131	2592.31	2570.62	2550.71
171	6.279	2592.31	2570.62	2550.71
173	6.431	2592.31	2570.62	2550.71
175	6.586	2592.31	2570.62	2550.71
177	6.743	2592.31	2570.62	2550.71
179	6.904	2592.31	2570.62	2550.71
181	7.068	2592.31	2570.62	2550.71
183	7.236	2592.31	2570.62	2550.71
185	7.407	2592.31	2570.62	2550.71
187	7.581	2592.31	2570.62	2550.71
189	7.759	2592.31	2570.62	2550.71
191	7.940	2592.31	2570.62	2550.71

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
193	8.125	2592.31	2570.62	2550.71			
195	8.314	2592.31	2570.62	2550.71			
197	8.507	2592.31	2570.62	2550.71			
199	8.703	2592.31	2570.62	2550.71			
201	8.903	2592.31	2570.62	2550.71			
203	9.108	2592.31	2570.62	2550.71			
205	9.316	2592.31	2570.62	2550.71			
207	9.529	2592.31	2570.62	2550.71			
209	9.746	2592.31	2570.62	2550.71			

BOSS DAMBRK version 3.00 PAGE 23
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Draft Final

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01	0.01			
3	0.026	0.01	0.01	0.01			
5	0.052	0.01	0.01	0.01			
7	0.078	0.02	0.02	0.01			
9	0.104	0.04	0.04	0.01			
11	0.130	0.12	0.12	0.04			
13	0.156	0.35	0.35	0.18			
15	0.182	0.73	0.73	0.51			
17	0.208	1.26	1.26	0.99			
19	0.234	1.84	1.84	1.58			
21	0.260	2.45	2.45	2.19			
23	0.310	3.78	3.78	3.52			
25	0.360	5.12	5.12	4.88			
27	0.410	6.61	6.61	6.36			
29	0.460	8.21	8.21	7.96			
31	0.510	8.67	8.67	8.60			
33	0.560	10.57	10.57	10.12			
35	0.610	8.75	8.75	9.00			
37	0.660	7.16	7.16	7.41			
39	0.710	5.84	5.84	6.05			
41	0.760	4.75	4.75	4.93			
43	0.810	3.90	3.90	4.05			
45	0.860	3.31	3.31	3.42			
47	0.910	2.79	2.79	2.89			
49	0.960	2.34	2.34	2.43			
51	1.010	1.94	1.94	2.02			
53	1.060	1.61	1.61	1.68			
55	1.110	1.34	1.34	1.40			
57	1.160	1.12	1.12	1.17			
59	1.210	0.93	0.93	0.98			
61	1.260	0.78	0.78	0.82			
63	1.311	0.65	0.65	0.69			
65	1.363	0.54	0.54	0.57			
67	1.415	0.45	0.45	0.48			
69	1.469	0.38	0.38	0.40			
71	1.524	0.31	0.31	0.33			
73	1.580	0.26	0.26	0.28			
75	1.637	0.22	0.22	0.24			
77	1.696	0.19	0.19	0.20			
79	1.755	0.16	0.16	0.17			
81	1.816	0.14	0.14	0.14			
83	1.878	0.12	0.12	0.12			
85	1.941	0.10	0.10	0.11			
87	2.006	0.09	0.09	0.09			
89	2.071	0.08	0.08	0.08			
91	2.138	0.07	0.07	0.07			

Draft Final

93	2.207	0.06	0.06	0.06

BOSS DAMBRK version 3.00 PAGE 24
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
95	2.277	0.05	0.05	0.05			
97	2.348	0.04	0.04	0.05			
99	2.420	0.04	0.04	0.04			
101	2.494	0.04	0.04	0.04			
103	2.570	0.03	0.03	0.03			
105	2.647	0.03	0.03	0.03			
107	2.726	0.03	0.03	0.03			
109	2.806	0.02	0.02	0.02			
111	2.888	0.02	0.02	0.02			
113	2.971	0.02	0.02	0.02			
115	3.056	0.02	0.02	0.02			
117	3.143	0.02	0.02	0.02			
119	3.232	0.02	0.02	0.02			
121	3.322	0.02	0.02	0.02			
123	3.414	0.01	0.01	0.01			
125	3.508	0.01	0.01	0.01			
127	3.604	0.01	0.01	0.01			
129	3.702	0.01	0.01	0.01			
131	3.802	0.01	0.01	0.01			
133	3.904	0.01	0.01	0.01			
135	4.008	0.01	0.01	0.01			
137	4.114	0.01	0.01	0.01			
139	4.222	0.01	0.01	0.01			
141	4.332	0.01	0.01	0.01			
143	4.445	0.01	0.01	0.01			
145	4.559	0.01	0.01	0.01			
147	4.677	0.01	0.01	0.01			
149	4.796	0.01	0.01	0.01			
151	4.918	0.01	0.01	0.01			
153	5.042	0.01	0.01	0.01			
155	5.169	0.01	0.01	0.01			
157	5.298	0.01	0.01	0.01			
159	5.430	0.01	0.01	0.01			
161	5.565	0.01	0.01	0.01			
163	5.702	0.01	0.01	0.01			
165	5.842	0.01	0.01	0.01			
167	5.985	0.01	0.01	0.01			
169	6.131	0.01	0.01	0.01			
171	6.279	0.01	0.01	0.01			
173	6.431	0.01	0.01	0.01			
175	6.586	0.01	0.01	0.01			
177	6.743	0.01	0.01	0.01			

Draft Final

179	6.904	0.01	0.01	0.01
181	7.068	0.01	0.01	0.01
183	7.236	0.01	0.01	0.01
185	7.407	0.01	0.01	0.01
187	7.581	0.01	0.01	0.01
189	7.759	0.01	0.01	0.01
191	7.940	0.01	0.01	0.01
193	8.125	0.01	0.01	0.01
195	8.314	0.01	0.01	0.01

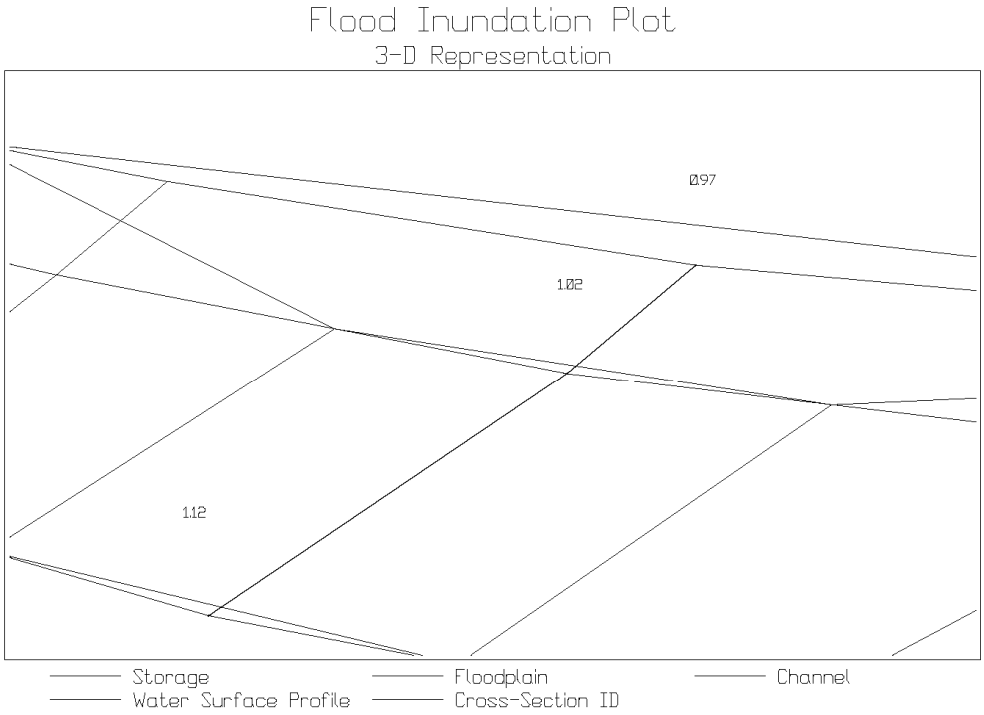
BOSS DAMBRK version 3.00 PAGE 25
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

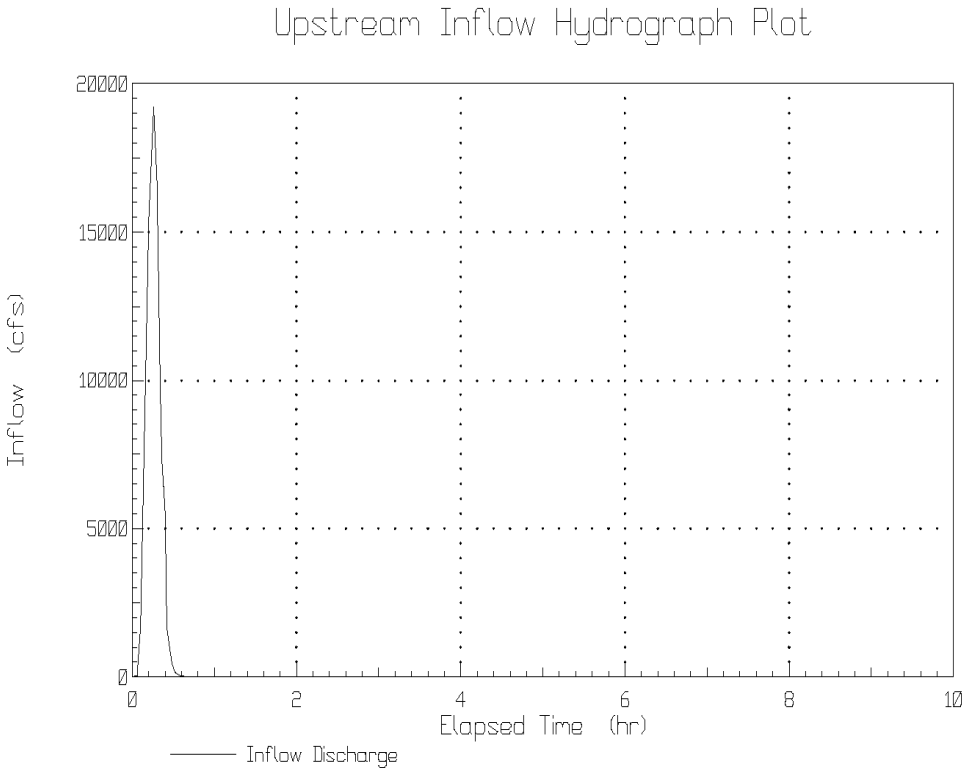
Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
197	8.507	0.01	0.01	0.01			
199	8.703	0.01	0.01	0.01			
201	8.903	0.01	0.01	0.01			
203	9.108	0.01	0.01	0.01			
205	9.316	0.01	0.01	0.01			
207	9.529	0.01	0.01	0.01			
209	9.746	0.01	0.01	0.01			

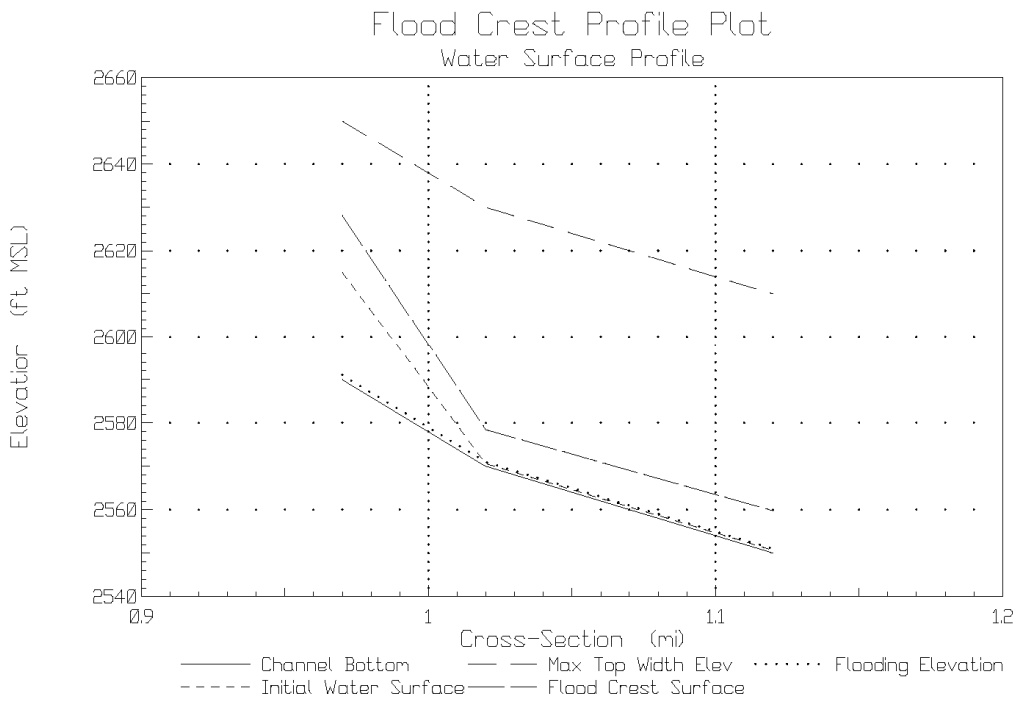
END OF OUTPUT

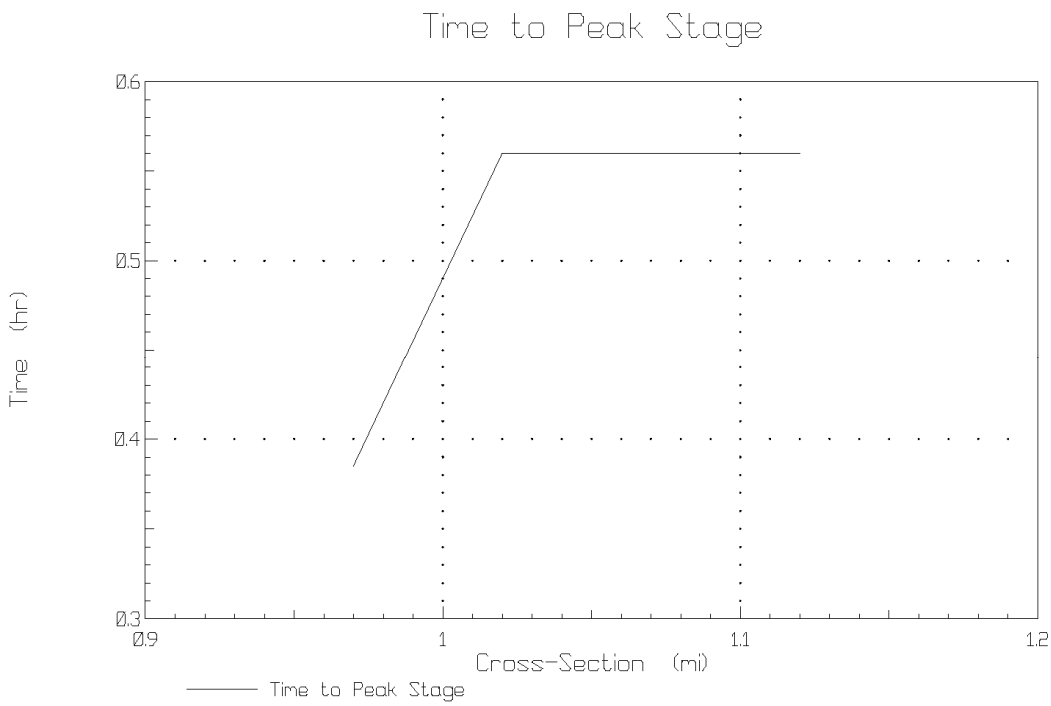
Draft Final

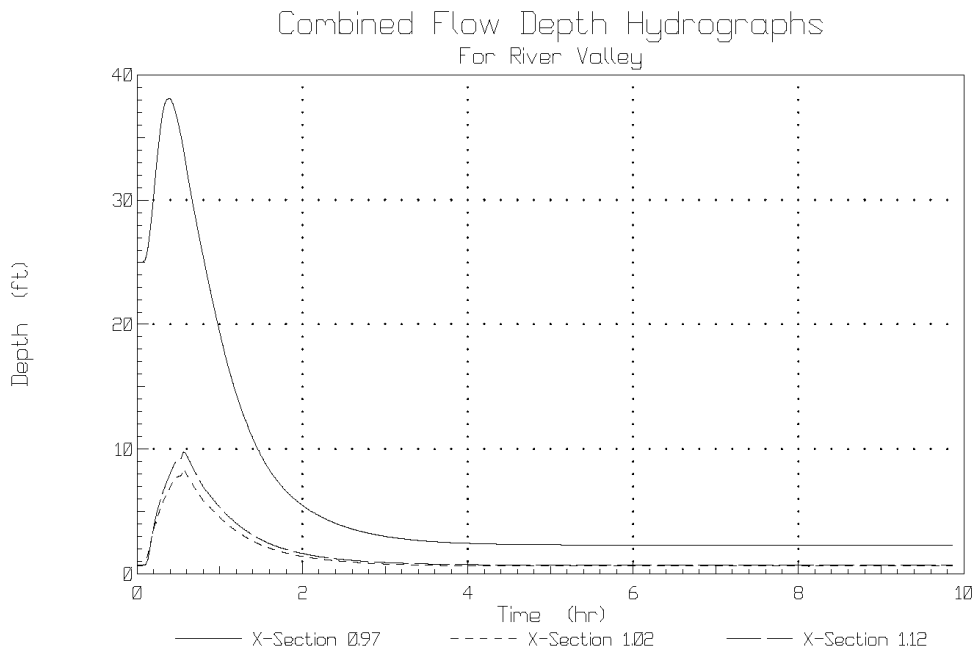
6.11 APPENDIX K: WCH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH BETWEEN YUCAIPA RESERVOIR NO.2 AND YUCAIPA RESERVOIR NO. 1

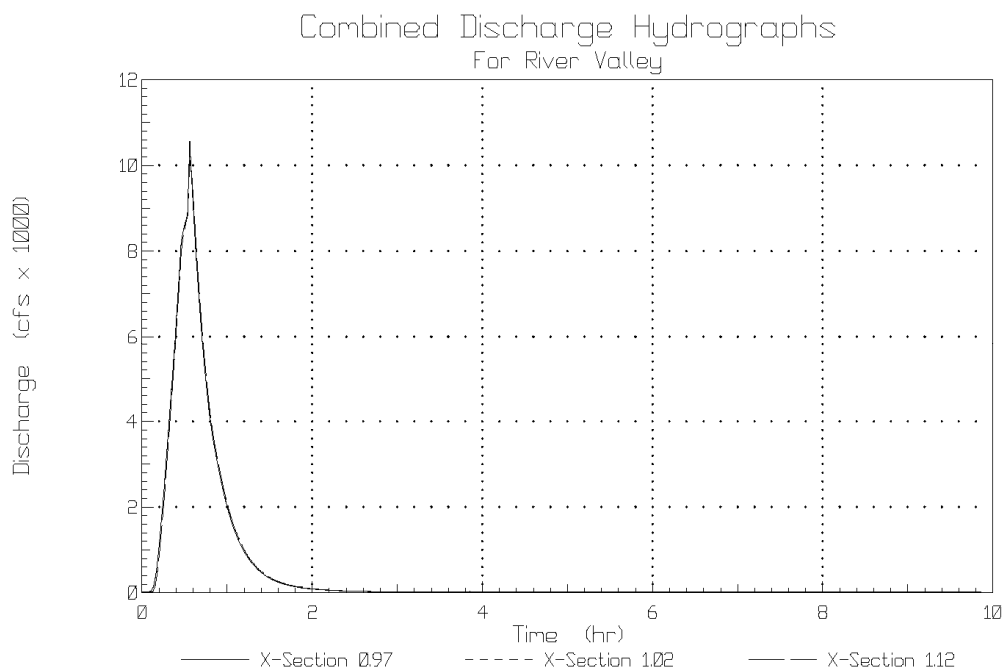


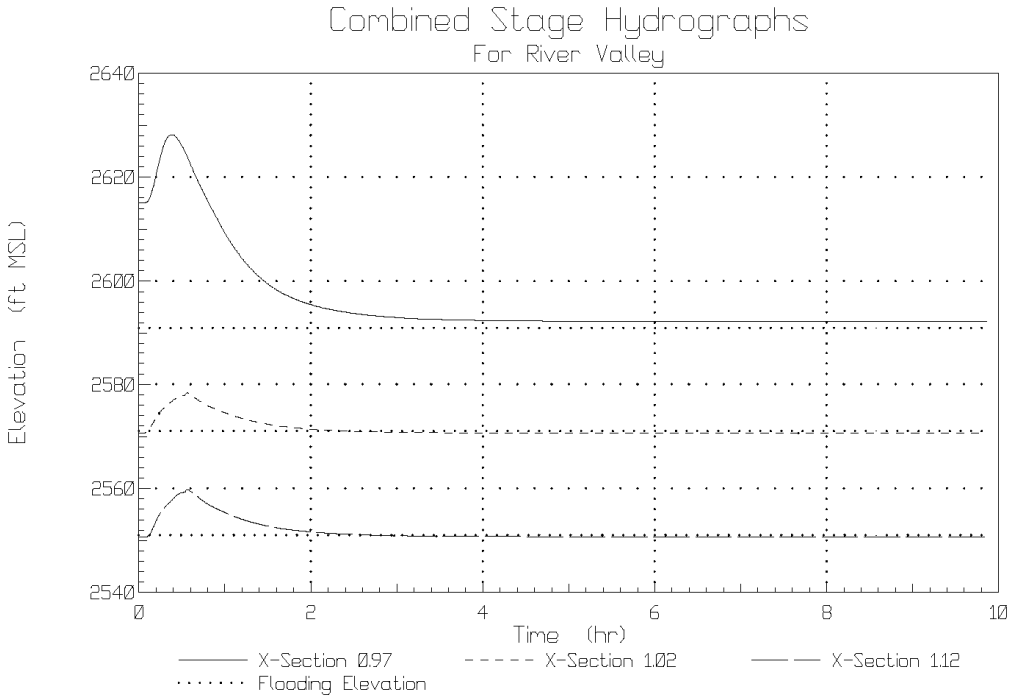



Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
2660
2640
2620
2600
2580
2560
2540
0.9
1
1.1
1.2
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface


Time to Peak Stage
Time (hr)
0.6
0.5
0.4
0.3
0.9
1
1.1
1.2
Cross-Section (mi)
Time to Peak Stage


Combined Flow Depth Hydrographs
For River Valley
Depth (ft)
40
30
20
10
0
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
12
10
8
6
4
2
0
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12


Combined Stage Hydrographs
For River Valley
Elevation (ft MSL)
2640
2620
2600
2580
2560
2540
0
2
4
6
8
10
Time (hr)
X-Section 0.97
X-Section 1.02
X-Section 1.12
Flooding Elevation

Draft F

6.12 APPENDIX L: WCH DAM BREACH - DAMBRK OUTPUT FILE FOR REACH DOWNSTREAM OF YUCAIPA RESERVOIR NO.1

```
BOSS DAMBRK  version 3.00                                          PAGE   1
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
____________________________________________________________________________

                          ==============================
                           B O S S    D A M B R K (tm)
                          ==============================

                     Copyright (C) 1988-92 Boss Corporation
                     All Rights Reserved

                     Version       : 3.00
                     Serial Number : 23999.200

     California Department of Water Resources

PROGRAM ORIGIN :
----------------

   Boss Dambrk (tm) is an enhanced version of Professor D. L. Fread's
   1991 NWS DAMBRK program.

DISCLAIMER :
------------

   Boss Dambrk (tm) is a complex program which requires engineering expertise
   to use correctly. Boss Corporation assumes absolutely no responsibility
   for the correct use of this program. All results obtained should be
   carefully examined by an experienced professional engineer to determine
   if they are reasonable and accurate.

   Although Boss Corporation has endeavored to make Boss Dambrk error free,
   the program is not and cannot be certified as infallible. Therefore, Boss
   Corporation makes no warranty, either implicit or explicit, as to the
   correct performance or accuracy of this software.

   In no event shall Boss Corporation be liable to anyone for special,
   collateral, incidental, or consequential damages in connection with or
   arising out of purchase or use of this software. The sole and exclusive
   liability to Boss Corporation, regardless of the form of action, shall
   not exceed the purchase price of this software.

PROJECT DESCRIPTION :
---------------------

   PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
   PROJECT NUMBER : DWR Dam No. 1-091
   DESCRIPTION    : Routing through Yucaipa Reservoir No. 2
   ENGINEER       : Nekane Hollister
   DATE OF RUN    :  9/30/2008
   TIME OF RUN    : 11:58 am
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   2
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

INPUT DATA SUMMARY :

INPUT CONTROL PARAMETERS :

Problem Specification Option	13	
Number of Dynamic Routing Reaches (KKN)	1	
Type of Reservoir Routing (KUI)	1	(dynamic routing)
Number of multiple dams/bridges (MULDAM)	1	
No. of Reservoir Inflow Hydrograph Points (ITEH)	17	
No. of Informational Cross-Sections (NPRT)	0	
Flood-Plain Routing (KFLP)	0	(no)

```
BOSS DAMBRK  version 3.00                                          PAGE   3
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBERS COINCIDENT
WITH UPSTREAM DAM FACE (IDAM) :

1

RESERVOIR VOLUME DESCRIPTION :

Elevation vs. Surface Area Table

Elevation HSA(K) (ft MSL)	Surface Area SA(K) (acres)
2625.00	22.300
2620.00	16.000
2615.00	9.800
2610.00	6.000
2605.00	4.000
2600.00	2.300
2595.00	1.200
2590.00	0.000

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   4
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   DAM NUMBER :  1
   ---------------

   RESERVOIR AND BREACH PARAMETERS :
   ---------------------------------

      Initial Elevation of Water Surface (YO, ft MSL)                2615.00

      Breach Side Slope (Z)                                   1:       0.50

      Breach Bottom Elevation (YBMIN, ft MSL)                        2590.00

      Breach Base Width (BB, ft)                                        0.00

      Time of Breach Formation (TFH, hr)                                0.50

   RESERVOIR DESCRIPTION :
   -----------------------

      Water Surface Elevation at Time of Breach (HF, ft MSL)         2622.00

      Top of Dam Crest Elevation (HD, ft MSL)                        2622.00

      Uncontrolled Spillway Crest Elevation (HSP, ft MSL)            2615.00

      Spillway Gate Center Elevation (HGT, ft MSL)                      0.00

      Uncontrolled Spillway Discharge Coefficient (CS)                  0.00

      Spillway Gate Discharge Coefficient (CG)                          0.00

      Piping Centerline Elevation (CDO, ft MSL)                      2600.00

      Turbine Discharge (QT, cfs)                                      10.00

   SPILLWAY/GATE RATING CURVE :
   ----------------------------

      Head       Flow
      HEAD( 1)   QSPILL( 1)
      (ft)       (cfs)
      --------- ---------------
           0.00             0.0
           1.00            85.0
           2.00           241.0
           3.00           443.0
           4.00           682.0
           5.00           953.0
           6.00          1253.0
           7.00          1579.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   5
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

BOUNDARY CONDITIONS :

Hydrograph Time Intervals (DHF, hr)	0.00
Routing Period (TEH, hr)	10.00
Breach Development Exponent (BREX)	1.00
Mud/Debris Flow Parameter (MUD)	0
Dry Bed Routing Parameter (IWF)	0
Hydraulic Radius Computation Parameter (KPRES)	0 (R=A/B)
Landslide Simulation (KSL)	0 (none)
Critical Flow Froude Number (DFR)	0.950

INFLOW HYDROGRAPH DESCRIPTION :

Time Elapsed TI(K) (hr)	Upstream Inflow QI(K) (cfs)
0.00	10.0
0.06	50.0
0.10	1700.0
0.14	7280.0
0.20	15460.0
0.26	19210.0
0.30	16720.0
0.34	9690.0
0.36	7290.0
0.38	6400.0
0.40	5520.0
0.42	1690.0
0.48	490.0
0.52	160.0
0.60	30.0
0.72	10.0
10.00	10.0

```
BOSS DAMBRK  version 3.00                                          PAGE   6
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

Draft Final

```
SUMMARY OF PROGRAM CONTROL PARAMETERS :
---------------------------------------

   Problem Specification Option (KKN, KUI, MULDAM, IDAM)   13

   Number of Cross-Sections Entered (NS)                    3

   Number of Top Widths Entered (NCS)                       4

   Number of Cross-Sectional Hydrographs to Plot (NTT)      3

   Flow Type Parameter (KSUPC)                              2  (mixed flow)

   Number of Lateral Inflow Hydrographs (LQ)                0

   Number of Points in Gate Control Curve (KCG)             0

CROSS-SECTIONS WHERE HYDROGRAPH REQUESTED :
(maximum allowed = 6)
--------------------------------------------

       1    2    3

CHANNEL-VALLEY BOUNDARY CONDITIONS :
------------------------------------

   Max Discharge at Downstream End (QMAXD, cfs)                        0.0

   Max Lateral Outflow due to Flood Wave (QLL, cfs/ft)                0.0000

   Initial Time-Step Size (DTHM, hr)                                  0.0000

   Time at which Dam Starts to Fail (TFI, hr)                         0.0000

   Theta Weighting Factor (F1I)                                        0.000

   Stage Convergence Criterion (EPSY, ft)                              0.000

   Downstream Boundary Type Paramter (YDN)                              0.00

   Slope of Channel Downstream of Dam (SOM, ft/mi)                    0.0000
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   7
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
CROSS-SECTION NUMBER :   1    Downstream end of Yucaipa
--------------------------

   Cross-Section Location (XS(I), mi)                                0.970

   Flooding Elevation (FSTG(I), ft MSL)                           2591.000
```

```
DOWNSTREAM REACH NUMBER :   1
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2590.00       0.0    0.0500       0.0
     2610.00     432.0    0.0500       0.0
     2630.00     652.0    0.0500       0.0
     2650.00     760.0    0.0500       0.0
```

```
BOSS DAMBRK  version 3.00                                          PAGE   8
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
CROSS-SECTION NUMBER :   2    Upstream end of Yucaipa R
--------------------------

   Cross-Section Location (XS(I), mi)                                   1.020

   Flooding Elevation (FSTG(I), ft MSL)                             2571.000

DOWNSTREAM REACH NUMBER :   2
-----------------------------

   Reach Contraction-Expansion Coefficient (FKC)                        0.000

   Minimum Distance Between Interpolated Cross-Sections (DXM, mi)       0.000

CROSS-SECTION and REACH DESCRIPTION :
-------------------------------------

   Elevation Channel   Channel   Storage
             Top       Manning   Top
             Width     n         Width
   HS(K,I)   BS(K,I)   CM(K,I)   BSS(K,I)
   (ft MSL)  (ft)                (ft)
   --------- --------- --------- ---------
     2570.00       0.0    0.0500       0.0
     2590.00     392.0    0.0500       0.0
     2610.00     597.0    0.0500       0.0
     2630.00     781.0    0.0500       0.0
```

Draft Final

```
BOSS DAMBRK  version 3.00                                          PAGE   9
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

CROSS-SECTION NUMBER : 3 Middle of Yucaipa Reservo

Cross-Section Location (XS(I), mi) 1.120

Flooding Elevation (FSTG(I), ft MSL) 2551.000

CROSS-SECTION DESCRIPTION :

Elevation HS(K,I) (ft MSL)	Channel Top Width BS(K,I) (ft)	Storage Top Width BSS(K,I) (ft)
2550.00	0.0	0.0
2570.00	277.0	0.0
2590.00	603.0	0.0
2610.00	739.0	0.0

```
BOSS DAMBRK  version 3.00                                          PAGE  10
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

NOTE: At cross-section reach 2 the distance between interpolated cross-sections (DXM) was changed to 0.147 due to (WAVE SPEED * DT) criteria

```
BOSS DAMBRK  version 3.00                                          PAGE  11
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

DISTANCE BETWEEN INTERPOLATED CROSS-SECTIONS (DXM) THAT WILL BE USED IN COMPUTATIONS :

Down Stream Reach Number I=1,NS1	Interp. Cross Section Distance DXM(I) (mi)
1	101.0000
2	0.1474

Draft Final

```
      Total number of cross-sections (original+interpolated)                 3

      Maximum number of cross-sections allowed                            2000
```

```
BOSS DAMBRK  version 3.00                                              PAGE  12
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
OUTPUT DATA SUMMARY :
---------------------

   CROSS-SECTION and REACH SUMMARY :
   ---------------------------------

      Cross      Cross      Bottom     Reach      Reach      Reach
      Section    Section    Elevation  Number     Length     Slope
      Number     Location
                 (mi)       (ft MSL)              (mi)       (ft/mi)
      --------- --------- --------- --------- --------- ---------
              1     0.970  2590.000
              2     1.020  2570.000         1     0.050   400.000
              3     1.120  2550.000         2     0.100   200.000
```

```
BOSS DAMBRK  version 3.00                                              PAGE  13
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   RE-NUMBERED DAM/BRIDGE CROSS-SECTIONS :
   ---------------------------------------

      Dam/       Revised
      Bridge     Cross
                 Section
                 Number
      --------- ---------
              1         1

      Number of Intermediate Cross-Sections (NN(NS))                         3

      Number of Time Steps (NNU)                                            17
```

```
BOSS DAMBRK  version 3.00                                              PAGE  14
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                                  9/30/2008
```

```
   INITIAL CONDITIONS TABLE :
   --------------------------
```

Draft Final

```
Cross     Cross     Normal    Normal    Critical  Critical  Froude    Iteration
Iteration
Section   Section   Flow      Flow      Flow      Flow      Indicator Count for
Count for
Number    Location  Water     Depth     Water     Depth     (0 = sub) Computing
Computing
                    Elevation           Elevation           (1 = sup) Nrml Dpth
Crtl Dpth
I         XI        YN        DEPN      YC        DEPC      IFR       ITN
ITC
          (mi)      (ft MSL)  (ft)      (ft MSL)  (ft)
--------- --------- --------- --------- --------- --------- --------- ---------
---------
        1     0.970   2590.92      0.92   2590.55      0.55         0        13
13
        2     1.020   2570.62      0.62   2570.57      0.57         0        13
13
        3     1.120   2550.71      0.71   2550.66      0.66         0        13
13
```

```
BOSS DAMBRK  version 3.00                                          PAGE  15
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   SUMMARY OF INITIAL DOWNSTREAM BOUNDARY CONDITIONS :
   ---------------------------------------------------

      Cross-section Number at Downstream End of Model (IN)                 3
      Initial Water Surface Elev. at Downstream End (YNN, ft MSL)      2550.707
      Initial Flow Depth at Downstream End (DEP, ft)                      0.707

   COMPUTED STEP BACKWATER TABLE :
   -------------------------------

      Cross     Cross     Flow            Backwater Backwater Iteration
      Section   Section                   Water     Water     Count for
      Number    Location                  Surface   Depth     Computing
                                          Elevation           Backwater
      I         X         QIL             YIL       DEP       ITB
                (mi)      (cfs)           (ft MSL)  (ft)
      --------- --------- -------------- --------- --------- ---------
              1     0.970           10.0  2615.000    25.000         0
```

```
BOSS DAMBRK  version 3.00                                          PAGE  16
  PROJECT TITLE  : CHR Enlargement, inflow from Aux. Dam
  PROJECT NUMBER : DWR Dam No. 1-091                              9/30/2008
```

```
   INITIAL CONDITIONS :
   --------------------

      Interp.   Initial   Initial
      Cross-    Water     Flow
```

Draft Final

Section I	Elevation YI(I) (ft MSL)	QDI(I) (cfs)
1	2615.00	10.0
2	2570.62	10.0
3	2550.71	10.0

BOSS DAMBRK version 3.00 PAGE 17
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

DAM OUTFLOW HYDROGRAPH TIME PARAMETERS :

Time to Failure (TFH, hr)	0.500
Time to Start of Rising Limb of Hydrograph (TFO, hr)	10.000
Time to Peak (TP, hr)	0.260
Time Step Size (DTHI, hr)	0.025

BOSS DAMBRK version 3.00 PAGE 18
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

ROUTING COMPLETED :

Number of Time Steps Used (KTIME)	210
Maximum Number of Time Steps Allowed	2999
Total Time of Flood Routing (TT, hr)	10.1
Flood Wave Arrival Time based upon a WSEL Increase of (ft)	1.00

CONSERVATION OF MASS RESULTS :

Should be close to 0.00%, a negative value denotes flow volume was lost during the routing, a positive value denotes flow volume was gained during the routing. Normalized as a percent of inflow volume, maximum change in conservation of mass during routing was 0.03

BOSS DAMBRK version 3.00 PAGE 19
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Draft Final

FLOOD CREST SUMMARY :

Cross Section Location (mi)	Maximum Stage Elevation (ft MSL)	Maximum Flow (cfs)	Time To Maximum Stage (hr)	Maximum Flow Velocity (ft/sec)	Flood Elevation (ft MSL)	Time To Flood Elevation (hr)	Flood Wave Arrival Time (hr)
0.970	2628.13	10566	0.385	0.92	2591.00	0.00	0.13
1.020	2578.44	10566	0.560	15.14	2571.00	0.10	0.16
1.120	2559.78	10116	0.560	15.29	2551.00	0.13	0.16

BOSS DAMBRK version 3.00 PAGE 20
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

COMPUTED WATER SURFACE ELEVATIONS AT REQUESTED STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
1	0.000	2615.00	2570.62	2550.71			
3	0.026	2615.00	2570.62	2550.71			
5	0.052	2615.01	2570.62	2550.71			
7	0.078	2615.08	2570.75	2550.71			
9	0.104	2615.38	2571.07	2550.79			
11	0.130	2616.17	2571.59	2551.19			
13	0.156	2617.50	2572.36	2552.10			
15	0.182	2619.15	2573.10	2553.09			
17	0.208	2620.97	2573.80	2554.00			
19	0.234	2622.76	2574.38	2554.78			
21	0.260	2624.46	2574.88	2555.43			
23	0.310	2627.00	2575.74	2556.51			
25	0.360	2628.03	2576.43	2557.39			
27	0.410	2628.03	2577.08	2558.18			
29	0.460	2627.12	2577.68	2558.92			
31	0.510	2625.76	2577.84	2559.20			
33	0.560	2624.07	2578.44	2559.78			
35	0.610	2622.08	2577.86	2559.38			
37	0.660	2620.20	2577.29	2558.70			
39	0.710	2618.44	2576.75	2558.05			
41	0.760	2616.77	2576.25	2557.44			
43	0.810	2615.15	2575.81	2556.90			
45	0.860	2613.56	2575.46	2556.46			
47	0.910	2612.02	2575.12	2556.06			
49	0.960	2610.50	2574.79	2555.67			
51	1.010	2609.03	2574.47	2555.29			
53	1.060	2607.67	2574.17	2554.93			

Draft Final

55	1.110	2606.41	2573.89	2554.60
57	1.160	2605.26	2573.63	2554.29
59	1.210	2604.19	2573.39	2554.01
61	1.260	2603.21	2573.17	2553.75
63	1.311	2602.30	2572.97	2553.50
65	1.363	2601.44	2572.77	2553.27
67	1.415	2600.64	2572.59	2553.06
69	1.469	2599.89	2572.42	2552.86
71	1.524	2599.19	2572.26	2552.67
73	1.580	2598.57	2572.11	2552.49
75	1.637	2597.99	2571.98	2552.34
77	1.696	2597.47	2571.86	2552.19
79	1.755	2597.00	2571.75	2552.06
81	1.816	2596.57	2571.65	2551.94
83	1.878	2596.17	2571.56	2551.83
85	1.941	2595.81	2571.47	2551.73
87	2.006	2595.48	2571.39	2551.63
89	2.071	2595.18	2571.32	2551.55
91	2.138	2594.90	2571.26	2551.46

BOSS DAMBRK version 3.00 PAGE 21
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
93	2.207	2594.65	2571.20	2551.39			
95	2.277	2594.42	2571.14	2551.32			
97	2.348	2594.20	2571.09	2551.26			
99	2.420	2594.01	2571.04	2551.21			
101	2.494	2593.83	2571.00	2551.16			
103	2.570	2593.67	2570.96	2551.11			
105	2.647	2593.52	2570.92	2551.07			
107	2.726	2593.38	2570.89	2551.03			
109	2.806	2593.26	2570.86	2550.99			
111	2.888	2593.15	2570.83	2550.96			
113	2.971	2593.05	2570.81	2550.93			
115	3.056	2592.96	2570.79	2550.90			
117	3.143	2592.87	2570.76	2550.88			
119	3.232	2592.80	2570.75	2550.86			
121	3.322	2592.74	2570.73	2550.84			
123	3.414	2592.68	2570.72	2550.82			
125	3.508	2592.63	2570.70	2550.80			
127	3.604	2592.58	2570.69	2550.79			
129	3.702	2592.54	2570.68	2550.78			
131	3.802	2592.51	2570.67	2550.77			
133	3.904	2592.48	2570.67	2550.76			
135	4.008	2592.45	2570.66	2550.75			
137	4.114	2592.43	2570.65	2550.75			

Draft Final

139	4.222	2592.41	2570.65	2550.74
141	4.332	2592.39	2570.64	2550.73
143	4.445	2592.38	2570.64	2550.73
145	4.559	2592.37	2570.64	2550.73
147	4.677	2592.36	2570.63	2550.72
149	4.796	2592.35	2570.63	2550.72
151	4.918	2592.34	2570.63	2550.72
153	5.042	2592.33	2570.63	2550.72
155	5.169	2592.33	2570.63	2550.71
157	5.298	2592.32	2570.63	2550.71
159	5.430	2592.32	2570.63	2550.71
161	5.565	2592.32	2570.63	2550.71
163	5.702	2592.32	2570.62	2550.71
165	5.842	2592.31	2570.62	2550.71
167	5.985	2592.31	2570.62	2550.71
169	6.131	2592.31	2570.62	2550.71
171	6.279	2592.31	2570.62	2550.71
173	6.431	2592.31	2570.62	2550.71
175	6.586	2592.31	2570.62	2550.71
177	6.743	2592.31	2570.62	2550.71
179	6.904	2592.31	2570.62	2550.71
181	7.068	2592.31	2570.62	2550.71
183	7.236	2592.31	2570.62	2550.71
185	7.407	2592.31	2570.62	2550.71
187	7.581	2592.31	2570.62	2550.71
189	7.759	2592.31	2570.62	2550.71
191	7.940	2592.31	2570.62	2550.71

BOSS DAMBRK version 3.00 PAGE 22
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time TTP(K) (hr)	Station 1 Water Surface Elevation YC(K,1) (ft MSL)	Station 2 Water Surface Elevation YC(K,2) (ft MSL)	Station 3 Water Surface Elevation YC(K,3) (ft MSL)	Station 4 Water Surface Elevation YC(K,4) (ft MSL)	Station 5 Water Surface Elevation YC(K,5) (ft MSL)	Station 6 Water Surface Elevation YC(K,6) (ft MSL)
193	8.125	2592.31	2570.62	2550.71			
195	8.314	2592.31	2570.62	2550.71			
197	8.507	2592.31	2570.62	2550.71			
199	8.703	2592.31	2570.62	2550.71			
201	8.903	2592.31	2570.62	2550.71			
203	9.108	2592.31	2570.62	2550.71			
205	9.316	2592.31	2570.62	2550.71			
207	9.529	2592.31	2570.62	2550.71			
209	9.746	2592.31	2570.62	2550.71			

BOSS DAMBRK version 3.00 PAGE 23
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Draft Final

COMPUTED DISCHARGES AT REQUESTED
STATIONS WHERE HYDROGRAPHS ARE PLOTTED :

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
1	0.000	0.01	0.01	0.01			
3	0.026	0.01	0.01	0.01			
5	0.052	0.01	0.01	0.01			
7	0.078	0.02	0.02	0.01			
9	0.104	0.04	0.04	0.01			
11	0.130	0.12	0.12	0.04			
13	0.156	0.35	0.35	0.18			
15	0.182	0.73	0.73	0.51			
17	0.208	1.26	1.26	0.99			
19	0.234	1.84	1.84	1.58			
21	0.260	2.45	2.45	2.19			
23	0.310	3.78	3.78	3.52			
25	0.360	5.12	5.12	4.88			
27	0.410	6.61	6.61	6.36			
29	0.460	8.21	8.21	7.96			
31	0.510	8.67	8.67	8.60			
33	0.560	10.57	10.57	10.12			
35	0.610	8.75	8.75	9.00			
37	0.660	7.16	7.16	7.41			
39	0.710	5.84	5.84	6.05			
41	0.760	4.75	4.75	4.93			
43	0.810	3.90	3.90	4.05			
45	0.860	3.31	3.31	3.42			
47	0.910	2.79	2.79	2.89			
49	0.960	2.34	2.34	2.43			
51	1.010	1.94	1.94	2.02			
53	1.060	1.61	1.61	1.68			
55	1.110	1.34	1.34	1.40			
57	1.160	1.12	1.12	1.17			
59	1.210	0.93	0.93	0.98			
61	1.260	0.78	0.78	0.82			
63	1.311	0.65	0.65	0.69			
65	1.363	0.54	0.54	0.57			
67	1.415	0.45	0.45	0.48			
69	1.469	0.38	0.38	0.40			
71	1.524	0.31	0.31	0.33			
73	1.580	0.26	0.26	0.28			
75	1.637	0.22	0.22	0.24			
77	1.696	0.19	0.19	0.20			
79	1.755	0.16	0.16	0.17			
81	1.816	0.14	0.14	0.14			
83	1.878	0.12	0.12	0.12			
85	1.941	0.10	0.10	0.11			
87	2.006	0.09	0.09	0.09			
89	2.071	0.08	0.08	0.08			
91	2.138	0.07	0.07	0.07			

Draft Final

93	2.207	0.06	0.06	0.06

BOSS DAMBRK version 3.00 PAGE 24
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
95	2.277	0.05	0.05	0.05			
97	2.348	0.04	0.04	0.05			
99	2.420	0.04	0.04	0.04			
101	2.494	0.04	0.04	0.04			
103	2.570	0.03	0.03	0.03			
105	2.647	0.03	0.03	0.03			
107	2.726	0.03	0.03	0.03			
109	2.806	0.02	0.02	0.02			
111	2.888	0.02	0.02	0.02			
113	2.971	0.02	0.02	0.02			
115	3.056	0.02	0.02	0.02			
117	3.143	0.02	0.02	0.02			
119	3.232	0.02	0.02	0.02			
121	3.322	0.02	0.02	0.02			
123	3.414	0.01	0.01	0.01			
125	3.508	0.01	0.01	0.01			
127	3.604	0.01	0.01	0.01			
129	3.702	0.01	0.01	0.01			
131	3.802	0.01	0.01	0.01			
133	3.904	0.01	0.01	0.01			
135	4.008	0.01	0.01	0.01			
137	4.114	0.01	0.01	0.01			
139	4.222	0.01	0.01	0.01			
141	4.332	0.01	0.01	0.01			
143	4.445	0.01	0.01	0.01			
145	4.559	0.01	0.01	0.01			
147	4.677	0.01	0.01	0.01			
149	4.796	0.01	0.01	0.01			
151	4.918	0.01	0.01	0.01			
153	5.042	0.01	0.01	0.01			
155	5.169	0.01	0.01	0.01			
157	5.298	0.01	0.01	0.01			
159	5.430	0.01	0.01	0.01			
161	5.565	0.01	0.01	0.01			
163	5.702	0.01	0.01	0.01			
165	5.842	0.01	0.01	0.01			
167	5.985	0.01	0.01	0.01			
169	6.131	0.01	0.01	0.01			
171	6.279	0.01	0.01	0.01			
173	6.431	0.01	0.01	0.01			
175	6.586	0.01	0.01	0.01			
177	6.743	0.01	0.01	0.01			

Draft Final

179	6.904	0.01	0.01	0.01
181	7.068	0.01	0.01	0.01
183	7.236	0.01	0.01	0.01
185	7.407	0.01	0.01	0.01
187	7.581	0.01	0.01	0.01
189	7.759	0.01	0.01	0.01
191	7.940	0.01	0.01	0.01
193	8.125	0.01	0.01	0.01
195	8.314	0.01	0.01	0.01

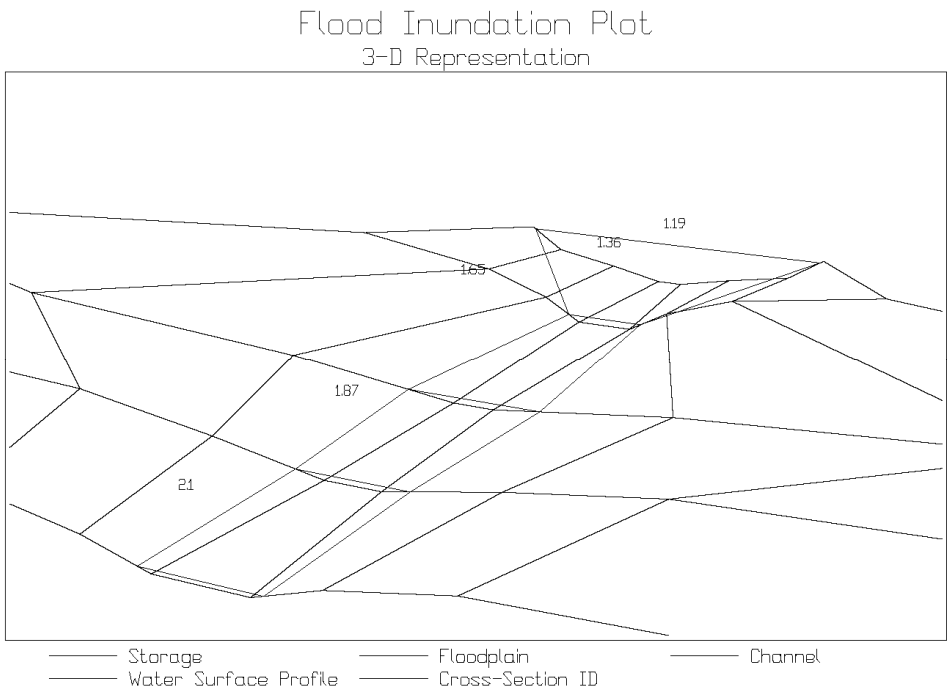
BOSS DAMBRK version 3.00 PAGE 25
PROJECT TITLE : CHR Enlargement, inflow from Aux. Dam
PROJECT NUMBER : DWR Dam No. 1-091 9/30/2008

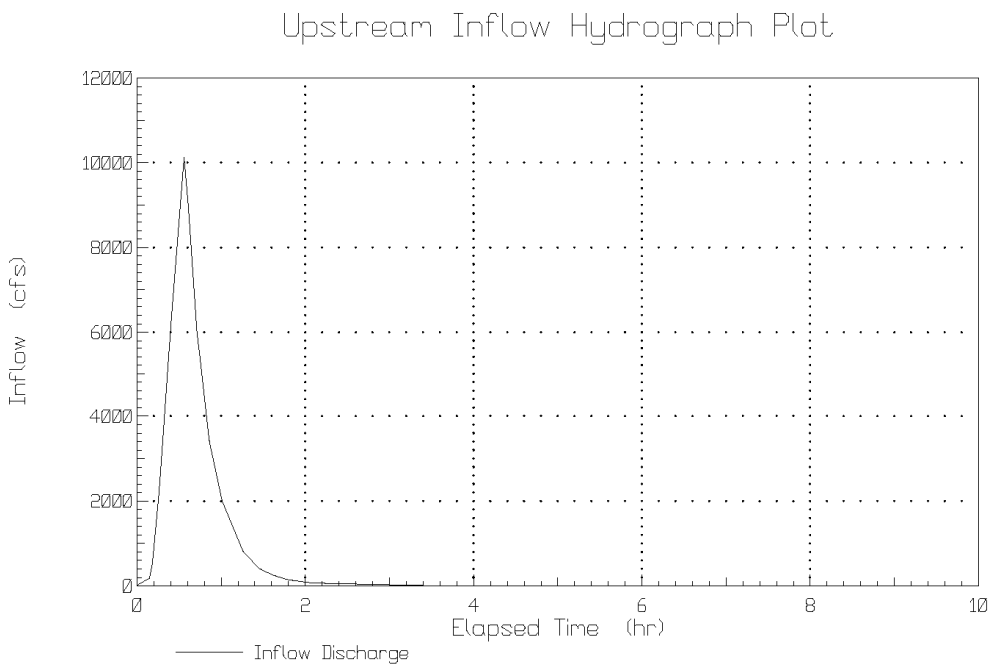
Time Step Count K	Elapsed Time (x 1000) TTP(K) (hr)	Station 1 Discharge (x 1000) QC(K,1) (cfs)	Station 2 Discharge (x 1000) QC(K,2) (cfs)	Station 3 Discharge (x 1000) QC(K,3) (cfs)	Station 4 Discharge (x 1000) QC(K,4) (cfs)	Station 5 Discharge (x 1000) QC(K,5) (cfs)	Station 6 Discharge (x 1000) QC(K,6) (cfs)
197	8.507	0.01	0.01	0.01			
199	8.703	0.01	0.01	0.01			
201	8.903	0.01	0.01	0.01			
203	9.108	0.01	0.01	0.01			
205	9.316	0.01	0.01	0.01			
207	9.529	0.01	0.01	0.01			
209	9.746	0.01	0.01	0.01			

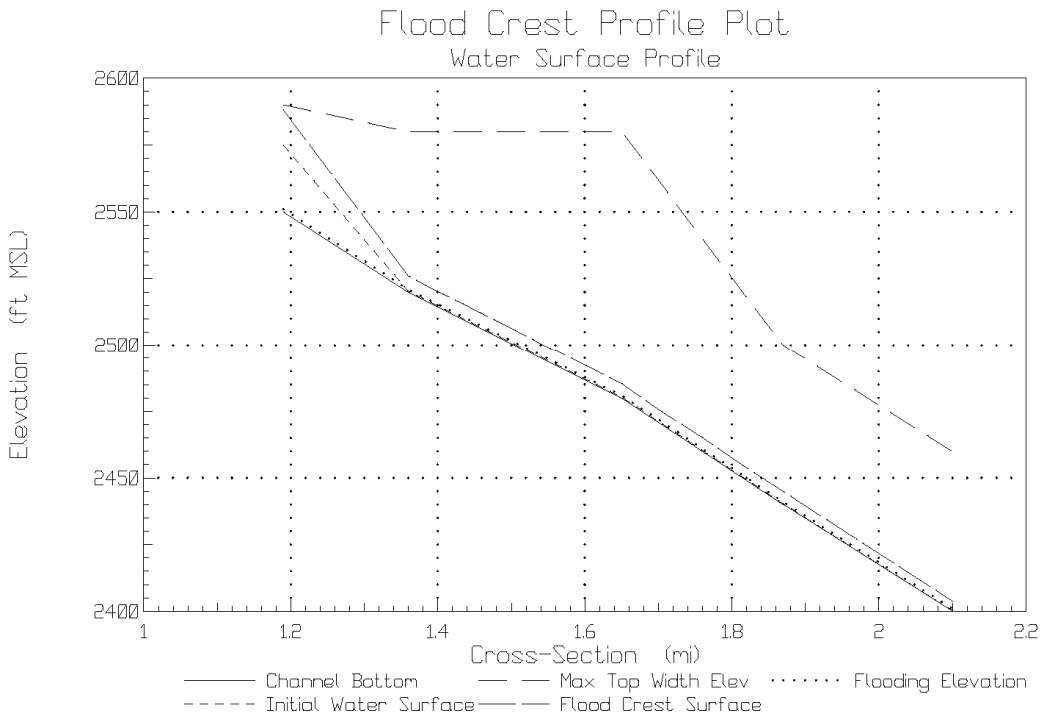
END OF OUTPUT

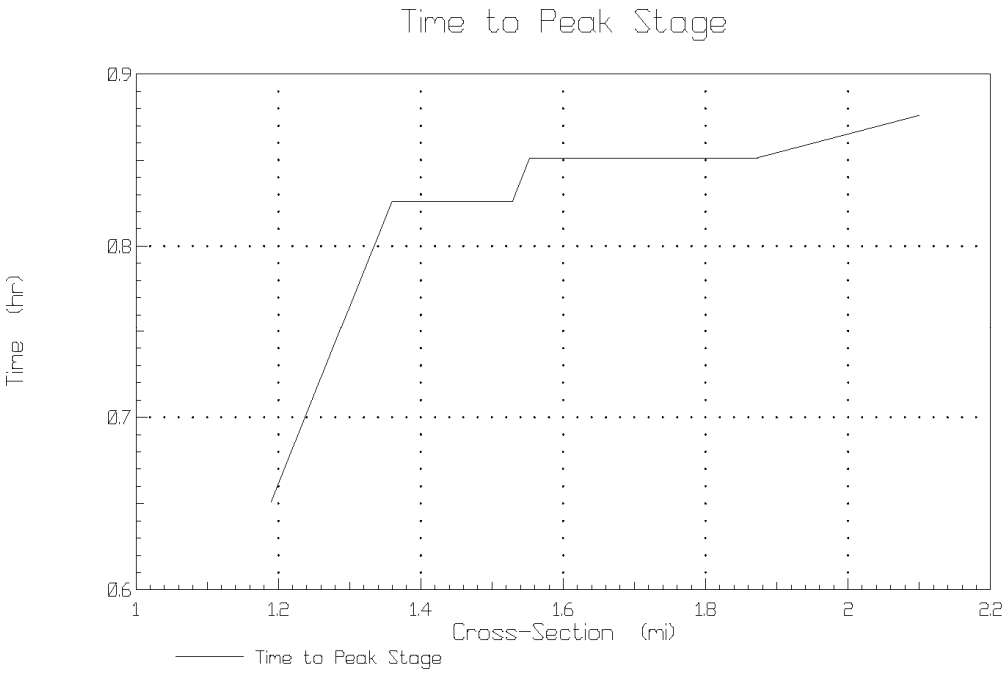
Draft Final

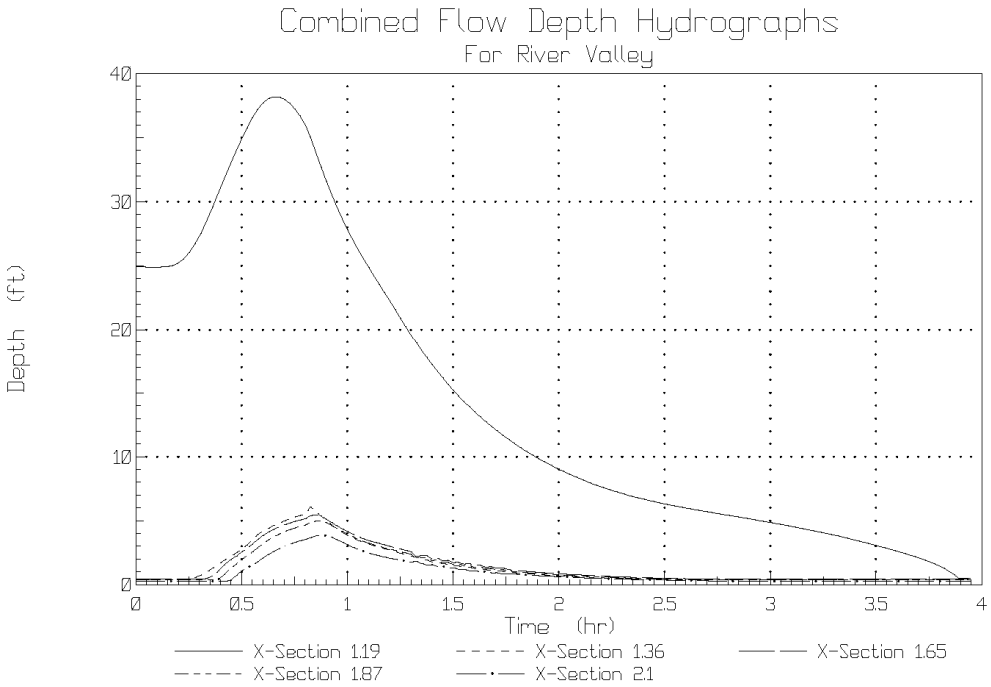
6.13 APPENDIX M: WCH DAM BREACH - DAMBRK GRAPHIC PLOTS FOR REACH DOWNSTREAM OF YUCAIPA RESERVOIR NO.1

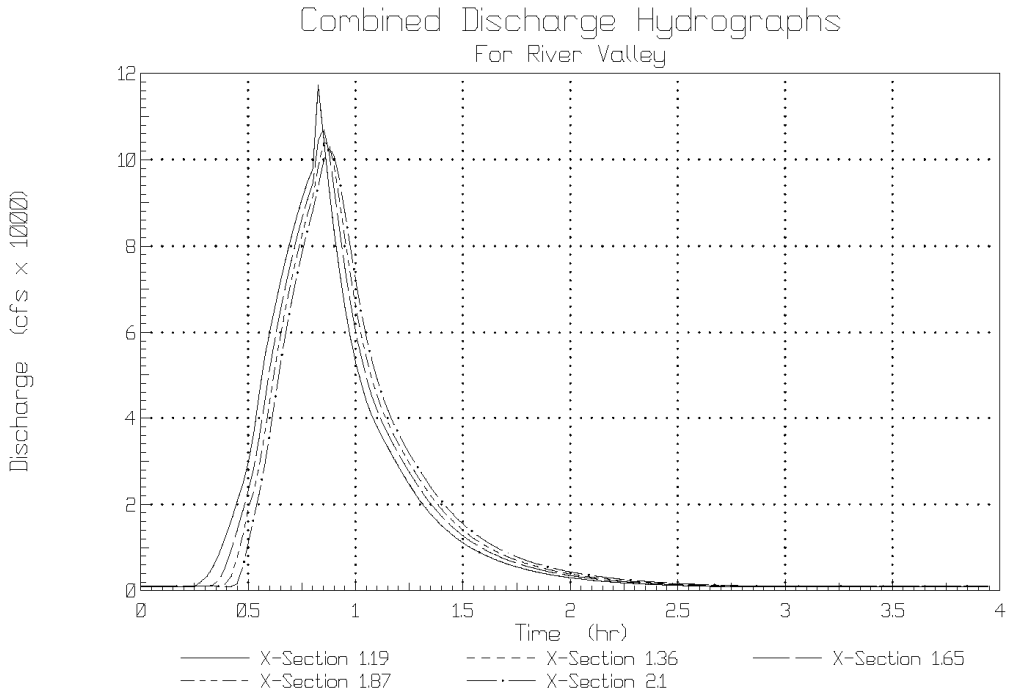


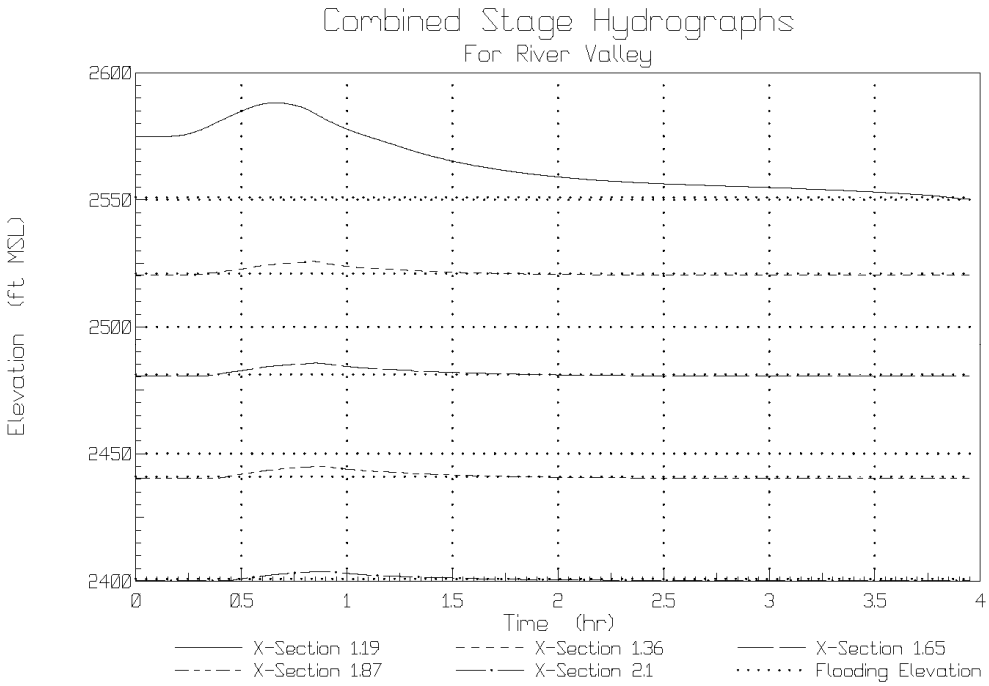



Flood Crest Profile Plot
Water Surface Profile
Elevation (ft MSL)
2600
2550
2500
2450
2400
1
1.2
1.4
1.6
1.8
2
2.2
Cross-Section (mi)
Channel Bottom
Max Top Width Elev
Flooding Elevation
Initial Water Surface
Flood Crest Surface


Time to Peak Stage
Time (hr)
0.9
0.8
0.7
0.6
1
1.2
1.4
1.6
1.8
2
2.2
Cross-Section (mi)
Time to Peak Stage


Combined Flow Depth Hydrographs
For River Valley
Depth (ft.)
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1


Combined Discharge Hydrographs
For River Valley
Discharge (cfs x 1000)
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1


Combined Stage Hydrographs
For River Valley
Elevation (ft MSL)
2600
2550
2500
2450
2400
0
0.5
1
1.5
2
2.5
3
3.5
4
Time (hr)
X-Section 1.19
X-Section 1.36
X-Section 1.65
X-Section 1.87
X-Section 2.1
Flooding Elevation

Draft F