


West Antioch Creek Channel Improvement Project
Notice of Determination

NOTICE OF DETERMINATION

TO: Office of Planning and Research
1400 10th Street
Sacramento, CA 95814

FROM: City of Antioch
200 H Street
Antioch, CA 94509

FILED
SEP 25 2014
J.E. CANCIAMILLA COUNTY CLERK CONTRA COSTA COUNTY
BY  DEPUTY

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 of the Public Resources Code

PROJECT TITLE: West Antioch Creek Channel Improvement Project

State Clearinghouse Number
2014042078

Contact Person
Mindy Gentry

Telephone Number
(925) 779-6133

Project Approval:

The City of Antioch approved the West Antioch Creek Channel Improvement Project on September 23, 2014.

Project Location:

The Project is located within the northern reach of West Antioch Creek in the City of Antioch, Contra Costa County, California, approximately 0.33 mile from the San Joaquin River/Sacramento-San Joaquin Delta. The City of Antioch is located approximately 36 miles northeast of the City of San Francisco and 42 miles southwest of the City of Sacramento.

The West Antioch Creek Channel Improvement Project (Project) is located in the City of Antioch, Contra Costa County. The Project would reduce flood risk in the Project area by increasing the capacity of the West Antioch Creek channel between West Tenth Street and West 8th Street and re-establishing the 25-year flood protection capacity of the channel downstream of West 8th Street to the Burlington Northern Santa Fe (BNSF) railroad trestle.

Project Description:

The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth Street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel that extends to Fourth Street. From Fourth Street a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues north beyond the BNSF railroad trestle.

The Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and West 8th Street. Project work in Reach B (desilting) would desilt the channel from around West 8th Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed to realize improved levels of flood protection.

Reach A – Conveyance Improvements: Six alternatives were proposed for Reach A. All alternatives would use a minimum of four pre-cast concrete box culverts measuring 14 feet wide and 7 feet high under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to near West 8th Street. Table 1 provides a summary of the six alternatives.

**West Antioch Creek Channel Improvement Project
Notice of Determination**

Table 1. Alternatives for Reach A

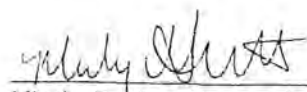
Alternative	Pre-Cast Box Culvert	Channel Type
Alternative 1	Culvert would extend a length of approximately 300 feet from West Tenth Street north to West Ninth Street.	New re-aligned earthen channel from West Ninth Street to West 8th Street.
Alternative 2	Culvert would extend a length of approximately 700 feet from West Tenth Street north to about West 8th Street.	No earthen channel would be included.
Alternative 3	Culvert would extend a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 3A	Culvert would extend a length of approximately 100 feet across West Tenth Street and shift 20 feet west, with a transition basin structure.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 4	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 5	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.

Reach B – Desilting: Project work in Reach B (desilting) would include the removal of accumulated sediment in the earthen channel from West 8th Street downstream to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Approximately 3,000 linear feet of channel would be desilted. Approximately 30,000 cubic yards of sediment accumulated since the completion of the 1993 Project would be removed from the channel to re-establish the 1993 Project design contours, thus restoring the design capacity of the channel to convey the 25-year storm event flows.

The City of Antioch, as the Lead Agency, has approved the above-described project and has made the following determinations:

1. There is no substantial evidence that the Project will have a significant effect on the environment.
2. In accordance with CEQA, a Mitigated Negative Declaration for the Project was prepared. The Mitigated Negative Declaration has been approved by the City of Antioch, which is the Lead Agency for the Project. The Mitigated Negative Declaration and record of project approval may be examined at the City of Antioch, 200 H Street, Antioch, California 94509. The Mitigated Negative Declaration reflects the independent judgment and analysis of the City of Antioch.
3. Mitigation measures were required to be made a condition of approval of the Project.
4. A Statement of Overriding Considerations was not required to be adopted for the Project.
5. A Mitigation Monitoring and Reporting Plan was adopted for the Project.

This is to certify that the Final Mitigated Negative Declaration with comments and responses and record of project approval is available to the general public at: City of Antioch, 200 H Street, Antioch, CA 94509.


Mindy Gehry, Senior Planner, City of Antioch

9/24/14
Date

Date Received for Filing at OPR: 9/25/14



State of California—Natural Resources Agency
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
2014 ENVIRONMENTAL FILING FEE CASH RECEIPT

RECEIPT#
07-2014- 283

STATE CLEARING HOUSE # (if applicable)

SEE INSTRUCTIONS ON REVERSE. TYPE OR PRINT CLEARLY

LEAD AGENCY CITY OF ANTIOCH			DATE 09/25/2014
COUNTY/STATE AGENCY OF FILING Contra Costa			DOCUMENT NUMBER E-0000372
PROJECT TITLE WEST ANTIOCH CREEK CANNEL IMPROVEMENT PROEJCT			
PROJECT APPLICANT NAME CITY OF ANTIOCH			PHONE NUMBER (925) 779-6133
PROJECT APPLICANT ADDRESS 200 H STREET	CITY ANTIOCH	STATE CA	ZIP CODE 94509
PROJECT APPLICANT (Check appropriate box): <input checked="" type="checkbox"/> Local Public Agency <input type="checkbox"/> School District <input type="checkbox"/> Other Special District <input type="checkbox"/> State Agency <input type="checkbox"/> Private Entity			

CHECK APPLICABLE FEES:

<input type="checkbox"/> Environmental Impact Report (EIR)	\$3,029.75	\$	0.00
<input checked="" type="checkbox"/> Mitigated/Negative Declaration (MND)(ND)	\$2,181.25	\$	2,181.25
<input type="checkbox"/> Application Fee Water Diversion (State Water Resources Control Board only)	\$850.00	\$	0.00
<input type="checkbox"/> Projects Subject to Certified Regulatory Programs (CRP)	\$1,030.25	\$	0.00
<input checked="" type="checkbox"/> County Administrative Fee	\$50.00	\$	50.00
<input type="checkbox"/> Project that is exempt from fees			
<input type="checkbox"/> Notice of Exemption (attach)			
<input type="checkbox"/> CDFW No Effect Determination (attach)			
<input type="checkbox"/> Other		\$	

PAYMENT METHOD:

☐ Cash ☐ Credit ☒ Check ☐ Other CH#353012/203567 TOTAL RECEIVED \$ 2,231.25

SIGNATURE

x A Vasquez

PRINTED NAME AND TITLE

A VASQUEZ:DEPUTY COUNTY CLERK

County Receipt number: 2076238

Your opinion matters!
Please tell us how well we did
by completing a brief web survey at
<http://www.surveymonkey.com/s/REK1BNI>

Change \$0.00
ANV,CN/1/0

Total fee \$2,231.25
Amount Tendered... \$2,231.25

Envir Dual \$50.00
Fish and Game \$2,181.25

Check Number 353012/203
READ BY

Document # 14-ANTIOCH-CI

CONTRA COSTA Co Recorder Office
JOSEPH CAMACHILLA, Clerk-Recorder

REC'D # 0002076238
September 25, 2014 12:08:52



State of California—Natural Resources Agency
CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE
2014 ENVIRONMENTAL FILING FEE CASH RECEIPT

RECEIPT# 07-2014- 283
STATE CLEARING HOUSE # (if applicable)

SEE INSTRUCTIONS ON REVERSE. TYPE OR PRINT CLEARLY

LEAD AGENCY CITY OF ANTIOCH			DATE 09/25/2014
COUNTY/STATE AGENCY OF FILING Contra Costa			DOCUMENT NUMBER E-0000372
PROJECT TITLE WEST ANTIOCH CREEK CANNEL IMPROVEMENT PROEJCT			
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PROJECT APPLICANT ADDRESS 200 H STREET	CITY ANTIOCH	STATE CA	ZIP CODE 94509
PROJECT APPLICANT (Check appropriate box): <input checked="" type="checkbox"/> Local Public Agency <input type="checkbox"/> School District <input type="checkbox"/> Other Special District <input type="checkbox"/> State Agency <input type="checkbox"/> Private Entity			

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<input type="checkbox"/> CDFW No Effect Determination (attach)			
<input type="checkbox"/> Other		\$	

PAYMENT METHOD:

☐ Cash ☐ Credit ☒ Check ☐ Other CH#353012/203567

TOTAL RECEIVED \$ 2,231.25

SIGNATURE X	PRINTED NAME AND TITLE A VASQUEZ:DEPUTY COUNTY CLERK
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County Receipt number: 2076238



Council Chambers
200 H Street
Antioch, CA 94509

Closed Session - 6:00 P.M.
Regular Meeting - 7:00 P.M.

ANNOTATED AGENDA

for

SEPTEMBER 23, 2014

**Antioch City Council
Regular Meeting**

**Including the Antioch City Council
acting as Successor Agency to the
Antioch Development Agency**

Wade Harper, Mayor
Mary Helen Rocha, Mayor Pro Tem
Monica E. Wilson, Council Member
Tony Tiscareno, Council Member
Arne Simonsen, City Clerk
Donna Conley, City Treasurer
Steven Duran, City Manager
Lynn Tracy Nerland, City Attorney

Electronic Agenda Packet viewing at: <http://www.ci.antioch.ca.us/CityGov/agendas/FindAgenda.asp>

With Project Plans at: <http://ci.antioch.ca.us/CityGov/CommDev/PlanningDivision/docs/Project-Pipeline.pdf>

Hard Copy viewing at: Antioch Public Library, 501 W 18th St, Antioch, CA

Online Viewing: <http://www.ci.antioch.ca.us/CityGov/citycouncilmeetings.asp>

Council meetings are televised live on Comcast Channel 24

APPROXIMATELY 5.59 ACRES. THE PROJECT SITE IS LOCATED ON THE WEST SIDE OF HEIDORN RANCH ROAD, AT THE EASTERN TERMINUS OF PREWETT RANCH DRIVE (APNS 056-130-012).

Direction provided to applicant, 4/0

Recommendation: Motion to provide feedback to the applicant and staff regarding the proposal and provide direction to the applicant for the Final Development Plan submittal

COUNCIL REGULAR AGENDA

5. ADOPTION OF THE INITIAL STUDY/MITIGATED NEGATIVE DECLARATION AND MITIGATION MONITORING AND REPORT PROGRAM AND SELECTION OF DESIGN PARAMETERS FOR THE WEST ANTIOCH CREEK CHANNEL IMPROVEMENTS PROJECT (P.W. 201-6)

Reso No. 2014/84 adopted and

Recommendation: 1) Motion to adopt the resolution approving and adopting the Initial Study/Mitigated Negative Declaration and Mitigation Monitoring and Report Program for the West Antioch Creek Channel Improvements project.

Approved, and

2) Motion to authorize the Director of Public Works/City Engineer to utilize Conveyance Alternative #3A as the basis for final project design.

Approved, 4/0

3) Motion to authorize the Director of Public Works/City Engineer to temporarily close West 10th Street between 'L' Street and Auto Center Drive during the construction of the new culvert structure.

STAFF REPORT

6. ANNUAL HOUSING ELEMENT PROGRESS REPORT

Received and filed, 4/0

Recommendation: Motion to receive, allow public comment, and file the Annual Housing Element Progress Report

STAFF REPORT

7. CITY OF ANTIOCH SOCIAL MEDIA PRESENCE

Received and filed with direction to staff, 4/0

Recommendation: Motion to receive report and direct staff regarding developing and enhancing the City of Antioch's presence on Social Media outlets

STAFF REPORT

8. POTENTIAL MID-YEAR BUDGET PRIORITIES

Received with direction to staff, 4/0

Recommended Action: Motion to receive report and direct staff regarding budget priorities for mid-year budget adjustments if the Business License Tax Measure O, passes on November 4, 2014

STAFF REPORT

PUBLIC COMMENT



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

FINAL
Initial Study and Mitigated
Negative Declaration
West Antioch Creek Channel
Improvement Project
and
Responses to Comments



September 2014

Lead Agency:

City of Antioch

200 H Street

Antioch, CA 94509

Prepared By:

ECORP Consulting, Inc.

2525 Warren Drive

Rocklin, CA 95677

**West Antioch Creek Channel Improvement Project
Notice of Determination**

NOTICE OF DETERMINATION

TO: Office of Planning and Research 1400 10 th Street Sacramento, CA 95814	FROM: City of Antioch 200 H Street Antioch, CA 94509
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SUBJECT: Filing of Notice of Determination in compliance with Section 21108 of the Public Resources Code

PROJECT TITLE: West Antioch Creek Channel Improvement Project

State Clearinghouse Number 2014042078	Contact Person Mindy Gentry	Telephone Number (925) 779-6133
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Project Approval:

The City of Antioch approved the West Antioch Creek Channel Improvement Project on September 23, 2014.

Project Location:

The Project is located within the northern reach of West Antioch Creek in the City of Antioch, Contra Costa County, California, approximately 0.33 mile from the San Joaquin River/Sacramento-San Joaquin Delta. The City of Antioch is located approximately 36 miles northeast of the City of San Francisco and 42 miles southwest of the City of Sacramento.

The West Antioch Creek Channel Improvement Project (Project) is located in the City of Antioch, Contra Costa County. The Project would reduce flood risk in the Project area by increasing the capacity of the West Antioch Creek channel between West Tenth Street and West 8th Street and re-establishing the 25-year flood protection capacity of the channel downstream of West 8th Street to the Burlington Northern Santa Fe (BNSF) railroad trestle.

Project Description:

The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth Street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel that extends to Fourth Street. From Fourth Street a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues north beyond the BNSF railroad trestle.

The Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and West 8th Street. Project work in Reach B (desilting) would desilt the channel from around West 8th Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed to realize improved levels of flood protection.

Reach A – Conveyance Improvements: Six alternatives were proposed for Reach A. All alternatives would use a minimum of four pre-cast concrete box culverts measuring 14 feet wide and 7 feet high under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to near West 8th Street. Table 1 provides a summary of the six alternatives.

**West Antioch Creek Channel Improvement Project
Notice of Determination**

Table 1. Alternatives for Reach A

Alternative	Pre-Cast Box Culvert	Channel Type
Alternative 1	Culvert would extend a length of approximately 300 feet from West Tenth Street north to West Ninth Street.	New re-aligned earthen channel from West Ninth Street to West 8th Street.
Alternative 2	Culvert would extend a length of approximately 700 feet from West Tenth Street north to about West 8th Street.	No earthen channel would be included.
Alternative 3	Culvert would extend a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 3A	Culvert would extend a length of approximately 100 feet across West Tenth Street and shift 20 feet west, with a transition basin structure.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 4	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.
Alternative 5	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.

Reach B – Desilting: Project work in Reach B (desilting) would include the removal of accumulated sediment in the earthen channel from West 8th Street downstream to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Approximately 3,000 linear feet of channel would be desilted. Approximately 30,000 cubic yards of sediment accumulated since the completion of the 1993 Project would be removed from the channel to re-establish the 1993 Project design contours, thus restoring the design capacity of the channel to convey the 25-year storm event flows.

The City of Antioch, as the Lead Agency, has approved the above-described project and has made the following determinations:

1. There is no substantial evidence that the Project will have a significant effect on the environment.
2. In accordance with CEQA, a Mitigated Negative Declaration for the Project was prepared. The Mitigated Negative Declaration has been approved by the City of Antioch, which is the Lead Agency for the Project. The Mitigated Negative Declaration and record of project approval may be examined at the City of Antioch, 200 H Street, Antioch, California 94509. The Mitigated Negative Declaration reflects the independent judgment and analysis of the City of Antioch.
3. Mitigation measures were required to be made a condition of approval of the Project.
4. A Statement of Overriding Considerations was not required to be adopted for the Project.
5. A Mitigation Monitoring and Reporting Plan was adopted for the Project.

This is to certify that the Final Mitigated Negative Declaration with comments and responses and record of project approval is available to the general public at: City of Antioch, 200 H Street, Antioch, CA 94509.

Mindy Gentry, Senior Planner, City of Antioch

Date

Date Received for Filing at OPR: _____

FINAL MITIGATED NEGATIVE DECLARATION West Antioch Creek Channel Improvement Project

Lead Agency: City of Antioch

Project Proponent: City of Antioch

Project Location: The Project is located on the northern portion of West Antioch Creek in the City of Antioch, Contra Costa County, California, approximately 0.33 mile from the San Joaquin River/Sacramento-San Joaquin Delta. The City of Antioch is located approximately 36 miles northeast of the City of San Francisco and 42 miles southwest of the City of Sacramento.

Project Description: The Project would improve the flood capacity of the West Antioch Creek channel to a 25-year level of protection and reduce flooding in the Project area within the City of Antioch. This Project consists of two components for one overall goal within the Project area; therefore the Project has been divided into two adjacent channel reaches titled Reach A and Reach B. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street to approximately West 8th Street. Project work in Reach B (desilting) would desilt the channel between approximately West 8th Street to approximately 200 feet north of the Burlington Northern Santa Fe (BNSF) railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed in order to realize improved levels of flood protection.

Finding: Based on the information contained in the attached Initial Study, the City of Antioch finds that there would not be a significant impact to the environment because the mitigation measures described herein would be incorporated as part of the Project.

Public Review Period: April 25, 2014 to May 28, 2014

Mitigation Measures Incorporated into the Project to Avoid Significant Effects

Alternatives 3A, 4, and 5 would require all of the mitigation measures listed in this Mitigated Negative Declaration (MND) to be implemented. Alternatives 1, 2, and 3 would require the implementation of all of the mitigation measures except Mitigation Measures HM-3 and HM-4.

Air Quality/Climate Change

Mitigation Measure

AQ-1: Basic Measures from Table 2 of the BAAQMD CEQA Guidelines

The following are the Basic Measures from Table 2 of the BAAQMD CEQA Guidelines. Table 2 notes, "The following controls should be implemented at all construction sites."

- A. Water all active construction areas at least twice daily.
- B. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.

**West Antioch Creek Channel Improvement Project
Final Mitigated Negative Declaration**

- C. Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- D. Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- E. Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

The following are the Enhanced Measures from Table 2 of the BAAQMD CEQA Guidelines. Table 2 notes, "The following additional measures should be implemented at construction sites greater than four acres in area."

- F. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- G. Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)
- H. Limit traffic speeds on unpaved roads to 15 mph.
- I. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- J. Replant vegetation in disturbed areas as quickly as possible.

The following are the Optional Measures from Table 2 of the *BAAQMD CEQA Guidelines*. Table 2 notes, "The following control measures are strongly encouraged at construction sites that are large in area, located near sensitive receptors or which for any other reason may warrant additional emissions reductions."

- K. Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- L. Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- M. Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- N. Limit the area subject to excavation, grading and other construction activity at any one time.

Biological Resources

Mitigation Measure

BIO-1 Delta Smelt, Sacramento Splittail

- A. To minimize take of delta smelt and Sacramento splittail and minimize disturbance to suitable habitat, desilting activities will be confined to a single calendar year. However, based on the extent of desilting required, in-stream work will be conducted in three work windows. Reaches A-1, A-2 and B-1 work window will be from March 15 to October 15; Reaches B-2 and B-3 work window will be from June 1 to October 15; and Reach B-4 work

**West Antioch Creek Channel Improvement Project
Final Mitigated Negative Declaration**

window will be from August 1 to November 30. If work cannot be completed by the appropriate end date of the work window, the City will request an extension from the United States Fish and Wildlife Service (USFWS).

- B. Standard Best Management Practices (BMPs) will be implemented to maintain water quality and control sedimentation. (See Mitigation Measures AQ-1 and G-1)
- C. Prior to dewatering and cofferdam installation/removal, a USFWS- and CDFW approved biologist will conduct a fish rescue for native fish and immediately relocate them to a suitable location upstream or downstream of the Project site as approved by the USFWS and CDFW. The USFWS/CDFW-approved biologist will be on-site during initial dewatering activities to ensure any fish that remain in the drawdown area are relocated to nearby suitable habitat. The City will submit the qualifications of qualified biologists to the USFWS for review and approval at least thirty (30) calendar days prior to Project initiation.
- D. Temporary fills including cofferdams and access roads will be completely removed following Project completion.
- E. If dewatering is necessary, pump intakes will be screened with mesh in accordance with National Oceanic Atmospheric Administration (NOAA) and National Marine Fisheries Services (NMFS) fish screening criteria for anadromous salmonids (NOAA 1997) to prevent uptake of fish that may be present in the creek.
- F. Sediment curtains will be placed downstream of the construction area during the installation and removal of the cofferdam to minimize downstream sediment transfer.
- G. A spill prevention plan for potentially hazardous materials will be prepared that includes procedures for handling and storing potentially hazardous materials, as well as cleanup and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.
- H. Equipment and materials will not be stored within 50 feet of the creek unless it is on established paved areas. However, if it is necessary to store equipment or materials within 50 feet of the creek, temporary containment berms will be constructed around the equipment/materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Secondary containment will be provided for stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the West Antioch Creek to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to the creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life.
- I. No fueling, cleaning or maintenance of vehicles or equipment, or placement of trash will occur within 50 feet of the creek or floodplain as measured from the top of bank unless it occurs in designated refueling/staging areas on existing paved surfaces with secondary containment in place. Contractors will inspect all equipment/vehicles for leaks prior to using on the Project site and will be inspected regularly throughout the Project duration.
- J. All temporarily disturbed areas will be revegetated with native species suitable for the area. Thus preventing construction activities from becoming vectors for invasive non-native plant

**West Antioch Creek Channel Improvement Project
Final Mitigated Negative Declaration**

species, reduce the need for long-term use of herbicides, and reduce the potential for spreading seed within West Antioch Creek, as well as to neighboring parcels.

Mitigation Measure

BIO-2 New Zealand Mudsnail

- A. The New Zealand mudsnail (*Potamopyrgus antipodarum*) is a small aquatic snail native to New Zealand. It is listed as a regulated species by the California Aquatic Invasive Species Management Plan (CDFG 2008). Due to the presence of New Zealand mud snails (a non-native species that range in size from a grain of sand to 1/8 inch in length and are black or brown in color) within West Antioch Creek, which are classified as an invasive species by CDFW, the following precautions are advised:
1. All Project personnel shall be trained in the identification, preventative measures, and physical and chemical cleaning methodologies for New Zealand mud snails prior to working on the Project. Brochures or identification cards shall be available to all Project personnel and CDFW informational posters shall be installed at the Project site.
 2. After work in West Antioch Creek, all waders, boots, gear, and other equipment will be thoroughly inspected for New Zealand mud snails. A cleaning station will be established on the Project site and maintained throughout the Project duration employing both physical and chemical cleaning methodologies. The cleaning station will implement the preventative and treatment methodologies in accordance with CDFW available at <http://www.dfg.ca.gov/invasives/mudsnail/>.
 3. A designated cleaning area will be established for heavy equipment and vehicles. All heavy equipment will be cleaned prior to leaving the site in accordance with CDFW guidelines.
 4. Fish and Western pond turtles shall be relocated to a safe location outside the work area, but shall not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.

Mitigation Measure

BIO-3 Western Pond Turtles

- A. A qualified biologist will conduct a preconstruction survey for western pond turtles immediately prior to work activities within the creek or floodplain downstream from the concrete-lined channel in Reach A-2. If western pond turtles are detected within the work area, no work will occur until they move or are captured and relocated outside of the work area. The on-site biologist will determine, in consultation with CDFW, if capturing and relocating the individual(s) is necessary. If authorized by CDFW, only a biologist in possession of a valid Scientific Collecting Permit will handle or relocate the turtles.
- B. Western pond turtles should be relocated to a safe location outside the work area, but should not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.

**West Antioch Creek Channel Improvement Project
Final Mitigated Negative Declaration**

Mitigation Measure

BIO-4 Western Burrowing Owl

A. Preconstruction Survey

Prior to any ground disturbance related to covered activities, a USFWS/CDFW-approved biologist will conduct a preconstruction survey in areas identified in the planning surveys as having potential burrowing owl habitat. The surveys will establish the presence or absence of western burrowing owl and/or habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFG 2012).

On the parcel where the activity is proposed, the biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys will take place near sunrise or sunset in accordance with CDFW guidelines. All burrows or burrowing owls will be identified and mapped. Surveys will take place no more than 30 days prior to construction. During the breeding season (February 1 – August 31), surveys will document whether burrowing owls are nesting in or directly adjacent to disturbance areas. During the nonbreeding season (September 1 – January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

B. Avoidance and Minimization Measures and Construction Monitoring

1. If burrowing owls are found during the breeding season (February 1 – August 31), the Project proponent will avoid all nest sites that could be disturbed by Project construction during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below). Construction may occur during the breeding season if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31), the Project proponent shall avoid the owls and the burrows they are using, if possible. Avoidance will include the establishment of a buffer zone (described below).
2. If occupied burrows for burrowing owls cannot be avoided, passive relocation will be implemented during the non-nesting season (September 1-January 31). Owls will be excluded from burrows in the immediate impact zone and within a 160-foot buffer zone by installing one-way doors in burrow entrances. These doors will be in place for 48 hours prior to excavation. The Project area will be monitored daily for 1 week to confirm that the owl has abandoned the burrow. Whenever possible, burrows will be excavated using hand tools and refilled to prevent reoccupation (CDFG 2012). Plastic tubing or a similar structure shall be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.

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Mitigation Measure

BIO-5 California Black Rail

- A. Within 700 feet of the Project footprint, focused preconstruction surveys for active California black rail nests, broods and calling centers will be conducted by a CDFW-approved biologist(s) within two weeks prior to the start of construction and monthly thereafter throughout the duration of the nesting season from February 1 to September 30. If active nests – nests with egg(s) or young present – broods, or calling centers are located in the survey area, all construction activities within 700 feet of the nest, brood or call center will cease immediately, CDFW will be notified within 24 hours of the observation and a 700 foot no-disturbance buffer will be established until the young have fledged unless otherwise directed by CDFW.
- B. A CDFW-approved biologist(s) will be present on site to monitor for California black rails during construction activities occurring downstream of Fourth Street. The biological monitor will have the authority to stop work if deemed necessary for any reason to protect federally listed species. If a California black rail is found in the work area, work within 100 feet of the rail(s) shall cease immediately and the CDFW-approved biologist(s) will monitor the rail until it leaves the work area. If the rail does not leave the work area, work will not restart until after the CDFW have made a decision on how to proceed with further construction activities. CDFW will be notified within 24 hours of an observation of a California black rail.

Mitigation Measure

BIO-6 Nesting Birds

A. Nesting Raptors

- 1. The removal or trimming of trees within 250 feet of the Project footprint will be conducted during the non-breeding season, i.e. between September 1 and February 1, to avoid impacts to nesting raptors. If tree removal during the non-breeding season is infeasible, trimming or delimbing of suitable trees to discourage nesting shall be conducted during the non-breeding season.
- 2. If Project construction begins during the breeding season, i.e. February 1 to August 31, preconstruction surveys for raptors will be conducted within the Project footprint and a 300-foot buffer, by a qualified biologist no more than two weeks prior to equipment or material staging, pruning/grubbing or surface-disturbing activities.
- 3. If active raptor nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 300 feet of the Project footprint, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.

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B. Protected Under the Migratory Bird Treaty Act

1. If active nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 50 feet of the Project footprint during the preconstruction survey described under A. b. above, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.

Mitigation Measure

BIO-7 Wetlands

- A. As part of the permitting process, the City will obtain a jurisdictional determination from the USACE of the prepared wetland delineation.
- B. Based on the preliminary design, a Section 404 permit application will be submitted to the USACE that includes a detailed analysis of mitigation that results in no net loss of wetlands. Wetland impacts of greater than 0.5 acre or greater than 300 feet of stream may be permitted under a Letter of Permission or an Individual Permit.
- C. Prepare a CDFW 1602 Streambed Alteration Agreement to quantify impacts to riparian and aquatic habitat.

Mitigation Measure

BIO-8 Tree Removal

Prior to the removal of trees (if necessary) protected under the City of Antioch, Code of Ordinances, Title 9, Ch. 5, Article 12-Tree Preservation and Regulation, the City or its contractor will:

- A. Prepare and submit an application to the City's Department of Parks, Leisure and Community Services for the removal of established trees.
- B. Replace trees that are legally removed, as follows:

All trees that are legally removed shall be replaced according to the following schedule:

- Each established tree: two 24-inch box trees.
- Each mature tree: two 48-inch box trees.

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Cultural Resources

Mitigation Measure

C-1 Unanticipated Discovery

If subsurface deposits believed to be cultural or human in origin are discovered during construction, then all work will halt within a 100-foot radius of the discovery. A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeologist, will be retained to evaluate the significance of the find, and will have the authority to modify the no-work zone radius as appropriate, using professional judgment. A Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission (NAHC), will be required if the nature of the unanticipated discovery is prehistoric.

Work cannot continue within the no-work zone radius until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the National Register of Historical Places (NRHP) or the California Register of Historic Resources (CRHR).

If a potentially-eligible resource is encountered, then the archaeologist and the City will arrange for either 1) total avoidance of the resource, if possible; or 2) test excavations to evaluate eligibility and, if eligible, total data recovery as mitigation. The determination will be formally documented in writing as verification that the provisions in CEQA/NEPA for managing unanticipated discoveries have been met.

In the event that evidence of human remains is discovered, construction activities within 100 feet of the discovery will be halted or diverted and the requirements for an unanticipated discovery will be implemented. In addition, the provisions of Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and AB 2641 will be implemented. When human remains are discovered, state law requires that the discovery be reported to the County Coroner (Section 7050.5 of the Health and Safety Code) and that reasonable protection measures be taken during construction to protect the discovery from disturbance (AB 2641). If the Coroner determines the remains are Native American, the Coroner notifies the NAHC, which then designates a Native American Most Likely Descendant (MLD) for the Project (Section 5097.98 of the Public Resources Code). The designated MLD then has 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains (AB 2641). If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (Section 5097.94 of the Public Resources Code). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (Section 5097.98 of the Public Resources Code). This will also include either recording the site with the NAHC or the Northwest Information Center at Sonoma State University; using an open space or conservation zoning designation or easement; or recording a document with the county in which the property is located (AB2641).

In the event that fossils are encountered, they shall be analyzed to a point of identification and curated at an established accredited museum repository with permanent retrievable paleontological storage. A technical report of findings shall be prepared with an appended itemized inventory of identified specimens and submitted with the recovered specimens to the curation facility.

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Mitigation Measure

C-2 Paleontological Monitoring for Reach A

Paleontological monitoring will be required in Reach A during all subsurface ground-disturbing activities in undisturbed native soils and geological formations. The monitoring will be conducted by a qualified vertebrate paleontologist. The monitor will be equipped to recover fossils and sediment samples during excavation, and shall have the authority to temporarily halt or divert equipment to allow for recovery of large or numerous fossils.

Geology and Soils

Mitigation Measure

G-1 Geotechnical Report Recommendations

The Project will follow all applicable recommendations made in the *Geotechnical Investigation West Antioch Creek Channel Improvements Antioch, California* prepared by Hultgren – Tillis Engineers.

Hazards and Hazardous Materials

Mitigation Measure

HM-1 Soil Sampling (Reach B)

Soils within Reach B of the West Antioch Creek channel will be sampled in accordance with a Sampling and Analysis Plan to be prepared by a qualified environmental professional in compliance with federal, state and local regulations and industry standards subject to approval by the Regional Water Quality Control Board. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility. If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.

Mitigation Measure

HM-2 Avoidance and Minimization Measures for Personnel

- A. All personnel working on the Project site shall be informed of the possibility that contaminated soil, soil vapor, and/or groundwater may be encountered on the job site.
- B. If previously unknown contaminated soils are encountered in the field during demolition or grading, ground disturbance activities in the vicinity of the discovery shall cease until a qualified hazardous materials management specialist can assess the potentially hazardous substances and, if necessary, develop appropriate management measures in coordination with the appropriate regulatory agencies.

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Mitigation Measure

HM-3 Contaminated Soil from Closed UST Site (Only Reach A Alternatives)

If soils in Reach A are to be excavated within 27 feet of the former waste oil underground storage tank (UST), a sampling protocol will be developed by a qualified environmental professional in compliance with federal, state, and local regulations and industry standards. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility. If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.

Mitigation Measure

HM-4 Hazardous Materials Survey (Only Reach A Alternatives)

Prior to the demolition of buildings or structures located on 1400 West Tenth Street, a survey for building-related hazardous materials will be conducted by qualified and properly certified individuals. Asbestos surveys will be conducted by a California Division of Occupational Safety and Health-certified asbestos consultant or site surveillance technician. Surveys for lead-based/bearing substances and lead-containing surface coatings will be conducted by a California Department of Health Service-certified lead inspector/risk assessor. If present, all recommendations regarding the removal and disposal of hazardous materials in accordance with federal, state, and local regulations will be implemented.

Noise

Mitigation Measure

N-1 Noise Best Management Practices

- A. The construction contractor will develop and implement a construction-related noise mitigation plan. This plan will depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses; in particular the apartment complexes on the west side of O Street in Reach B-1 and the motel to the west of Reach A-2.
- B. The construction contractor will place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site. During all Project site excavation and grading on-site, the construction contractors will equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.
- C. The construction contractor will locate equipment staging areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction.
- D. The construction contractor will limit all construction-related activities that would result in high noise levels to comply with the city code between the hours of 7:00 a.m. and 6:00 p.m.

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Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays Construction-related activities within 300 feet of an occupied dwelling will be limited to the hours of 8:00 a.m. to 5:00 p.m. No construction will be allowed on Sundays and public holidays.

- E. Haul truck activity will be subject to the same hours specified for construction equipment.
- F. Project haul routes will be developed in the TMP which will minimize the usage of routes through residential neighborhoods or other sensitive land uses.

Transportation/Traffic

Mitigation Measure

T-1 Traffic Management Plan

The City of Antioch (or its contractor) will prepare a Traffic Management Plan (TMP) to manage site access, temporary access restrictions and/or closure of West Tenth Street, material and equipment delivery, and the hauling of soil and vegetation from the site. The TMP will address, but not be limited to, the following:

- A. Access to the Project site (for workers, material and equipment delivery, and dump trucks);
- B. Detour plan for street closures which maximizes the use of the larger streets, such as West Fourth Street and L Street, while minimizing cut-through traffic on the smaller residential streets;
- C. Traffic control measures at ingress/egress points;
- D. Number of dump haul trucks to be used;
- E. Days and hours of haul operation (restrictions during AM and PM peak operating periods);
- F. Haul operation restrictions during community/county events in the area (e.g. Contra Costa County Fair);
- G. Frequency of dump trucks entering and leaving the Project site;
- H. Primary and alternate haul routes to be used to and from the staging areas to the disposal sites; and
- I. Best Management Practices BMPs to prevent tracking dirt onto City streets, consistent with Mitigation Measure AQ-1.

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WEST ANTIOCH CREEK CHANNEL IMPROVEMENT PROJECT

**Final
Initial Study/Mitigated Negative Declaration
and
Responses to Comments**

State Clearinghouse Number 2014042078

September 2014

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**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

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SECTION 1. INTRODUCTION

This document is the Final Initial Study/Mitigated Negative Declaration (Final IS/MND) and Responses to Comments for the West Antioch Creek Channel Improvement Project (Project). It has been prepared in accordance with the California Environmental Quality Act (CEQA) (Public Resource Code Section 21000 et. seq.) and the State CEQA Guidelines (California Code of Regulations Section 15000 et seq.) as amended. This Final IS/MND and Responses to Comments document supplements and updates the Draft Initial Study/Mitigated Negative Declaration (Draft IS/MND) released for public review on April 25, 2014.

The City of Antioch (City) is the Lead Agency for the Project. On April 25, 2014 the City distributed the Draft IS/MND for the Project to public agencies and the general public for review and comment. In accordance with the State CEQA Guidelines, a 30-day review period, which ended on May 28, 2014, was completed. During the public review period, written comments on the Draft IS/MND were received from the Central Valley Regional Water Quality Control Board (CVRWQCB), the Delta Protection Commission, California Department of Fish and Wildlife (CDFW), and the Governor's Office of Planning and Research.

This Final IS/MND and Responses to Comments document is organized as follows:

- Section 1.0 provides a discussion of the purpose of the document and discusses the structure of the document;
- Section 2.0 contains a summary of the Project Description, a description of minor refinements to the Project Description and a discussion regarding why these changes do not require recirculation of the Draft IS/MND;
- Section 3.0 includes the comment letters received and responses to these comments;
- Section 4.0 includes corrections and revisions made to the Draft IS/MND in response to comments;
- Section 5.0 includes the Project's Mitigation Monitoring and Reporting Program (MMRP), prepared pursuant to Public Resources Code Section 21081.6; and
- Section 6.0 includes the Notice of Intent, proof of publication, environmental filing receipt, and the Draft IS/MND.

This Final IS/MND and Responses to Comments document and the Draft IS/MND together constitute the environmental document for the Project.

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SECTION 2. PROJECT OVERVIEW

2.1 Project Location

The Project is located on the northern portion of West Antioch Creek in the City of Antioch, Contra Costa County, California, approximately 0.33 mile from the San Joaquin River/Sacramento-San Joaquin Delta. The City of Antioch is located approximately 36 miles northeast of the City of San Francisco and 42 miles southwest of the City of Sacramento.

2.2 Project Description

The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel that extends to Fourth Street. From Fourth Street, a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues north beyond the BNSF railroad trestle.

The Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and West 8th Street. Project work in Reach B (desilting) would desilt the channel from around West 8th Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed to realize improved levels of flood protection.

2.3 Minor Modifications to the Project Description

2.3.1 Background

The City of Antioch (City) is the Lead Agency for this Project. However, the Contra Costa County Flood Control and Water Conservation District (Flood Control District) also has jurisdiction over the creek channel's flood capacity. The Flood Control District reviewed the document during the public review period and requested inclusion of a modification to Reach A. The Flood Control District provided engineering guidance to the City for the additional alternative. This new alternative is referred to as Alternative 3A.

Alternative 3A would make hydraulic conditions uniform through Reach A, lower the average channel velocity, and minimize erosion and sediment deposition. Alternative 3A fits within the original analysis area of the Project (see Figure 2a of the Draft IS/MND), would not result in environmental impacts that are new or more severe, and does not require any additional mitigation measures.

2.3.2 Description of Minor Modifications

Alternative 3A includes the following modifications requested by the Flood Control District:

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- shifting the four pre-cast concrete box culverts measuring 14 feet wide and 7 feet high under West Tenth Street by 20 feet to the west and backfilling on the east side in Reach A-1;
- demolition of the breezeway attached to the building at 1400 West Tenth Street in Reach A-2;
- demolition of the service bay building on the western edge of 1400 West Tenth Street and the channel geometry and maintenance road would extend into a vacant parcel in Reach A-2; and
- the earthen channel bottom would maintain a width of 82-84 feet in Reach A-2, similar to Alternative 5.

These modifications would result in more uniform hydraulic conditions and lower average channel velocities. With Alternative 3A, the soldier pile retaining wall adjacent to O Street that would be constructed with the other alternatives would be replaced with an earthen slope and the sidewalk would be retained. (See Figure 1. *Alternative 3A: Revised Alternative Minimum Culvert Option.*)

In addition, for Alternative 3A the transition area on the south side of West Tenth Street would be modified. With Alternative 3A, the transition apron and wing walls in Reach A-1 would be modified to a transition basin with a 2-foot drop with rock protection on the bottom, sheet pile walls matching existing bank grade (slope) and rip-rap prior to the basin to prevent scour from the transition structure. The basin would prevent upstream sediment from passing through the channel system and depositing in Reach B. The transition area for Alternative 3A would be approximately 40 feet longer than for the other alternatives and would include a vertical wall backfilled to the sidewalk at the southwest corner of West Tenth Street and O Street. (See Figure 2. *Upstream Transitions* and Figure 3. *Upstream Transition Sections.*)

Alternative 3A would have a slightly larger footprint; however, it would provide improvements in hydraulics, flood capacity, and pedestrian traffic in comparison to the other five alternatives. To implement Alternative 3A, the City would need to acquire permanent and/or temporary construction easements as well as acquire a permanent easement or right-of-way acquisition of a portion or all of the privately owned vacant parcel number 074-130-076, a portion of 1400 West Tenth Street and a portion of 804 O Street, which adjoin the creek to the west and east, respectively. Relocation of the apartment building's carport and demolition of a portion of the service bay building on the western edge of 1400 West Tenth Street would also be required, similar to Alternatives 1, 3, and 5. Although Alternative 3A has a slightly larger footprint than the other five alternatives, it fits within the original analysis area of the Project (see Figure 2a of the Draft IS/MND). Alternative 3A would not result in environmental impacts that are new or more severe and would not require any additional mitigation measures.

Implementation of the conveyance improvements, construction schedule, hauling and disposal, operations and maintenance, and regulatory requirements for Alternative 3A would be the same as described in Section 2.2 of the Draft IS/MND for the other five alternatives. Alternative 3A would require the implementation of all the mitigation measures identified in the MND, similar to Alternatives 4 and 5. Additional details describing Alternative 3A have been added to Section 2 Project Description of the Draft IS/MND and have been included in Section 4 Revisions in this document.

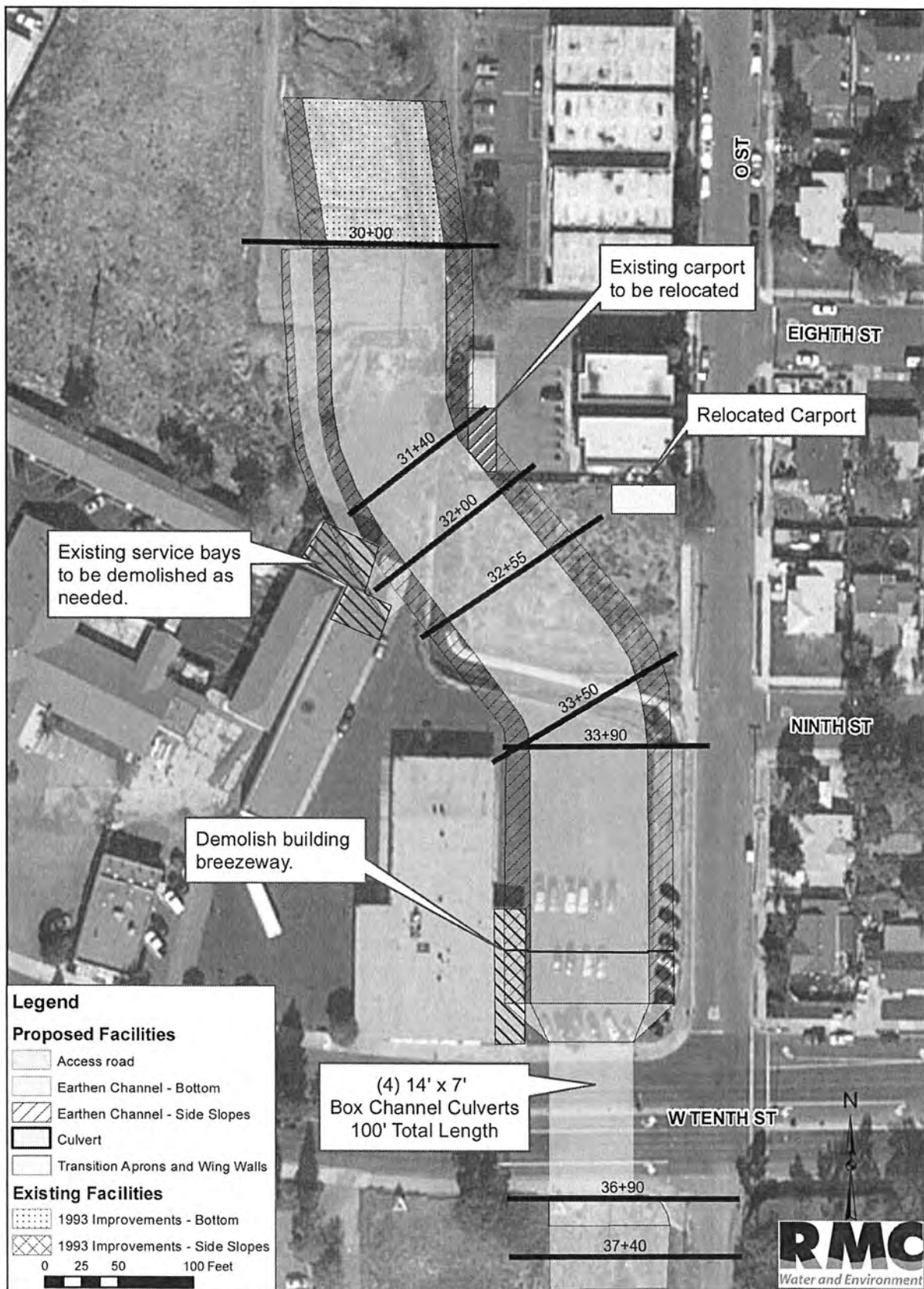


Figure 1. Alternative 3A: Revised Alternative Minimum Culvert Option

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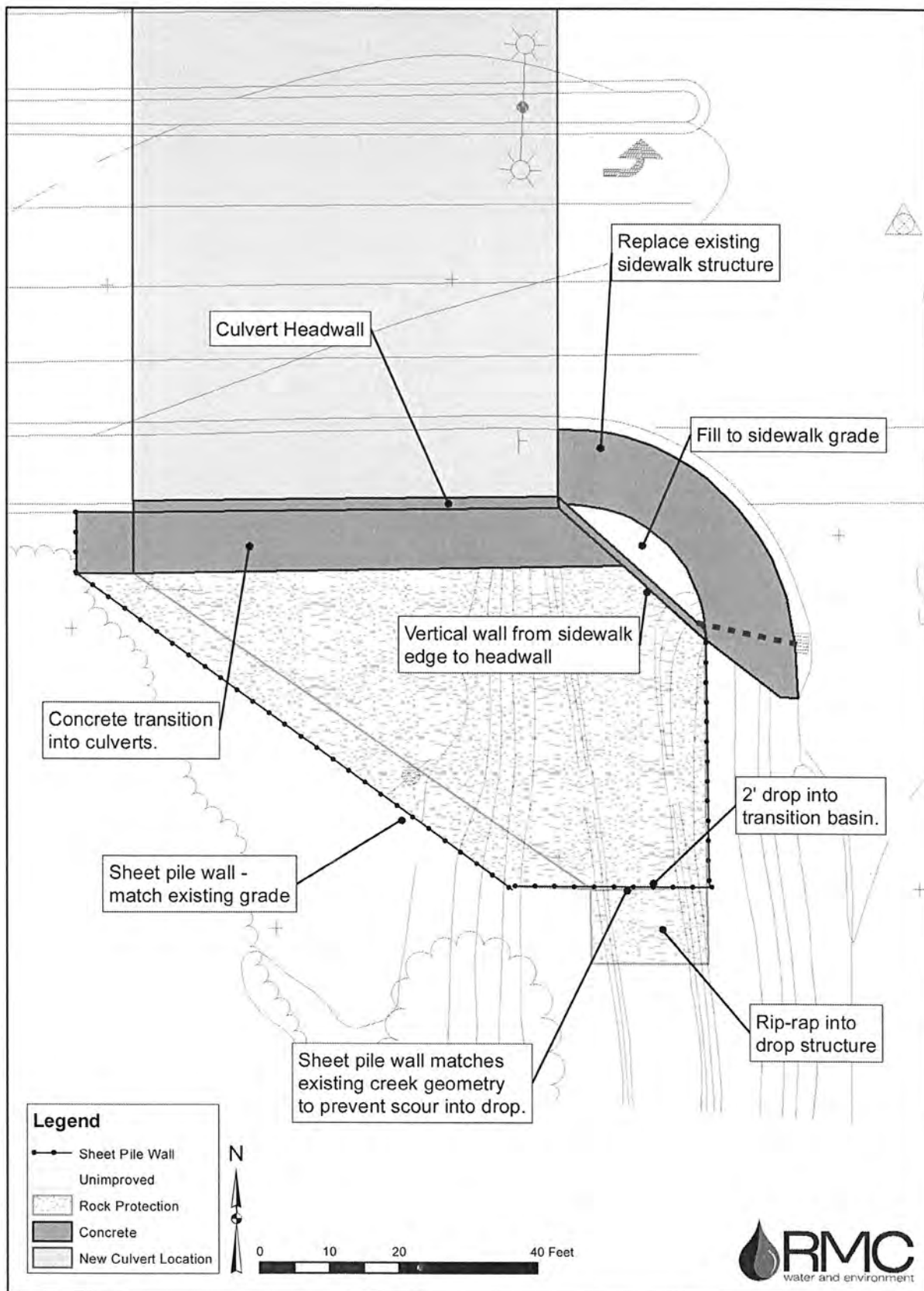
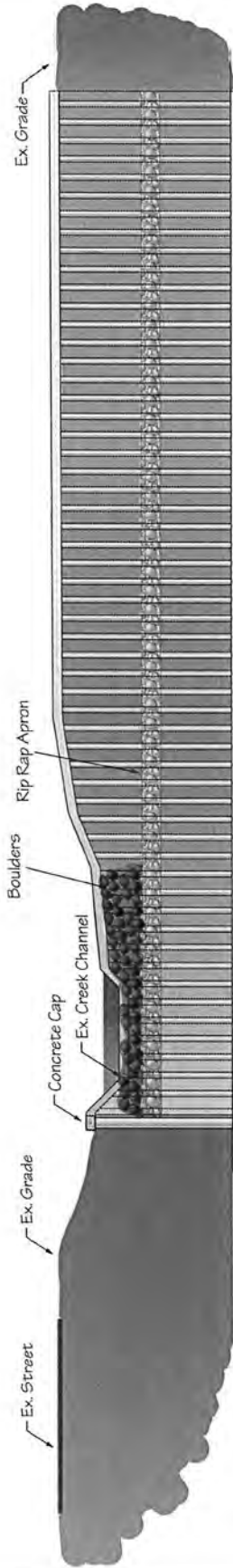
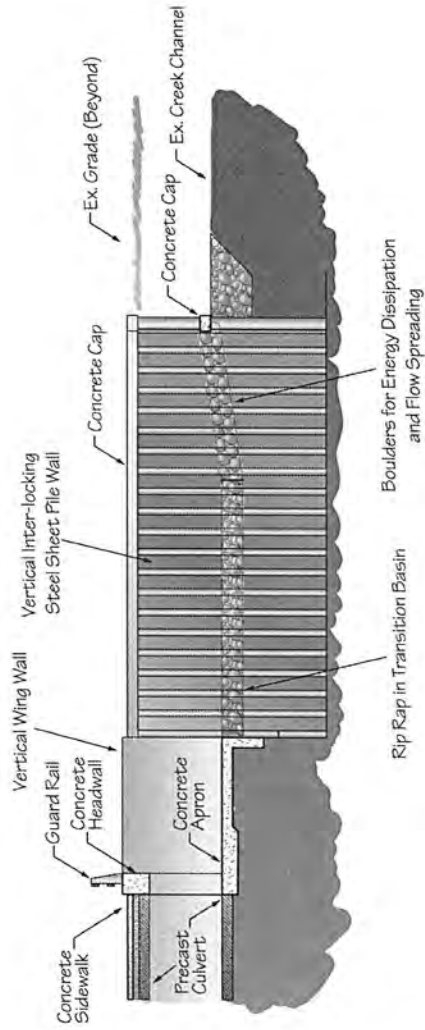


Figure 2. Upstream Transitions

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2.4 Decision Not to Recirculate Draft MND

After the completion of the public/agency comment period for the Draft IS/MND, minor changes were made to the Project Description and other sections of the IS/MND. These revisions do not meet the criteria for recirculation of the MND prior to adoption, outlined in Section 15073.5 of the State CEQA Guidelines. According to the Guidelines "A lead agency is required to recirculate a negative declaration when the document must be substantially revised after public notice of its availability has been given pursuant to Section 15072 but prior to its adoption."

The revisions proposed in this Final IS/MND do not meet the criteria for recirculation provided in Section 15073.5 (c) of the CEQA Guidelines. These criteria are provided below, along with an explanation regarding the reasons why the changes to the project do not require recirculation.

Recirculation is not required under the following circumstances:

- (1) *Mitigation measures are replaced with equal or more effective measures pursuant to Section 15074.1.* No mitigation measures have been replaced. Mitigation Measure BIO-1 has been refined to provide more effective mitigation to sensitive habitat in the Delta and impacted waters.
- (2) *New project revisions are added in response to written or verbal comments on the project's effects identified in the proposed negative declaration which are not new avoidable significant effects.* Changes to the project construction schedule were made in response to CDFW's comment letter. These changes will further minimize impacts to sensitive habitat in the Delta and impacted waters, which were identified in the Draft IS/MND and do not represent new avoidable significant effects.
- (3) *Measures or conditions of project approval are added after circulation of the negative declaration which is not required by CEQA, which do not create new significant environmental effects, and are not necessary to mitigate an avoidable significant effect.* This criterion does not apply to the proposed changes to this Project or Mitigation Measure BIO-1.
- (4) *New information is added to the negative declaration which merely clarifies, amplifies, or makes insignificant modifications to the negative declaration.* The engineering modifications to the Project Description would improve the function of the Project but would not create new, significant or more severe environmental impacts that require new or revised mitigation measures. Although Alternative 3A would have a slightly larger footprint, the alternative would still be within the original analysis area for the Project. Therefore, the modifications to the Project Description do not require recirculation.

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**West Antioch Creek Channel Improvement Project
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SECTION 3. COMMENTS AND RESPONSES

This section of the document contains copies of the comment letters received during the 30-day public review period, which began on April 25, 2014 and ended on May 28, 2014. In conformance with Section 15088(a) of the State CEQA Guidelines, the City has considered comments on environmental issues from reviewers of the Draft IS/MND and has prepared written responses. Letters were received from CVRWQCB, Delta Protection Commission, and CDFW commenting on the Draft IS/MND. Additionally, a letter from the State Clearinghouse, acknowledging that the City has complied with review requirements, was received. These letters, and the responses to the comments contained in the letters are provided in this section.

A list of public agencies, organizations, and individuals that provided comments on the Draft IS/MND is presented below. Each letter is numbered, and each comment within each letter has been assigned a numerical designation so that each comment can be cross-referenced with an individual response. The letters and the responses to the comments follow this page.

List of Comment Letters

Letter Number	Sender	Date Received
1	Delta Protection Commission	5/22/2014
2	California Department of Fish and Wildlife	5/28/2014
3	Central Valley Regional Water Quality Control Board	5/28/2014
4	Governor's Office of Planning and Research, State Clearinghouse	6/2/2014

In addition to the letters received during the public comment period, the Flood Control District provided verbal comments to the City after the completion of the public comment period. These comments were related to minor refinements in Project design, and are described in full in Section 2.3.1.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Letter 1 - Delta Protection Commission, received May 22, 2014

STATE OF CALIFORNIA – NATURAL RESOURCES AGENCY

EDMUND G. BROWN, JR., Governor

DELTA PROTECTION COMMISSION

2101 Stone Blvd., Suite 210
West Sacramento, CA 95691
Phone (916) 375-4800 / FAX (916) 376-3962
Home Page: www.delta.ca.gov



Contra Costa County Board of Supervisors

Sacramento County Board of Supervisors

San Joaquin County Board of Supervisors

Solano County Board of Supervisors

Yolo County Board of Supervisors

Cities of Contra Costa and Solano Counties

Cities of Sacramento and Yolo Counties

Cities of San Joaquin County

Central Delta Reclamation Districts

North Delta Reclamation Districts

South Delta Reclamation Districts

CA State Transportation Agency

CA Department of Food and Agriculture

CA Natural Resources Agency

CA State Lands Commission

May 22, 2014

Mindy Gentry, Senior Planner
City of Antioch
200 H Street,
Antioch, California 94509

SUBJECT: West Antioch Creek Channel Improvement Project
(2014042078)

Dear Ms. Gentry:

Delta Protection Commission (Commission) staff has reviewed the proposed West Antioch Creek Channel Improvement Project (Project) and offer the following comments.

The Great California Delta Trail Act (chapter 839, statutes of 2006) directed the Commission to develop and adopt a plan and implementation program for a continuous regional recreational corridor extending throughout the five Delta Counties, including Contra Costa County, and linking the San Francisco Bay Trail to the Sacramento River Parkway Trail. The Commission has partnered with East Bay Regional Park District (EBRPD) to adopt the Park District Master Plan as part of the Delta Trail Blueprint Report for Contra Costa and Solano Counties. From our review, your project is in the Great California Delta Trail corridor based on the EBRPD Existing and Potential Parklands and Trails map (2013), which includes Class I Multi-use Paths and Class II Bike Lanes. Staff advises that any recreational access improvements be coordinated with EBRPD and the Commission in order to ensure that planned Delta Trail segments are implemented into your Project. This will assist in meeting our overarching goal to increase opportunities for tourism and recreation in the Delta, which is supported by the Commission's Economic Sustainability Plan.

Even though your Project lies within the secondary zone of the legal Delta, it is subject to consistency requirements with the Commission's *Land Use and Resource Management Plan (LURMP)* when the Project has the potential to impact the recreational resources of the primary zone of the Delta. The following LURMP policies apply to your Project:

Rec P4- Encourage new regional recreational opportunities, such as Delta-wide trails, which take into consideration environmental, agricultural, infrastructure, and law enforcement needs, and private property boundaries. Also, encourage opportunities for water, hiking, and biking trails.

1-1

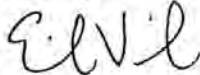
1-2

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Mindy Gentry, City of Antioch
Page 2

Thank you for the opportunity to provide input. Please contact Raymond Costantino, Associate Environmental Planner, at 916-375-4534 for any questions regarding our comments.

Sincerely,



Erik Vink
Executive Director

cc: State Clearinghouse in the Office of Planning and Research
Jim Townsend, Trails Development Programs, EBRPD
Mary Piepho, Commission Vice-Chair and Contra Costa County Board of Supervisor

Letter 1 Responses to Comments

Response to Comment 1-1:

These comments note the Delta Protection Commission's (Commission) responsibilities to protect the Delta and outline the Legislation that mandates the Commission to prepare a plan for the Great California Delta Trail System. The City recognizes that Commission and EBRPD coordination would be needed for any recreational access improvements. No recreational access improvements have been included in the Project however; implementation of the Project would not preclude or hinder the development of recreational access improvements in the future.

Response to Comment 1-2:

These comments also recognize a portion of the Project is within the Secondary Zone of the legal Delta and notes the Project areas potential for future regional trails. As stated in the Draft IS/MND, Section 4.15 Recreation, several recreational facilities exist within a 2-mile radius of the Project area, including the Dow Wetlands Preserve located directly adjacent to the Project site to the northwest and the Contra Costa County Fairgrounds at the southern terminus. However, the Project does not include recreational facilities nor would it require any construction, expansion, or change in any existing facilities that have potential for future regional trail development. The Commission's policy to encourage regional recreational opportunities has been noted.

The City will consider and has noted the Commission's comments moving forward with the planning process; no revisions to the Draft IS/MND are required to address these comments.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Letter 2 – California Department of Fish and Wildlife, received May 28, 2014

From: Stanley, Robert@Wildlife [mailto:Robert.Stanley@wildlife.ca.gov]
Sent: Wednesday, May 28, 2014 9:27 AM
To: Gentry, Mindy
Subject: West Antioch Creek

Good Morning,

I am contacting you about the West Antioch Creek Channel Improvements Project. CDFW was not able to get out our comments letter in time for yesterday's due date but I wanted to share some Project concerns that we did have that may assist you in developing the Project further. I appreciate your early consultation on this Project and bringing me out for a site visit and I hope we can continue this open communication throughout the development and employment of this Project. One, is the work window for Fish Species Avoidance that was pointed out in the document is not what CDFW recognizes. Generally in the Delta and its influenced waters the dates are August 1 to November 30 and inland waters with connection but not direct influence from the Delta is a general work window of June to October with varying dates dependent upon resources present. Two, is the discussion of the alternatives describes that the overall impact is the same for all alternative choices, CDFW feels this is not the case as converting the entire portion of currently open channel into culverts causes an increased impact versus the hybrid, or completely open channel model. CDFW would strongly advise the alternative that increases the amount of open channel versus the entire culvert, as the mitigation to offset the impacts of culvert installation may be at minimum 3 to 1. Third, is clarification on how the City of Antioch will be seeking coverage under the HCP is something that I am sure you in contact with John Kopchik about but is also something CDFW would be more interested in to learn about.

2-1

2-2

2-3

Thank You and feel free to contact me with any comments, concerns, or questions.

Robert Stanley
Environmental Scientist
California Department of Fish and Wildlife
7329 Silverado Trail
Napa, CA 94558

Phone: (707)944-5573
Fax: (707)-944-5563

Letter 2 Responses to Comments

Response to Comment 2-1:

The comment notes that the construction work window is not what CDFW recognizes and that the Delta and influenced waters have a work window of August 1 to November 30.

See Section 4 of this Final IS/MND for revisions to the Draft IS/MND.

Response to Comment 2-2:

The CDFW preference is noted. Alternatives were presented for flexibility and all have been evaluated. All of the alternatives will be impacting Reach A-2, the difference would be that Alternative 2 would not be returning Reach A-2 to an earthen channel. Mitigation will need to be implemented for Reach A-2 for any alternative including the preferred alternative (Alternative 3A). Once the preferred alternative is selected then the required permit applications will be submitted. The applications for the Section 404 Individual Permit and the Section 1602 Streambed Alteration Agreement are anticipated to be submitted to the USACE and CDFW in September of 2014.

The City will consider and has noted the CDFW comments; no major revisions to the Draft IS/MND are required to address this comment.

Response to Comment 2-3:

Comment about the HCP coverage is noted. It is currently anticipated that the Project will not seek HCP coverage.

The City will consider and has noted the CDFW comments; no major revisions to the Draft IS/MND are required to address these comments.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Letter 3 - Central Valley Regional Water Quality Control Board, received May 28, 2014



Central Valley Regional Water Quality Control Board

21 May 2014

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MAY 27 2014

Mindy Gentry
City of Antioch
200 H Street
Antioch, CA 94509

CITY OF ANTIOCH
COMMUNITY DEVELOPMENT

CERTIFIED MAIL
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**COMMENTS TO REQUEST FOR REVIEW FOR THE INTENT TO ADOPT A DRAFT
MITIGATED NEGATIVE DECLARATION, WEST ANTIOCH CREEK CHANNEL
IMPROVEMENT PROJECT, SCH# 2014042078, CONTRA COSTA COUNTY**

Pursuant to the State Clearinghouse's 25 April 2014 request, the Central Valley Regional Water Quality Control Board (Central Valley Water Board) has reviewed the *Request for Review for the Intent to Adopt a Draft Mitigated Negative Declaration* for the West Antioch Creek Channel Improvement Project, located in Contra Costa County.

3-1

Our agency is delegated with the responsibility of protecting the quality of surface and groundwaters of the state; therefore our comments will address concerns surrounding those issues.

Construction Storm Water General Permit

Dischargers whose project disturb one or more acres of soil or where projects disturb less than one acre but are part of a larger common plan of development that in total disturbs one or more acres, are required to obtain coverage under the General Permit for Storm Water Discharges Associated with Construction Activities (Construction General Permit), Construction General Permit Order No. 2009-009-DWQ. Construction activity subject to this permit includes clearing, grading, grubbing, disturbances to the ground, such as stockpiling, or excavation, but does not include regular maintenance activities performed to restore the original line, grade, or capacity of the facility. The Construction General Permit requires the development and implementation of a Storm Water Pollution Prevention Plan (SWPPP).

3-2

For more information on the Construction General Permit, visit the State Water Resources Control Board website at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml.

KARL E. LONGLEY Sr.D, P.E., CHAIR | PAMELA C. CREEDON P.E., BCCE, EXECUTIVE OFFICER
11020 Sun Center Drive #200, Rancho Cordova, CA 95670 | www.waterboards.ca.gov/centralvalley

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West Antioch Creek Channel Improvement Project Final IS/MND and Responses to Comments

West Antioch Creek Channel Improvement
Contra Costa County

- 2 -

21 May 2014

Phase I and II Municipal Separate Storm Sewer System (MS4) Permits¹

The Phase I and II MS4 permits require the Permittees reduce pollutants and runoff flows from new development and redevelopment using Best Management Practices (BMPs) to the maximum extent practicable (MEP). MS4 Permittees have their own development standards, also known as Low Impact Development (LID)/post-construction standards that include a hydromodification component. The MS4 permits also require specific design concepts for LID/post-construction BMPs in the early stages of a project during the entitlement and CEQA process and the development plan review process.

3-3

For more information on which Phase I MS4 Permit this project applies to, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/municipal_permits/.

For more information on the Phase II MS4 permit and who it applies to, visit the State Water Resources Control Board at:
http://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.shtml

Industrial Storm Water General Permit

Storm water discharges associated with industrial sites must comply with the regulations contained in the Industrial Storm Water General Permit Order No. 97-03-DWQ.

3-4

For more information on the Industrial Storm Water General Permit, visit the Central Valley Water Board website at:
http://www.waterboards.ca.gov/centralvalley/water_issues/storm_water/industrial_general_permits/index.shtml.

Clean Water Act Section 404 Permit

If the project will involve the discharge of dredged or fill material in navigable waters or wetlands, a permit pursuant to Section 404 of the Clean Water Act may be needed from the United States Army Corps of Engineers (USACOE). If a Section 404 permit is required by the USACOE, the Central Valley Water Board will review the permit application to ensure that discharge will not violate water quality standards. If the project requires surface water drainage realignment, the applicant is advised to contact the Department of Fish and Game for information on Streambed Alteration Permit requirements.

3-5

If you have any questions regarding the Clean Water Act Section 404 permits, please contact the Regulatory Division of the Sacramento District of USACOE at (916) 557-5250.

¹ Municipal Permits = The Phase I Municipal Separate Storm Water System (MS4) Permit covers medium sized Municipalities (serving between 100,000 and 250,000 people) and large sized municipalities (serving over 250,000 people). The Phase II MS4 provides coverage for small municipalities, including non-traditional Small MS4s, which include military bases, public campuses, prisons and hospitals.

West Antioch Creek Channel Improvement Project Final IS/MND and Responses to Comments

West Antioch Creek Channel Improvement
Contra Costa County

- 3 -

21 May 2014

Clean Water Act Section 401 Permit – Water Quality Certification

If an USACOE permit, or any other federal permit, is required for this project due to the disturbance of waters of the United States (such as streams and wetlands), then a Water Quality Certification must be obtained from the Central Valley Water Board prior to initiation of project activities. There are no waivers for 401 Water Quality Certifications.

3-6

Waste Discharge Requirements

If USACOE determines that only non-jurisdictional waters of the State (i.e., "non-federal" waters of the State) are present in the proposed project area, the proposed project will require a Waste Discharge Requirement (WDR) permit to be issued by Central Valley Water Board. Under the California Porter-Cologne Water Quality Control Act, discharges to all waters of the State, including all wetlands and other waters of the State including, but not limited to, isolated wetlands, are subject to State regulation.

3-7

For more information on the Water Quality Certification and WDR processes, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/help/business_help/permit2.shtml.

Low or Limited Threat General NPDES Permit

If the proposed project includes construction dewatering and it is necessary to discharge the groundwater to waters of the United States, the proposed project will require coverage under a National Pollutant Discharge Elimination System (NPDES) permit. Dewatering discharges are typically considered a low or limited threat to water quality and may be covered under the General Order for *Dewatering and Other Low Threat Discharges to Surface Waters* (Low Threat General Order) or the General Order for *Limited Threat Discharges of Treated/Untreated Groundwater from Cleanup Sites, Wastewater from Superchlorination Projects, and Other Limited Threat Wastewaters to Surface Water* (Limited Threat General Order). A complete application must be submitted to the Central Valley Water Board to obtain coverage under these General NPDES permits.

3-8

For more information regarding the Low Threat General Order and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0074.pdf

For more information regarding the Limited Threat General Order and the application process, visit the Central Valley Water Board website at:

http://www.waterboards.ca.gov/centralvalley/board_decisions/adopted_orders/general_orders/r5-2013-0073.pdf

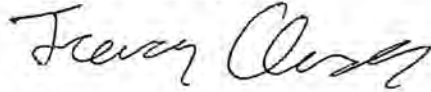
**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

West Antioch Creek Channel Improvement
Contra Costa County

- 4 -

21 May 2014

If you have questions regarding these comments, please contact me at (916) 464-4684 or
tcleak@waterboards.ca.gov.



Trevor Cleak
Environmental Scientist

cc: State Clearinghouse Unit, Governor's Office of Planning and Research, Sacramento

Letter 3 Responses to Comments

Response to Comment 3-1:

This comment notes the CVRWQCB's jurisdictional authority over the surface and groundwaters of the state. This information is acknowledged as the laws, regulations, guidelines, and provisions that were used to determine the potential impacts to hydrology and water quality.

Response to Comment 3-2:

The total acreage of the Project is greater than one acre; therefore the City will obtain coverage under the General Permit for Storm Water Discharges (General Construction Permit Order No. 2009-009-DWQ) and will develop and implement a Storm Water Pollution Prevention Plan (SWPPP).

Response to Comment 3-3:

As stated in the Draft IS/MND, Section 4.9.2 Hydrology and Water Quality, the City is required to comply with the NPDES Municipal Separate Storm Sewer System (MS4) permit issued by the RWQCB. The Project would comply with all requirements of the City's MS4 permit.

Response to Comment 3-4:

The Project is not an industrial site and would not release storm water discharges associated with an industrial site. Therefore, an Industrial Storm Water General Permit is not applicable to this project.

Response to Comment 3-5:

As stated in the Draft IS/MND, Section 2.4 Regulatory Requirements, Permits, and Approvals and Section 4.9.2 Hydrology and Water Quality, the Project requires a 404 Individual Permit and a California Fish and Game Code Section 1602 Streambed Alteration Agreement. The applications for the Section 404 Individual Permit and the Section 1602 Streambed Alteration Agreement were submitted to the USACE and CDFW in September of 2014.

Response to Comment 3-6:

As stated in the Draft IS/MND, Section 2.4 Regulatory Requirements, Permits, and Approvals and Section 4.9.2 Hydrology and Water Quality, the Project requires a Section 401 Water Quality Certification from the CVRWQCB. A request for Section 401 Water Quality Certification is anticipated to be submitted to the CVRWQCB in June of 2014.

Response to Comment 3-7:

The Project will not impact the San Joaquin River/Sacramento-San Joaquin Delta. The San Joaquin River/Sacramento-San Joaquin Delta is determined to be Waters of the U.S. and under the USACE's jurisdiction. A Waste Discharge Requirement Permit is not applicable for this project.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Response to Comment 3-8:

Alternatives 3A, 4, 5 and Reach B as described in the Draft IS/MND Section 4.8.2, may require construction dewatering and discharge of untreated groundwater from a cleanup site as referenced by Order R5-2013-0073 NPDES No. CAG995002. This General Order covers discharges to surface waters of treated or untreated groundwater from cleanup sites, super chlorination projects (generally pipeline or well disinfection projects), and other wastewaters that do not contain human sewage or significant concentrations of oxygen demanding substances prior to treatment for which the Executive Officer determines meets the conditions of this General Order. Therefore, a Low or Limited Threat General National Pollutant Discharge Elimination System (NPDES) permit may be applicable to this project.

The City will consider and has noted the CVRWQCB comments; the Low or Limited Threat General National Pollutant Discharge Elimination System (NPDES) permit has been added to the regulatory section. See Section 4 of this Final IS/MND for revisions to the Draft IS/MND.

West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments

Letter 4 – Governor's Office of Planning and Research, State
Clearinghouse, received June 2, 2014



Edmund G. Brown Jr.
Governor

STATE OF CALIFORNIA
Governor's Office of Planning and Research
State Clearinghouse and Planning Unit



Ken Alex
Director

May 28, 2014

Mindy Gentry
City of Antioch
200 H Street
Antioch, CA 94509

Subject: West Antioch Creek Channel Improvement Project
SCH#: 2014042078

Dear Mindy Gentry:

The State Clearinghouse submitted the above named Mitigated Negative Declaration to selected state agencies for review. On the enclosed Document Details Report please note that the Clearinghouse has listed the state agencies that reviewed your document. The review period closed on May 27, 2014, and the comments from the responding agency (ies) is (are) enclosed. If this comment package is not in order, please notify the State Clearinghouse immediately. Please refer to the project's ten digit State Clearinghouse number in future correspondence so that we may respond promptly.


Please note that Section 21104(c) of the California Public Resources Code states that:

"A responsible or other public agency shall only make substantive comments regarding those activities involved in a project which are within an area of expertise of the agency or which are required to be carried out or approved by the agency. Comments shall be supported by specific documentation."

These comments are forwarded for use in preparing your final environmental document. Should you need more information or clarification of the enclosed comments, we recommend that you contact the commenting agency directly.

This letter acknowledges that you have complied with the State Clearinghouse review requirements for California environmental documents, pursuant to the California Environmental Quality Act. Please contact the State Clearinghouse at (916) 445-0613 if you have any questions regarding the environmental review process.

Sincerely,


Scott Morgan
Director, State Clearinghouse

Enclosures
cc: Resources Agency

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JUN 02 2014

CITY OF ANTIOCH
COMMUNITY DEVELOPMENT

1400 TENTH STREET P.O. BOX 3044 SACRAMENTO, CALIFORNIA 95812-3044
TEL (916) 445-0913 FAX (916) 323-3018 www.opr.ca.gov

West Antioch Creek Channel Improvement Project

Final IS/MND and Responses to Comments

Document Details Report State Clearinghouse Data Base

SCH# 2014042078
Project Title West Antioch Creek Channel Improvement Project
Lead Agency Antioch, City of

Type MND Mitigated Negative Declaration
Description The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel with one concrete-lined segment near 4th Street that continues to north of the BNSF railroad trestle.

Lead Agency Contact

Name Mindy Gentry
Agency City of Antioch
Phone 925 779 6133
email
Address 200 H Street
City Antioch
State CA **Zip** 94509
Fax

Project Location

County Contra Costa
City Antioch
Region
Lat / Long 38° 0' 40" N / 121° 49' 25" W
Cross Streets West Tenth Street and O Street
Parcel No
Township 2N **Range** 1E **Section** **Base**

Proximity to:

Highways SR 4
Airports
Railways BNSF
Waterways West Antioch Creek, Sacramento-San Joaquin Delta
Schools Mission ES
Land Use

Project Issues Aesthetic/Visual; Agricultural Land; Air Quality; Archaeologic-Historic; Biological Resources; Recreation/Parks; Drainage/Absorption; Flood Plain/Flooding; Forest Land/Fire Hazard; Geologic/Seismic; Minerals; Noise; Population/Housing Balance; Public Services; Schools/Universities; Sewer Capacity; Soil Erosion/Compaction/Grading; Solid Waste; Toxic/Hazardous; Traffic/Circulation; Vegetation; Water Quality; Water Supply; Wetland/Riparian; Growth Inducing; Landuse; Cumulative Effects

Reviewing Agencies Resources Agency; Department of Boating and Waterways; Department of Fish and Wildlife, Region 3; Delta Protection Commission; Department of Parks and Recreation; Department of Water Resources; Office of Emergency Services, California; Caltrans, District 4; Air Resources Board; Regional Water Quality Control Bd., Region 5 (Sacramento); Native American Heritage Commission; Public Utilities Commission; State Lands Commission

Date Received 04/24/2014 **Start of Review** 04/25/2014 **End of Review** 05/27/2014

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Letter 4 Responses to Comments

This letter acknowledges that the City of Antioch has complied with State Clearinghouse review requirements for draft environmental documents and does not require a response.

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SECTION 4. REVISIONS TO THE DRAFT INITIAL STUDY / MITIGATED NEGATIVE DECLARATION

As a result of minor Project changes and comments received on the Draft IS/MND, revisions have been made to the Draft IS/MND text. These revisions include minor changes to the Project Description, clarification of impacts and minor revisions to mitigation measures, and do not constitute substantial revisions that would require recirculation of the document. According to Section 15073.5 of the CEQA Guidelines, "a substantial revision shall mean:

- (1) A new, avoidable significant effect is identified and mitigation measures or project revisions must be added in order to reduce the effect to insignificance, or
- (2) The lead agency determines that the proposed mitigation measures or project revisions will not reduce potential effects to less than significance and new measures or revisions must be required."

The revisions are provided below. Changes in text are identified by ~~strikeout~~ where text is removed and by underline where text is added.

-
1. Due to the addition of Alternative 3A, the Project characteristics and alternatives section has been revised.
-

Pages 2-11 through 2-14 and 2-17 through 2-18 of the Draft IS/MND:

2.2 Project Characteristics and Alternatives

Reach A – Conveyance Improvements

~~Five~~Six alternatives were proposed for Reach A. All alternatives would use a minimum of four pre-cast concrete box culverts measuring 14 feet wide and 7 feet high under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to near West 8th Street. Table 1 lists the components of each alternative.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Table 1. Alternatives for Reach A

Alternative	Pre-Cast Box Culvert	Channel Type	Property Acquisition/ Easement Requirements
Alternative 1 (Figure 3a)	Culvert would extend a length of approximately 300 feet from West Tenth Street north to West Ninth Street.	New re-aligned earthen channel from West Ninth Street north to West 8th Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of privately-owned parcels at 1400 West Tenth Street (a commercial building with automotive uses) and at 804 O Street (occupied by an apartment complex), which adjoin the creek to the west and east, respectively. Removal and relocation of the apartment building's carport would also be required.
Alternative 2 (Figure 3b)	Culvert would extend a length of approximately 700 feet from West Tenth Street north to about West 8th Street.	No earthen channel would be included.	City would need to acquire permanent and/or temporary construction easements from 1400 West Tenth Street.
Alternative 3 (Figure 3c)	Culvert would extend a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street north to West 8th Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of privately-owned parcels at 1400 West Tenth Street and at 804 O Street, which adjoin the creek to the west and east, respectively. Removal and relocation of the apartment building's carport would also be required.
Alternative 3A (Figure 3f)	<u>Culvert would extend a length of approximately 100 feet across West Tenth Street.</u>	<u>New re-aligned earthen channel from West Tenth Street north to West 8th Street.</u>	<u>City would need to acquire permanent and/or temporary construction easements as well as acquire a portion or all of the privately-owned vacant parcel number 074-130-076, a portion of 1400 West Tenth Street and a portion of the parcel at 804 O Street, which adjoin the creek to the west and east, respectively. Relocation of the apartment building's carport and demolition of the service bay building on the western edge of 1400 West Tenth Street would also be required.</u>
Alternative 4 (Figure 3d)	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.	City would need to acquire all or most of the property at 1400 West Tenth Street and demolish all existing buildings.
Alternative 5 (Figure 3e)	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West 8th Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of the privately-owned parcels at 1400 West Tenth Street and at 804 O Street, which adjoin the creek to the west and east, respectively. Relocation of the apartment building's carport and demolition of the service bay building on the western edge of 1400 West Tenth Street would also be required.

Alternative Selection. The City evaluated all of the alternatives for Reach A based on the following criteria: hydraulics, property acquisition feasibility, permanent property impacts, change in channel impacts, and permitting feasibility to determine the preferred alternative. Table 2 shows the comparison of all alternatives.

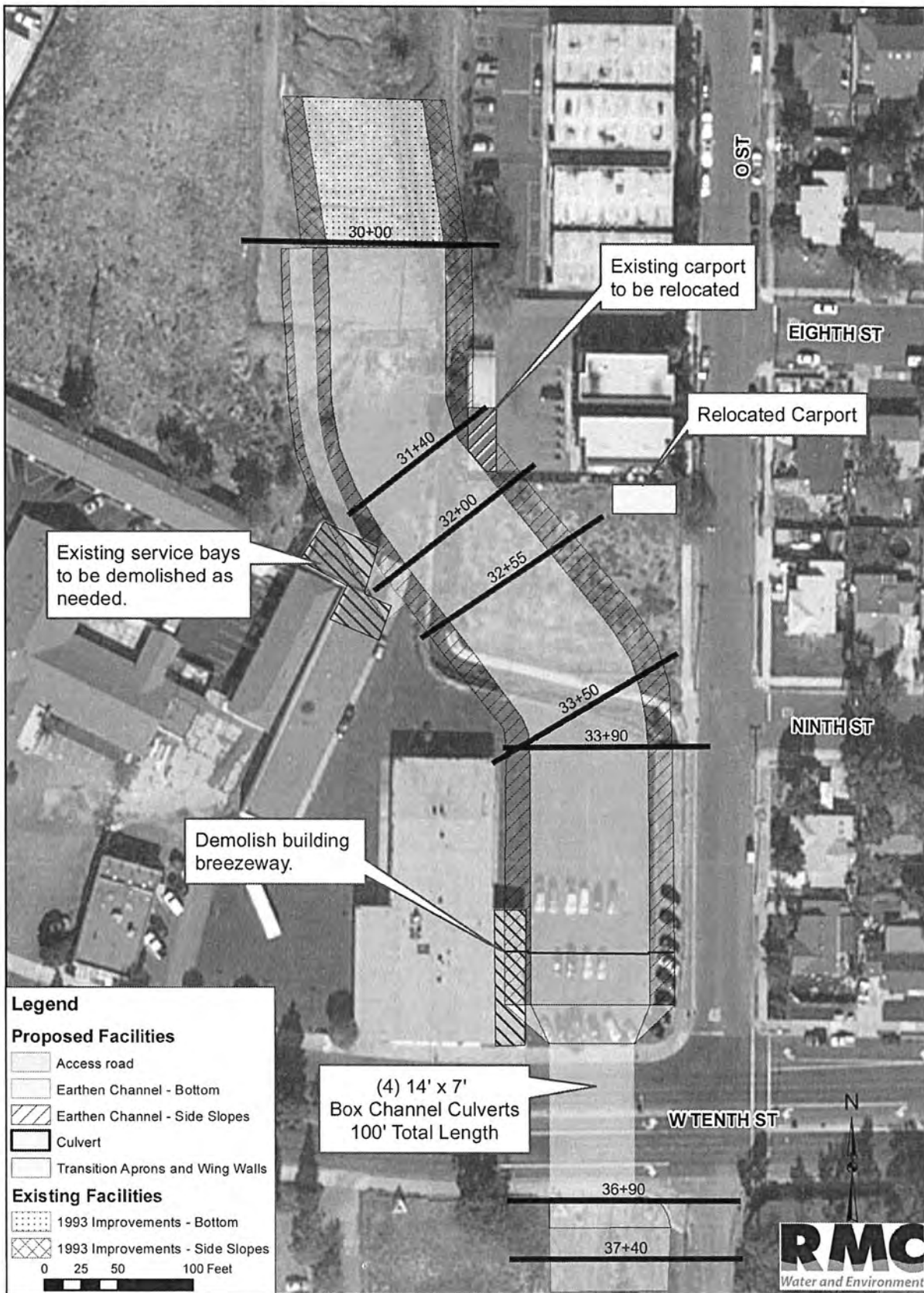


Figure 3F. Alternative 3A: Revised Alternative Minimum Culvert Option

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**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Preferred Alternative. The City's preferred alternative is Alternative 3A because, in comparison to the other alternatives described in the Draft IS/MND, it would result in more uniform hydraulic conditions through Reach A, lower the average channel velocity, and reduce the potential for erosion and sediment deposition. Alternative 3A fits within the original analysis area of the Project (see Figure 2a of the Draft IS/MND), would not result in environmental impacts that are new or more severe, and does not require any additional mitigation measures. Therefore, the City has determined that Alternative 3A is the preferred alternative for improvements to Reach A. This Initial Study evaluates the environmental impacts of implementing Alternative 3A but also evaluates the environmental impacts of the other alternatives. The analysis of the other alternatives includes sufficient information to allow meaningful evaluation and comparison.

Table 2. Alternative Comparison Matrix

Criteria	Alternative 1:	Alternative 2:	Alternative 3:	Alternative 3A:	Alternative 4:	Alternative 5:
Hydraulics	Effective for 25-year flows. 100-year flow conveyance capacity through culvert, limited by upstream and downstream channel capacity.	Effective for 25-year flows. 100-year flow conveyance capacity through culvert, limited by upstream and downstream channel capacity.	Effective for 25-year flows.	<u>Effective for 25-year flows. Improvement over Alternative 3 due to elimination of bottleneck between 1400 West Tenth Street and 804 O Street; and the improved transition structure.</u>	Effective for 25-year flows. Slight improvement over Alternative 3 due to elimination of bottleneck between 1400 West Tenth Street and 804 O Street.	Effective for 25-year flows. Slight improvement over Alternative 3 due to elimination of bottleneck between 1400 West Tenth Street and 804 O Street.
Property Acquisition Feasibility	Moderate to least difficult	Least difficult	Moderate difficulty	<u>Most difficult</u>	Most difficult	Moderate difficulty
	1400 West Tenth Street: Permanent Easement (for culvert): 0.3 acre Acquire (for earthen channel): 0.35 acre	1400 West Tenth Street: Permanent Easement (for culvert): 0.55 acre	1400 West Tenth Street: Acquire: 0.8 acre	<u>1400 West Tenth Street: Acquire: 1.1 acres</u>	1400 West Tenth Street: Acquisition of 1400 West Tenth is not considered feasible by City/County (purchase: 1.3 acres).	1400 West Tenth Street: Acquire: 0.85 acre
	804 O Street: Acquire/Swap (for adjacent County land): 0.02 acre	804 O Street: None	804 O Street: Acquire/Swap: 0.02 acres	<u>804 O Street: Acquire/Swap: 0.02 acres</u>	804 O Street: None	804 O Street: Acquire/Swap: 0.02 acres
	<u>Vacant Parcel # 074-130-076:</u> None	<u>Vacant Parcel # 074-130-076:</u> None	<u>Vacant Parcel # 074-130-076:</u> None	<u>Vacant Parcel # 074-130-076: Acquire 0.03 acres</u>	<u>Vacant Parcel # 074-130-076:</u> None	<u>Vacant Parcel # 074-130-076:</u> None
Permanent Property Impacts	1400 West Tenth Street: ~0.05 acre of paved area at edge of property would be part of earthen channel. Parking on top of the culvert would remain	1400 West Tenth Street: No permanent impacts (parking on top of the culvert would remain available).	1400 West Tenth Street: 0.5 acre of paved area currently used for parking would be part of earthen channel. Northern section of parcel,	<u>1400 West Tenth Street: 0.5 acre of paved area currently used for parking would be part of earthen channel. Northern section of parcel, including 0.2 acre</u>	1400 West Tenth Street: Current buildings in the path of the channel would need to be demolished. Construction	1400 West Tenth Street: 0.5 acre of paved area currently used for parking would be part of earthen channel. Northern section of parcel, including 0.2

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Criteria	Alternative 1:	Alternative 2:	Alternative 3:	Alternative 3A:	Alternative 4:	Alternative 5:
	available. Northern section of parcel, including 0.2 acre of parking and access to service bays would be part of earthen channel, which would restrict access to the service bay buildings.		including 0.2 acre of parking and access to service bays would be part of earthen channel, which would restrict access to the service bay buildings.	<u>of parking and part of the service bay building would be part of earthen channel. Current structures in the path of the channel would need to be demolished and prior to demolition conduct asbestos and lead abatement.</u>	cost includes demolition and \$62k for asbestos and lead abatement.	acre of parking and access to service bay building would be part of earthen channel. Service bay building on western portion of parcel would be demolished and paved to increase on-property parking.
	804 O Street: 40 linear feet of parking structure would need to be relocated.	804 O Street: No impact	804 O Street: 40 linear feet of parking structure would need to be relocated.	<u>804 O Street: 40 linear feet of parking structure would need to be relocated.</u>	804 O Street: No impact	804 O Street: 40 linear feet of parking structure would need to be relocated.
	<u>Vacant Parcel # 074-130-076: No impacts</u>	<u>Vacant Parcel # 074-130-076: No impacts</u>	<u>Vacant Parcel # 074-130-076: No impacts</u>	<u>Vacant Parcel # 074-130-076: 0.03 acres at the east boundary would become part of the drainage channel.</u>	<u>Vacant Parcel # 074-130-076: No impacts</u>	<u>Vacant Parcel # 074-130-076: No impacts</u>
Channel Impacts	Remove 400 feet of open, lined, channel (~0.25 acre), to be replaced by wider earthen channel (~0.85 acres earthen channel area).	Remove 400 feet of open, lined, channel (~0.25 acre), to be replaced by culvert and transition structure.	Replace 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).	<u>Replaces 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel than the other alternatives and add 200 feet of open earthen channel (total earthen channel area ~1.5 acres).</u>	Replaces 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).	Replace 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).
Permitting Feasibility	Moderate Difficulty	Most Difficult	Least Difficult	<u>Least difficult</u>	Least Difficult	Least Difficult

*Phase 1 Environmental Site Assessment (ESA) results indicated no contaminated soil/groundwater that would require special handling; it has been assumed that 10% of soils would require special handling. This assumption will be verified in the Phase 2 ESA. Source: RMC 2013

Sub-Reach A-1 (culvert construction across West Tenth Street)

Access to the channel during construction of Sub-Reach A-1 would be from 1400 West Tenth Street (west side of the channel and north of West Tenth Street) and through the Contra Costa County Fairgrounds (west of the channel, south of West Tenth Street). To construct the culvert across West Tenth Street a cofferdam, sump, and bypass pipe would be installed upstream of the Project. During culvert construction, water flow from the channel would be piped downstream to West 8th Street or other appropriate outfall location, through the bypass pipe.

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West Tenth Street would be subject to temporary access restrictions and/or closure to traffic during construction of the culvert across West Tenth Street, from approximately 200 feet west of West Antioch Creek to O Street. The existing roadway would then be demolished and the existing steel arch culverts would be removed and replaced with four side-by-side pre-cast concrete box culverts. Once the culverts are constructed the creek bypass pipe would be relocated through the new pre-cast concrete box culverts. An eight-inch sewer pipe crossing the culvert in West Tenth Street and water connection to the Contra Costa County Fairgrounds would be replaced and relocated with an inverted siphon in the same area as the existing sewer line relocated as a result of construction. An existing twelve-inch water main, a water service line to the Contra Costa County Fairgrounds, and electrical line for a street light would need to be relocated in the same area as the culverts. A cast-in-place culvert inlet structure would be constructed just south of West Tenth Street. The pre-cast concrete box culverts would then be back-filled and West Tenth Street would be reconstructed, repaved, and reopened for traffic.

Sub-Reach A-2 (earthen channel construction from north side of West Tenth Street to West 8th Street)

The bypass piping of creek flows from the construction of Sub-Reach A-1 would continue through the construction of Sub-Reach A-2. Access to the channel during construction of Sub-Reach A-2 would be from 1400 West Tenth Street (west side of the channel), from Reach B-1 via West Sixth Street (east of channel), from O Street (vacant lot on the east of the channel) and from the south from within the channel.

The existing wooden planking, concrete channel, and paved parking at 1400 West Tenth Street would be demolished and removed. Soil would be excavated and a cast-in-place concrete culvert discharge structure would be constructed at the end of the pre-cast concrete box culverts on the north side of West Tenth Street. Excavation and shaping of the earthen channel would then occur from the discharge concrete structure downstream to West 8th Street. A soldier pile retaining wall would be constructed along the east side of the channel adjacent to O Street. Riprap erosion barriers would be installed along the top of bank and slopes, and the channel bottom would be revegetated. A maintenance road would be installed parallel to the channel on the west side starting at the service bay building at 1400 West Tenth Street to the existing paved service road. See Figure 3f.

Access and Easement Requirements

Construction of the Project would require access to and use of several parcels in the vicinity of the Project area. The required permanent easements, R/W, and temporary construction easements are described in Table 3 and shown in Figure 5.

Table 3. Parcel Information and Easement Requirements

Parcel Information and Easement Requirements		
APN/Location	Permanent Easement or Right-of-Way (R/W) Acquisition	Temporary Construction Easement
067-010-003 (Government-owned) Contra Costa County Fairgrounds 1201 West Tenth Street <i>Southwest corner of O Street and West Tenth Street</i>	Permanent Easement – Required for construction of culvert transition structure and channel transition to upstream creek. Required for ongoing operations and maintenance.	Required for equipment and material hauling access from West Tenth Street.

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Parcel Information and Easement Requirements		
APN/Location	Permanent Easement or Right-of-Way (R/W) Acquisition	Temporary Construction Easement
074-130-060 and 074-130-061 (Privately-owned) Commercial building 1400 West Tenth Street <i>Northwest corner of O Street and West Tenth Street.</i>	Permanent Easement – Required for construction of culvert, culvert transition structure, and open channel. Required for ongoing operations and maintenance.	Required for equipment and material access to permanent easement.
074-130-050 (County-owned) <i>O Street between 074-130-060 and apartment buildings at 804 O Street (074-130-056, 057, 058)</i>	Permanent Easement – Required for construction of culvert, culvert transition structure, open channel, and for relocating the apartment complex carport and parking area. Required for ongoing operations and maintenance. R/W – Portion of the parcel would be conveyed to apartment complex owner for carport and parking area. Remainder would be R/W for West Antioch Creek.	Not Applicable
074-130-056, 057, -058 (Privately-owned) Apartments 804 O Street <i>O Street north of Contra Costa County Parcel (074-130-050)</i>	Permanent Easement – Required for open channel construction. Required for ongoing operations and maintenance.	Required for construction of channel, removal of carport and restoration of parking area.
074-130-XXX (City of Antioch) Creek Channel <i>West Antioch Creek from West 8th Street to West Fourth Street.</i>	Permanent Easement – Required for construction of open channel and desilting of existing improved channel.	Not Applicable
074-130-076 (Privately-owned) <i>Vacant parcel north of motel and adjoins west side of channel.</i>	<u>Permanent Easement – Required for open channel construction. Required for ongoing operations and maintenance.</u> Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.
074-130-064 (Privately-owned) <i>Vacant parcel north of motel and adjoins west side of channel.</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.
074-130-081 (Eastern Contra Costa Transit - Public) <i>Vacant parcel east of Somersville Road/Auto Center Drive and south of West Sixth Street.</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.
074-040-025 (Privately owned) <i>Large parcel north of West Fourth Street and south BNSF encompassing existing West Antioch Creek and RV storage facility.</i>	Permanent Easement – Required for desilting of West Antioch Creek north of West Fourth Street and south of BNSF and for ongoing operations and maintenance.	Required for equipment and material hauling access to east side of West Antioch Creek from West Fourth Street.
074-040-036 (Privately-owned) <i>Vacant parcel northeast of 074-040-025 (RV storage facility).</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, and off-haul operations.
074-040-044 (City-owned) <i>City parcel along south side of BNSF.</i>	Permanent Easement – Required for desilting of West Antioch Creek north of West Fourth Street and south of BNSF and for ongoing operations and maintenance.	Not Applicable

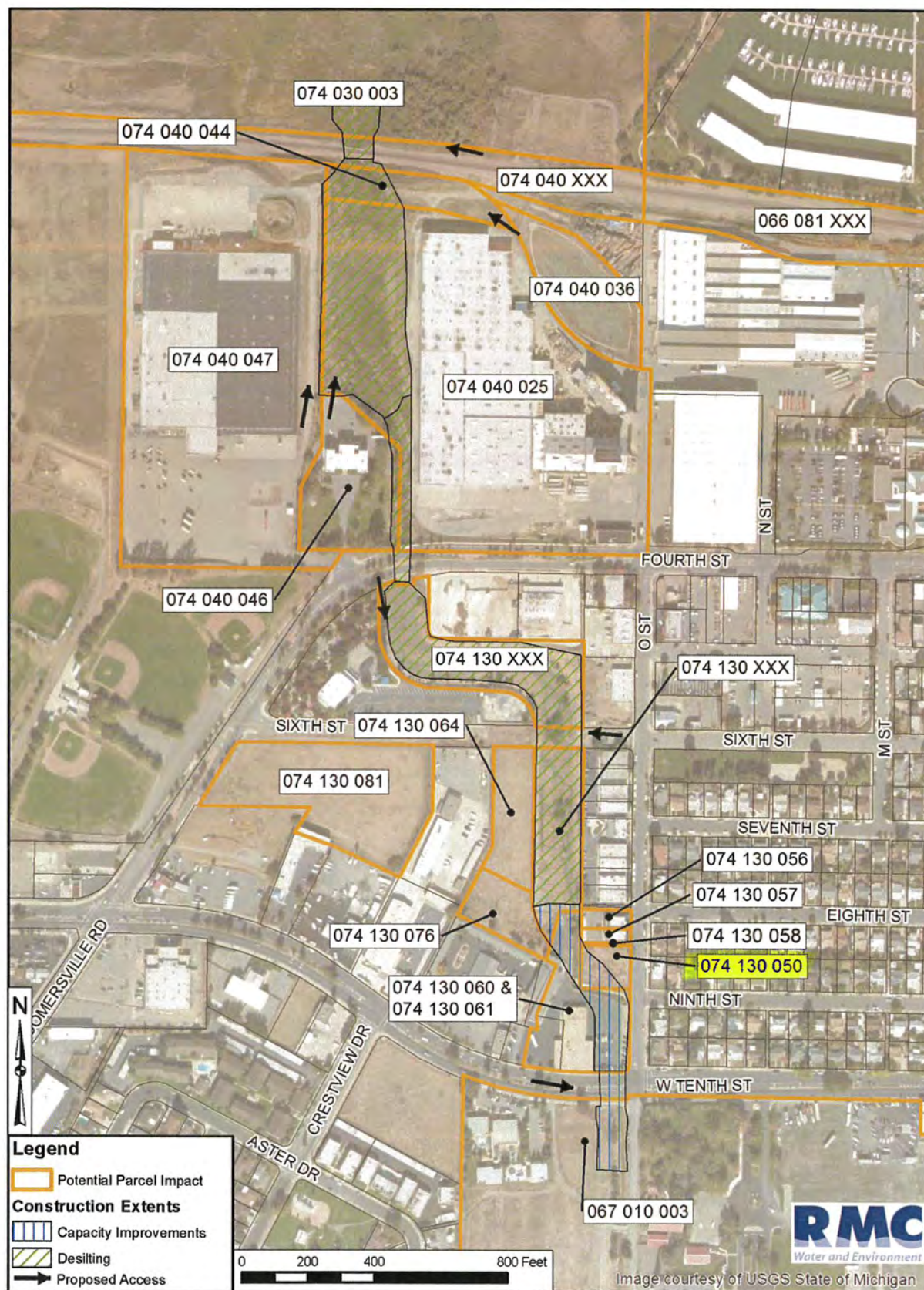


Figure 5. Potentially Impacted Parcels

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Parcel Information and Easement Requirements		
APN/Location	Permanent Easement or Right-of-Way (R/W) Acquisition	Temporary Construction Easement
074-040-046 (Privately-owned) Antioch Historical Society	Not Applicable	Required for equipment and material hauling access to the west side of West Antioch Creek from West Fourth Street.
074-040-047 (Privately-owned) Bond Manufacturing <i>Adjacent to and west of West Antioch Creek.</i>	Not Applicable	Required for equipment and material hauling access to west side of West Antioch Creek from West Fourth Street.
074-040-XXX and 066-081-XXX BNSF Railroad R/W <i>North end of Project area, aligned east & west.</i>	Permanent Easement – Required for ongoing maintenance and operations.	Encroachment permit required for equipment and material hauling access to West Antioch Creek north of BNSF.
074-030-003 (Privately-owned) <i>North of BNSF and West Antioch Marina</i>	Permanent Easement – Required for desilting of West Antioch Creek north of BNSF and for ongoing operations and maintenance.	Required for desilting activities north of BNSF.

2. Due to comments received by CDFW, regarding the work window for the Delta and influenced waters, the construction schedule has been revised.

Page 2-14 of the Draft IS/MND:

Construction Schedule

Construction would occur between 7:00 a.m. and 6:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. No construction would be allowed on Sundays and public holidays. The construction season would extend from March 15 to ~~October 15~~ November 30 which is based on minimizing potential impacts to delta smelt. Reaches A-1, A-2 and B-1 work window will be from March 15 to October 15; Reaches B-2 and B-3 work window will be from June 1 to October 15; and Reach B-4 work window will be from August 1 to November 30. It is anticipated that the Project could be completed in one construction season. If work cannot be completed by the appropriate end date of the work windows, in one construction season, then the City would request an extension from the USFWS and other regulatory agencies with similar restrictions (Nomad 2013a).

Due to comments received by CDFW, regarding the work window for the Delta and influenced waters, Mitigation Measure BIO-1 has been revised.

Page 4-37 of the Draft IS/MND:

Mitigation Measure

BIO-1 Delta Smelt, Sacramento Splittail

- A. To minimize take of delta smelt and Sacramento splittail and minimize disturbance to suitable habitat, desilting activities will be confined to a single calendar year. However, based on the extent of desilting required, in-stream work will be conducted in three work windows, during an extended work window from March 15 to October 15. Reaches A-1, A-2 and B-1 work window will be from March 15 to October 15; Reaches B-2 and B-3 work window will be from June 1 to October 15; and Reach B-4 work window will be from August 1 to November 30. If work cannot be completed by ~~October 15~~ the appropriate end date of

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the work window, the City will request an extension from the United States Fish and Wildlife Service (USFWS).

- B. Standard Best Management Practices (BMPs) will be implemented to maintain water quality and control sedimentation. (See Mitigation Measures AQ-1 and G-1)
- C. Prior to dewatering and cofferdam installation/removal, a USFWS- and CDFW approved biologist will conduct a fish rescue for native fish and immediately relocate them to a suitable location upstream or downstream of the Project site as approved by the USFWS and CDFW. The USFWS/CDFW-approved biologist will be on-site during initial dewatering activities to ensure any fish that remain in the drawdown area are relocated to nearby suitable habitat. The City will submit the qualifications of qualified biologists to the USFWS for review and approval at least thirty (30) calendar days prior to Project initiation.
- D. Temporary fills including cofferdams and access roads will be completely removed following Project completion.
- E. If dewatering is necessary, pump intakes will be screened with mesh in accordance with National Oceanic Atmospheric Administration (NOAA) and National Marine Fisheries Services (NMFS) fish screening criteria for anadromous salmonids (NOAA 1997) to prevent uptake of fish that may be present in the creek.
- F. Sediment curtains will be placed downstream of the construction area during the installation and removal of the cofferdam to minimize downstream sediment transfer.
- G. A spill prevention plan for potentially hazardous materials will be prepared that includes procedures for handling and storing potentially hazardous materials, as well as cleanup and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.
- H. Equipment and materials will not be stored within 50 feet of the creek unless it is on established paved areas. However, if it is necessary to store equipment or materials within 50 feet of the creek, temporary containment berms will be constructed around the equipment/materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Secondary containment will be provided for stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the West Antioch Creek to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to the creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life.
- I. No fueling, cleaning or maintenance of vehicles or equipment, or placement of trash will occur within 50 feet of the creek or floodplain as measured from the top of bank unless it occurs in designated refueling/staging areas on existing paved surfaces with secondary containment in place. Contractors will inspect all equipment/vehicles for leaks prior to using on the Project site and will be inspected regularly throughout the Project duration.
- J. All temporarily disturbed areas will be revegetated with native species suitable for the area. Thus preventing construction activities from becoming vectors for invasive non-native plant species, reduce the need for long-term use of herbicides, and reduce the potential for spreading seed within West Antioch Creek, as well as to neighboring parcels.

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3. Due to comments received by CVRWQCB, regarding potential permitting requirements for the Project, Section 2.4 has been revised.
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Page 2-34 of the Draft IS/MND:

2.4 Regulatory Requirements, Permits, and Approvals

The City of Antioch is working in concert with Contra Costa County Flood Control District; however, the City of Antioch is the approval authority for the Project. Additional subsequent approvals and other permits that may be required from local, regional, state, and federal agencies including, but are not limited to:

- City of Antioch Building Permit and Encroachment Permit;
- Stormwater Construction General Permit (including the development and implementation of a Storm Water Pollution Prevention Plan) from the State Water Resources Control Board;
- Clean Water Act, Section 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board;
- Clean Water Act, Section 404 Individual Permit from the U.S. Army Corps of Engineers-Sacramento District;
- California Fish and Game Code, Section 1602 Streambed Alteration Agreement from California Department of Fish and Wildlife; and
- Federal Endangered Species Act, Section 7, Biological Opinion from the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service and/or California Endangered Species Act, Section 2081, Incidental Take Permit (ITP) from the California Department of Wildlife.
- Low or Limited Threat General National Pollutant Discharge Elimination System (NPDES) permit from the Central Valley Regional Water Quality Control Board
- Railroad Right of Way Encroachment Permit from BNSF.

The City would consult with the Contra Costa County Flood Control District and East Contra Costa County Habitat Conservancy to determine if Reach A of the Project can receive HCP/NCCP permit coverage. Reach A of the Project area is located largely within the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) inventory area. Although the City of Antioch is not a permittee of the HCP/NCCP, the Contra Costa County Flood Control District, an HCP/NCCP permittee, has jurisdiction over drainages that span city and county boundaries including a portion of West Antioch Creek. The Reach B portion (desilting) of the Project is located outside of the HCP/NCCP inventory area and would require separate consultation with regulatory agencies.

SECTION 5. MITIGATION MONITORING AND REPORTING PLAN

5.1 Introduction

In accordance with CEQA, an MND identifying adverse impacts related to the construction activity for the West Antioch Creek Channel Improvement Project was prepared. The MND identifies mitigation measures that would reduce or eliminate these impacts.

Section 21081.6 of the Public Resources Code and Sections 15091(d) and 15097 of the State CEQA Guidelines require public agencies to adopt a reporting and monitoring program for changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment. A Mitigation Monitoring Reporting Plan (MMRP) is required for the Project, because the IS/MND identified potentially significant adverse impacts related to construction activity, and mitigation measures have been identified to mitigate these impacts. Adoption of the MMRP will occur along with approval of the Project.

5.2 Purpose of the Mitigation Monitoring and Reporting Plan

This MMRP has been prepared to ensure that all required mitigation measures are implemented and completed according to schedule and maintained in a satisfactory manner during the construction and operation of the Project, as required. The MMRP may be modified by the City of Antioch during project implementation, as necessary, in response to changing conditions or other project refinements. Table 5-1 has been prepared to assist the responsible parties in implementing the MMRP. This table identifies the category of significant environmental impact(s), individual mitigation measures, monitoring and mitigation timing, responsible person/agency for implementing the measure, monitoring and reporting procedure, and notation space to confirm implementation of the mitigation measures. The numbering of the mitigation measures follows the numbering sequence in the IS/MND.

5.3 Roles and Responsibilities

The City of Antioch is responsible for oversight of compliance of the mitigation measures in the MMRP.

5.4 Mitigation Monitoring and Reporting Plan

The column categories identified in the MMRP table (Table 5-1) are described below.

- **Mitigation Measure** – This column lists the mitigation measures by number.
- **Monitoring Activity/Timing/Frequency/Schedule** – This column lists the activity (ies) to be monitored for each mitigation measure, the timing of each activity, and the frequency/schedule of monitoring for each activity.
- **Implementation Responsibility/Verification** – This column identifies the entity responsible for complying with the requirements of the mitigation measure, and provides space for verification initials and date.
- **Responsibility for Oversight of Compliance/Verification** – This column provides the agency responsible for oversight of the mitigation implementation, and is to be dated and initialed by the agency representative based on the documentation provided by the construction contractor or through personal verification by agency staff.

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- **Outside Agency Coordination** – this column lists any agencies with which the City of Antioch may coordinate for implementation of the mitigation measure.
- **Comments** – this column provides space for written comments, if necessary.

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**Table 5-1
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Mitigation Monitoring and Reporting Program**

Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
<p>AQ-1: Basic Measures from Table 2 of the BAAQMD CEQA Guidelines</p> <p>The following are the Basic Measures from Table 2 of the BAAQMD CEQA Guidelines. Table 2 notes, "The following controls should be implemented at all construction sites."</p> <p>A. Water all active construction areas at least twice daily.</p> <p>B. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.</p> <p>C. Pavement, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.</p> <p>D. Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.</p> <p>E. Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.</p> <p>F. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).</p> <p>G. Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt,</p>	<p>Activity: Comply with BAAQMD Measures.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Construction Contractor</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>Possible coordination with BAAQMD</p>	

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Mitigation Measure	Monitoring Activity/ Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
<p>sand, etc.)</p> <p>H. Limit traffic speeds on unpaved roads to 15 mph.</p> <p>I. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.</p> <p>J. Replant vegetation in disturbed areas as quickly as possible.</p> <p>K. Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.</p> <p>L. Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.</p> <p>M. Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.</p> <p>N. Limit the area subject to excavation, grading and other construction activity at any one time.</p>					
<p>BIO-1 Delta Smelt, Sacramento Splittail</p> <p>A. To minimize take of delta smelt and Sacramento splittail and minimize disturbance to suitable habitat, desilting activities will be confined to a single calendar year. However, based on the extent of desilting required, in-stream work will be conducted in three work windows. Reaches A-1, A-2 and B-1 work window will be from March 15 to October 15; Reaches B-2 and B-3 work window will be from June 1 to October 15; and Reach B-4 work window will be from August 1 to November 30. If work cannot be completed by the appropriate</p>	<p>Activity: Implement construction window and BMPs.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Contractor</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>Possible coordination with CDFW and USFWS.</p>	

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Mitigation Measure	Monitoring Activity/Timing/Frequency/Schedule	Implementation Responsibility/Verification	Responsibility for Oversight of Compliance/Verification	Outside Agency Coordination	Comments
<p>end date of the work window, the City will request an extension from the United States Fish and Wildlife Service (USFWS).</p> <p>B. Standard Best Management Practices (BMPs) will be implemented to maintain water quality and control sedimentation. (See Mitigation Measures AQ-1 and G-1)</p> <p>BIO-1 (continued)</p> <p>C. Prior to dewatering and cofferdam installation/removal, a USFWS- and CDFW approved biologist will conduct a fish rescue for native fish and immediately relocate them to a suitable location upstream or downstream of the Project site as approved by the USFWS and CDFW. The USFWS/CDFW-approved biologist will be on-site during initial dewatering activities to ensure any fish that remain in the drawdown area are relocated to nearby suitable habitat. The City will submit the qualifications of qualified biologists to the USFWS for review and approval at least thirty (30) calendar days prior to Project initiation.</p>					
	<p>Activity: Submit qualifications of biologists to USFWS for approval. Conduct fish rescue and relocation.</p> <p>Timing: 30 calendar days prior to Project initiation.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Coordination with USFWS and CDFW</p>	

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Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
BIO-1 (continued) D. Temporary fills including cofferdams and access roads will be completely removed following Project completion.	Activity: Removing fill. Timing: Prior to Project completion. Frequency: As necessary during construction or prior to completion.	Project Contractor Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with CDFW and CVRWQCB.	
BIO-1 (continued) E. If dewatering is necessary, pump intakes will be screened with mesh in accordance with National Oceanic Atmospheric Administration (NOAA) and National Marine Fisheries Services (NMFS) fish screening criteria for anadromous salmonids (NOAA 1997) to prevent uptake of fish that may be present in the creek.	Activity: Dewatering and screening pump intakes. Timing: During construction. Frequency: As necessary during construction.	Project Contractor Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with CDFW and USFWS.	
BIO-1 (continued) F. Sediment curtains will be placed downstream of the construction area during the installation and removal of the cofferdam to minimize downstream sediment transfer.	Activity: Install sediment curtains. Timing: During installation and removal of cofferdam. Frequency: As necessary during	Project Contractor Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with CDFW, USFWS, and CVRWQCB.	

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Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
<p>BIO-1 (continued)</p> <p>G. A spill prevention plan for potentially hazardous materials will be prepared that includes procedures for handling and storing potentially hazardous materials, as well as cleanup and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.</p> <p>H. Equipment and materials will not be stored within 50 feet of the creek unless it is on established paved areas. However, if it is necessary to store equipment or materials within 50 feet of the creek, temporary containment berms will be constructed around the equipment/materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Secondary containment will be provided for stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the West Antioch Creek to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to the creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life.</p> <p>I. No fueling, cleaning or maintenance of vehicles or equipment, or placement of trash will occur within 50 feet of the creek or floodplain as measured from the top of bank</p>	<p>Activity: Prepare a Spill Prevention Plan and implement BMPs.</p> <p>Timing: Prior to start of construction and during construction</p> <p>Frequency: As necessary during construction.</p>	<p>Project Contractor</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>Possible coordination with CDFW, CUPA, and USFWS.</p>	

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unless it occurs in designated refueling/staging areas on existing paved surfaces with secondary containment in place. Contractors will inspect all equipment/vehicles for leaks prior to using on the Project site and will be inspected regularly throughout the Project duration.					
BIO-1 (continued) J. All temporarily disturbed areas will be revegetated with native species suitable for the area. Thus preventing construction activities from becoming vectors for invasive non-native plant species, reduce the need for long-term use of herbicides, and reduce the potential for spreading seed within West Antioch Creek, as well as to neighboring parcels.	Activity: Revegetation of disturbed areas Timing: To follow after completion of construction Frequency: As necessary during construction.	Project Contractor _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Possible coordination with CDFW, CUPA, and USFWS.	
BIO-2 New Zealand Mudsnaill A. The New Zealand mudsnail (Potamopyrgus antipodarum) is a small aquatic snail native to New Zealand. It is listed as a regulated species by the California Aquatic Invasive Species Management Plan (CDFG 2008). Due to the presence of New Zealand mud snails (a non-native species that range in size from a grain of sand to 1/8 inch in length and are black or brown in color) within West Antioch Creek, which are classified as an invasive species by CDFW, the following precautions are advised: 1. All Project personnel shall be trained in the	Activity: New Zealand mud snail awareness training. Timing: Prior to work activities. Frequency: As necessary during construction.	Project Biologist _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Possible coordination with CDFW.	

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identification, preventative measures, and physical and chemical cleaning methodologies for New Zealand mud snails prior to working on the Project. Brochures or identification cards shall be available to all Project personnel and CDFW informational posters shall be installed at the Project site.					
BIO-2 (continued) 2. After work in West Antioch Creek, all waders, boots, gear, and other equipment will be thoroughly inspected for New Zealand mud snails. A cleaning station will be established on the Project site and maintained throughout the Project duration employing both physical and chemical cleaning methodologies. The cleaning station will implement the preventative and treatment methodologies in accordance with CDFW available at http://www.dfg.ca.gov/invasives/mudsnail/ . 3. A designated cleaning area will be established for heavy equipment and vehicles. All heavy equipment will be cleaned prior to leaving the site in accordance with CDFW guidelines.	Activity: Implement precautions to prevent spread of the New Zealand mud snail. Timing: Prior to work activities. Frequency: As necessary during construction.	Project Contractor _____ Initials _____ Date	City of Antioch _____ Initials _____ Date		

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BIO-2 (continued) 4. Fish and Western pond turtles shall be relocated to a safe location outside the work area, but shall not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.	Activity: Relocation of fish and pond turtles to prevent spread of the New Zealand mud snail. Timing: Prior to work activities. Frequency: As necessary during construction.	Project Biologist _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Possible coordination with CDFW.	

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<p>BIO-3 Western Pond Turtles</p> <p>A. A qualified biologist will conduct a preconstruction survey for western pond turtles immediately prior to work activities within the creek or floodplain downstream from the concrete-lined channel in Reach A-2. If western pond turtles are detected within the work area, no work will occur until they move or are captured and relocated outside of the work area. The on-site biologist will determine, in consultation with CDFW, if capturing and relocating the individual(s) is necessary. If authorized by CDFW, only a biologist in possession of a valid Scientific Collecting Permit will handle or relocate the turtles.</p> <p>B. Western pond turtles should be relocated to a safe location outside the work area, but should not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.</p>	<p>Activity: Conduction preconstruction clearance survey (Reach A-2).</p> <p>Timing: 14 days prior to work construction.</p> <p>Frequency: Once, immediately prior to construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW</p>	
<p>BIO-4 Western Burrowing Owl</p> <p>A. Preconstruction Survey</p> <p>Prior to any ground disturbance related to covered activities, a USFWS/CDFW-approved biologist will conduct a preconstruction survey in areas identified in the planning surveys as having potential burrowing owl habitat. The surveys will establish the presence or absence of western burrowing owl and/or habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFG 2012).</p> <p>On the parcel where the activity is proposed, the</p>	<p>Activity: Preconstruction surveys.</p> <p>Timing: No more than 30 days prior to construction.</p> <p>Frequency: Once prior to construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW.</p>	

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<p>biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys will take place near sunrise or sunset in accordance with CDFW guidelines. All burrows or burrowing owls will be identified and mapped. Surveys will take place no more than 30 days prior to construction. During the breeding season (February 1 – August 31), surveys will document whether burrowing owls are nesting in or directly adjacent to disturbance areas. During the nonbreeding season (September 1 – January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.</p>					
<p>BIO-4 (continued)</p> <p>B. Avoidance and Minimization Measures and Construction Monitoring</p> <p>1. If burrowing owls are found during the breeding season (February 1 – August 31), the Project proponent will avoid all nest sites that could be disturbed by Project construction during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below). Construction may occur during the breeding season if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and</p>	<p>Activity: Avoidance and minimization measures.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW.</p>	

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incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31), the Project proponent shall avoid the owls and the burrows they are using, if possible. Avoidance will include the establishment of a buffer zone (described below).					
BIO-4 (continued) 2. If occupied burrows for burrowing owls cannot be avoided, passive relocation will be implemented during the non-nesting season (September 1-January 31). Owls will be excluded from burrows in the immediate impact zone and within a 160-foot buffer zone by installing one-way doors in burrow entrances. These doors will be in place for 48 hours prior to excavation. The Project area will be monitored daily for 1 week to confirm that the owl has abandoned the burrow. Whenever possible, burrows will be excavated using hand tools and refilled to prevent reoccupation (CDFG 2012). Plastic tubing or a similar structure shall be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.	Activity: Passive relocation Timing: 48 hours prior to excavation, during September 1-January 31. Frequency: As necessary during construction.	Project Biologist _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Possible coordination with CDFW.	

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BIO-5 California Black Rail A. Within 700 feet of the Project footprint, focused preconstruction surveys for active California black rail nests, broods and calling centers will be conducted by a CDFW-approved biologist(s) within two weeks prior to the start of construction and monthly thereafter throughout the duration of the nesting season from February 1 to September 30. If active nests – nests with egg(s) or young present – broods, or calling centers are located in the survey area, all construction activities within 700 feet of the nest, brood or call center will cease immediately, CDFW will be notified within 24 hours of the observation and a 700 foot no-disturbance buffer will be established until the young have fledged unless otherwise directed by CDFW.	Activity: Preconstruction survey. Timing: 2 weeks prior to start of construction and monthly from Feb 1 through Sept 30. Frequency: Once, prior to construction and monthly.	Project Biologist Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with CDFW	
BIO-5 (continued) B. A CDFW-approved biologist(s) will be present on site to monitor for California black rails during construction activities occurring downstream of Fourth Street. The biological monitor will have the authority to stop work if deemed necessary for any reason to protect state listed species. If a California black rail is found in the work area, work within 100 feet of the rail(s) shall cease immediately and the CDFW-approved biologist(s) will monitor the rail until it leaves the work area. If the rail does not leave the work area, work will not restart until after the CDFW have made a decision on how to proceed with further construction activities. CDFW will be notified	Activity: Black rail monitoring. Timing: During construction activities. Frequency: As necessary during construction.	Project Biologist Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with CDFW	

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<p>within 24 hours of an observation of a California black rail.</p> <p>BIO-6 Nesting Birds</p> <p>A. Nesting Raptors</p> <p>1. The removal or trimming of trees within 250 feet of the Project footprint will be conducted during the non-breeding season, i.e. between September 1 and February 1, to avoid impacts to nesting raptors. If tree removal during the non-breeding season is infeasible, trimming or delimbing of suitable trees to discourage nesting shall be conducted during the non-breeding season.</p>	<p>Activity: Tree removal and trimming timing.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Contractor</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW and USFWS</p>	
<p>BIO-6 (continued)</p> <p>2. If Project construction begins during the breeding season, i.e. February 1 to August 31, preconstruction surveys for raptors will be conducted within the Project footprint and a 300-foot buffer, by a qualified biologist no more than two weeks prior to equipment or material staging, pruning/grubbing or surface-disturbing activities.</p>	<p>Activity: Preconstruction surveys.</p> <p>Timing: No more than 2 weeks prior to staging and work activities.</p> <p>Frequency: Once prior to construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW and USFWS</p>	

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<p>BIO-6 (continued)</p> <p>3. If active raptor nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 300 feet of the Project footprint, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.</p>	<p>Activity: Establish buffers around active nests.</p> <p>Timing: During consultation.</p> <p>Frequency: Once with preconstruction survey.</p>	<p>Project Biologist</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>Possible coordination with CDFW and USFWS</p>	

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<p>BIO-6 (continued)</p> <p>B. Protected Under the Migratory Bird Treaty Act</p> <p>1. If active nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 50 feet of the Project footprint during the preconstruction survey described under A. b. above, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.</p>	<p>Activity: Preconstruction survey and monitoring.</p> <p>Timing: No more than 2 weeks prior to staging and work activities.</p> <p>Frequency: Once, prior to construction.</p>	<p>Project Biologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with CDFW or USFWS.</p>	

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BIO-7 Wetlands A. As part of the permitting process, the City will obtain a jurisdictional determination from the USACE of the prepared wetland delineation.	Activity: Obtain wetland determination. Timing: Prior to construction Frequency: Once prior to permit applications.	City of Antioch Initials _____ Date _____	City of Antioch Initials _____ Date _____	Coordination with the USACE.	
BIO-7 (continued) B. Based on the preliminary design, a Section 404 permit application will be submitted to the USACE that includes a detailed analysis of mitigation that results in no net loss of wetlands. Wetland impacts of greater than 0.5 acre or greater than 300 feet of stream may be permitted under a Letter of Permission or an Individual Permit.	Activity: Prepare and obtain required permit. Timing: Prior to construction Frequency: Once prior to construction.	City of Antioch Initials _____ Date _____	City of Antioch Initials _____ Date _____	Coordination with the USACE.	

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BIO-7 (continued) C. Prepare a CDFW 1602 Streambed Alteration Agreement to quantify impacts to riparian and aquatic habitat.	Activity: Prepare and obtain required permit. Timing: Prior to construction. Frequency: Once before construction.	City of Antioch _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with the CDFW.	
BIO-8 Tree Removal Prior to the removal of trees (if necessary) protected under the City of Antioch, Code of Ordinances, Title 9, Ch. 5, Article 12-Tree Preservation and Regulation, the City or its contractor will: A. Prepare and submit an application to the City's Department of Parks, Leisure and Community Services for the removal of established trees.	Activity: Prepare and obtain required permit. Timing: Prior to construction. Frequency: Once before construction.	City of Antioch _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with the City of Antioch Department of Parks, Leisure and Community Services.	

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BIO-8 (continued) B. Replace trees that are legally removed, as follows: All trees that are legally removed shall be replaced according to the following schedule: <input type="checkbox"/> Each established tree: two 24-inch box trees. <input type="checkbox"/> Each mature tree: two 48-inch box trees.	Activity: Tree replacement. Timing: Prior to completion of construction. Frequency: Once prior to completion of construction.	Project Contractor Initials _____ Date _____	City of Antioch Initials _____ Date _____	Coordination with the City of Antioch Department of Parks, Leisure and Community Services.	
C-1 Unanticipated Discovery If subsurface deposits believed to be cultural or human in origin are discovered during construction, then all work will halt within a 100-foot radius of the discovery. A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeologist, will be retained to evaluate the significance of the find, and will have the authority to modify the no-work zone radius as appropriate, using professional judgment. A Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission (NAHC), will be required if the nature of the unanticipated discovery is prehistoric. Work cannot continue within the no-work zone radius until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either1) not	Activity: Unanticipated cultural materials found. Timing: During construction. Frequency: As necessary during construction.	Project Contractor Initials _____ Date _____ Project Archaeologist Initials _____ Date _____	City of Antioch Initials _____ Date _____	Possible coordination with SHPO	

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<p>cultural in origin; or 2) not potentially significant or eligible for listing on the National Register of Historical Places (NRHP) or the California Register of Historic Resources (CRHR).</p> <p>C-1 (continued)</p> <p>If a potentially-eligible resource is encountered, then the archaeologist and the City will arrange for either 1) total avoidance of the resource, if possible; or 2) test excavations to evaluate eligibility and, if eligible, total data recovery as mitigation. The determination will be formally documented in writing as verification that the provisions in CEQA/NEPA for managing unanticipated discoveries have been met.</p>	<p>Activity: Unanticipated cultural materials avoided or evaluated.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Archaeologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Possible coordination with SHPO</p>	

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<p>C-1 (continued)</p> <p>In the event that evidence of human remains is discovered, construction activities within 100 feet of the discovery will be halted or diverted and the requirements for an unanticipated discovery will be implemented. In addition, the provisions of Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and AB 2641 will be implemented. When human remains are discovered, state law requires that the discovery be reported to the County Coroner (Section 7050.5 of the Health and Safety Code) and that reasonable protection measures be taken during construction to protect the discovery from disturbance (AB 2641).</p>	<p>Activity: Unanticipated human remains discovered.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Contractor</p> <p>_____ Initials</p> <p>_____ Date</p> <p>Project Archaeologist</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Coordination with Contra Costa County Coroner and SHPO.</p>	
<p>C-1 (continued)</p> <p>If the Coroner determines the remains are Native American, the Coroner notifies the NAHC, which then designates a Native American Most Likely Descendant (MLD) for the Project (Section 5097.98 of the Public Resources Code). The designated MLD then has 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains (AB 2641). If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (Section 5097.94 of the Public Resources Code). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (Section 5097.98 of the Public Resources Code). This will also include</p>	<p>Activity: Unanticipated human remains determination and relocation.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p> <p>Project MLD</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>Coordination with Contra Costa County Coroner, NAHC and MLD.</p>	

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either recording the site with the NAHC or the Northwest Information Center at Sonoma State University; using an open space or conservation zoning designation or easement; or recording a document with the county in which the property is located (AB2641).					
C-1 (continued) In the event that fossils are encountered, they shall be analyzed to a point of identification and curated at an established accredited museum repository with permanent retrievable paleontological storage. A technical report of findings shall be prepared with an appended itemized inventory of identified specimens and submitted with the recovered specimens to the curation facility.	Activity: Unanticipated paleontological resources found. Timing: During ground-disturbing activities. Frequency: As necessary during construction.	Project Contractor _____ Initials _____ Date Project Paleontologist _____ Initials _____ Date	City of Antioch _____ Initials _____ Date		

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<p>C-2 Paleontological Monitoring for Reach A</p> <p>Paleontological monitoring will be required in Reach A during all subsurface ground-disturbing activities in undisturbed native soils and geological formations. The monitoring will be conducted by a qualified vertebrate paleontologist. The monitor will be equipped to recover fossils and sediment samples during excavation, and shall have the authority to temporarily halt or divert equipment to allow for recovery of large or numerous fossils.</p>	<p>Activity: Paleontological monitoring in Reach A.</p> <p>Timing: During ground-disturbing activities.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Paleontologist</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>		
<p>G-1 Geotechnical Report Recommendations</p> <p>The Project will follow all applicable recommendations made in the Geotechnical Investigation West Antioch Creek Channel Improvements Antioch, California prepared by Hultgren – Tillis Engineers.</p>	<p>Activity: Adhere to all recommendations from the geotechnical investigation.</p> <p>Timing: During construction.</p> <p>Frequency: As necessary during construction.</p>	<p>Project Contractor</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>		

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HM-1 Soil Sampling (Reach B) Soils within Reach B of the West Antioch Creek channel will be sampled in accordance with a Sampling and Analysis Plan to be prepared by a qualified environmental professional in compliance with federal, state and local regulations and industry standards subject to approval by the Regional Water Quality Control Board. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility. If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.	Activity: Soil sampling in Reach B. Timing: Prior to work. Frequency: Once before construction.	Project Contractor _____ Initials _____ Date Environmental Professional _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with CVRW/QCB and CUPA.	
HM-2 Avoidance and Minimization Measures for Personnel A. All personnel working on the Project site shall be informed of the possibility that contaminated soil, soil vapor, and/or groundwater may be encountered on the job site.	Activity: Conduct Worker's Awareness Training. Timing: Prior to start of construction. Frequency: As needed.	Project Contractor _____ Initials _____ Date	City of Antioch _____ Initials _____ Date		

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Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
HM-2 (continued) B. If previously unknown contaminated soils are encountered in the field during demolition or grading, ground disturbance activities in the vicinity of the discovery shall cease until a qualified hazardous materials management specialist can assess the potentially hazardous substances and, if necessary, develop appropriate management measures in coordination with the appropriate regulatory agencies.	Activity: Contamination encountered and assessed. Timing: During construction. Frequency: As needed.	Project Contractor _____ Initials _____ Date	City of Antioch _____ Initials _____ Date		
HM-3 Contaminated Soil from Closed UST Site (Only Reach A Alternatives) If soils in Reach A are to be excavated within 27 feet of the former waste oil underground storage tank (UST), a sampling protocol will be developed by a qualified environmental professional in compliance with federal, state, and local regulations and industry standards. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility.	Activity: Develop sampling protocol (Reach A Alternatives). Timing: Prior to start of construction. Frequency: Once prior to construction.	Environmental Professional _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with CVRWQCB and CUPA.	

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
HM-3 (Continued) If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.	Activity: Contaminated soil assessment and management. Timing: After soil sampling. Frequency: As required.	Hazardous Materials Management Specialist _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with CVRWQCB and CUPA.	
HM-4 Hazardous Materials Survey (Only Reach A Alternatives) Prior to the demolition of buildings or structures located on 1400 West Tenth Street, a survey for building-related hazardous materials will be conducted by qualified and properly certified individuals. Asbestos surveys will be conducted by a California Division of Occupational Safety and Health-certified asbestos consultant or site surveillance technician. Surveys for lead-based/bearing substances and lead-containing surface coatings will be conducted by a California Department of Health Service-certified lead inspector/risk assessor. If present, all recommendations regarding the removal and disposal of hazardous materials in accordance with federal, state, and local regulations will be implemented.	Activity: Conduct survey for hazardous materials (Reach A Alternatives). Timing: Prior to start of construction. Frequency: Once prior to construction.	City of Antioch _____ Initials _____ Date	City of Antioch _____ Initials _____ Date	Coordination with BAAQMD and Cal/OSHA.	

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
<p>N-1 Noise Best Management Practices</p> <p>A. The construction contractor will develop and implement a construction-related noise mitigation plan. This plan will depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses; in particular the apartment complexes on the west side of O Street in Reach B-1 and the motel to the west of Reach A-2.</p> <p>B. The construction contractor will place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site. During all Project site excavation and grading on-site, the construction contractors will equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.</p> <p>C. The construction contractor will locate equipment staging areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction.</p> <p>D. The construction contractor will limit all construction-related activities that would result in high noise levels to comply with the city code between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays Construction-related activities within 300 feet of an occupied</p>	<p>Activity: Develop and implement construction-related noise mitigation plan and BMPs.</p> <p>Timing: Prior to and during construction.</p> <p>Frequency: As required.</p>	<p>Project Contractor</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>	<p>City of Antioch</p> <p>_____</p> <p>Initials</p> <p>_____</p> <p>Date</p>		

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

Mitigation Measure	Monitoring Activity/Timing/Frequency/Schedule	Implementation Responsibility/Verification	Responsibility for Oversight of Compliance/Verification	Outside Agency Coordination	Comments
<p>dwelling will be limited to the hours of 8:00 a.m. to 5:00 p.m. No construction will be allowed on Sundays and public holidays.</p> <p>E. Haul truck activity will be subject to the same hours specified for construction equipment.</p> <p>F. Project haul routes will be developed in the TMP which will minimize the usage of routes through residential neighborhoods or other sensitive land uses.</p>					
<p>T-1 Traffic Management Plan</p> <p>The City of Antioch (or its contractor) will prepare a Traffic Management Plan (TMP) to manage site access, temporary access restrictions and/or closure of West Tenth Street, material and equipment delivery, and the hauling of soil and vegetation from the site. The TMP will address, but not be limited to, the following:</p> <p>A. Access to the Project site (for workers, material and equipment delivery, and dump trucks);</p> <p>B. Detour plan for street closures which maximizes the use of the larger streets, such as West Fourth Street and L Street, while minimizing cut-through traffic on the smaller residential streets;</p> <p>C. Traffic control measures at ingress/egress points;</p> <p>D. Number of dump haul trucks to be used;</p> <p>E. Days and hours of haul operation (restrictions during AM and PM peak operating periods);</p>	<p>Activity: Develop and implement Traffic Management Plan and BMPs.</p> <p>Timing: Prior to and during construction.</p> <p>Frequency: As required.</p>	<p>Project Contractor</p> <p>_____ Initials</p> <p>_____ Date</p> <p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>	<p>City of Antioch</p> <p>_____ Initials</p> <p>_____ Date</p>		

West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments

Mitigation Measure	Monitoring Activity/Timing/ Frequency/ Schedule	Implementation Responsibility/ Verification	Responsibility for Oversight of Compliance/ Verification	Outside Agency Coordination	Comments
<p>G. Frequency of dump trucks entering and leaving the Project site;</p> <p>H. Primary and alternate haul routes to be used to and from the staging areas to the disposal sites; and</p> <p>I. Best Management Practices BMPs to prevent tracking dirt onto City streets, consistent with Mitigation Measure AQ-1.</p>					

To be signed when all mitigation measures have been completed:

Signature _____

Printed Name _____

Date _____

SECTION 6. LIST OF ATTACHMENTS

Attachment A – Notice of Intent

Attachment B – Proof of Publication

Attachment C –Draft Initial Study and Mitigated Negative Declaration West Antioch Creek Channel
Improvement Project

West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments

ATTACHMENT A

Notice of Intent

NOTICE OF INTENT TO ADOPT AN INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

DATE: April 25, 2014

TO: Responsible Agencies, Interested Parties, and Organizations

SUBJECT: **NOTICE OF INTENT TO ADOPT AN INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION FOR THE WEST ANTIOCH CREEK CHANNEL IMPROVEMENT PROJECT**

The City of Antioch Community Development Department Planning Division is the Lead Agency for the proposed West Antioch Creek Channel Improvement Project (Project). In compliance with the California Environmental Quality Act (CEQA), an Initial Study and Mitigated Negative Declaration (IS/MND) was prepared for the Project. The purpose of an IS/MND is to provide decision makers, public agencies, and the general public with an objective and informative document that facilitates a basic understanding of the Project and fully discloses the potential environmental effects associated with the Project, including direct, indirect, and cumulative environmental effects. The City of Antioch will use the IS/MND to obtain permits, agreements, and approvals from necessary agencies to implement the Project.

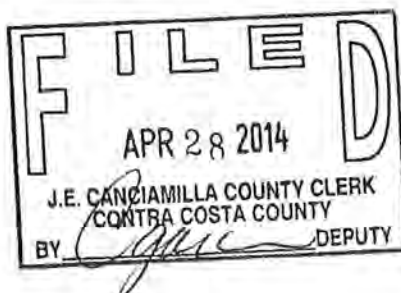
Project Location: The Project is located within the northern reach of West Antioch Creek in the City of Antioch, Contra Costa County, California.

Project Description: The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel with one concrete-lined segment near 4th Street that continues to north of the BNSF railroad trestle.

The Project would be divided into two work types in adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and West Eighth Street. Project work in Reach B (desilting) would desilt the channel from around West Eighth Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed to realize improved levels of flood protection.

Potentially Significant Environmental Impacts: Potentially significant impacts to air quality, biological resources, cultural resources, geology and soils, hazards and hazardous materials, noise, and transportation were identified in the Initial Study. All impacts would be reduced to a less than significant level with the implementation of mitigation measures.

Public Review Period: In compliance with CEQA, the City of Antioch Community Development Department Planning Division has established a 30-day public review period beginning April 25, 2014 to solicit comments and input on the Draft IS/MND.



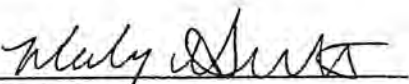
NOTICE OF INTENT TO ADOPT AN INITIAL STUDY AND MITIGATED NEGATIVE DECLARATION

To ensure that all environmental issues are fully identified and adequately addressed, written comments are invited from all interested parties. Written comments regarding the scope and content of information in the Draft IS/MND should be submitted no later than 5:00 pm on May 27, 2014 to:

City of Antioch
Community Development Department
PO Box 5007
Antioch, CA 94531-5007

Correspondence and comments regarding the scope and content of information in the Draft IS/MND may also be submitted to: Mindy Gentry, Senior Planner, (925)779-7035, email: mgentry@ci.antioch.ca.us.

Document Availability: Copies of the Mitigated Negative Declaration are available for review Monday through Thursday, between the hours of 8:00 a.m. and 11:30 a.m., and between the hours of 1:00 p.m. and 5:00 p.m. by appointment only, at the City of Antioch City Hall, Community Development Department, 3rd and H Street, Antioch, CA, except on specified holidays. The Mitigated Negative Declaration is also available online at: www.ci.antioch.ca.us and at the Contra Costa County Public Library, at 501 W. Eighteenth Street, Antioch, California.


Mindy Gentry
Senior Planner

4/17/14
Date

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

ATTACHMENT B

Proof of Publication

East County Times

1700 Cavallo Road
Antioch, CA 94509
(925) 779-7115

Legal No.

0005159206

COPY
FOR FILE

ANTIOCH, CITY OF
GEORGINA MEEK, PO BOX 5007
ANTIOCH CA 94531-5007

PROOF OF PUBLICATION

FILE NO. NOI

In the matter of

East County Times

I am a citizen of the United States and a resident of the County aforesaid; I am over the age of eighteen years, and not a party to or interested in the above-entitled matter.

I am the Principal Legal Clerk of the East County Times, a newspaper of general circulation, printed and published at 2640 Shadelands Drive in the City of Walnut Creek, County of Contra Costa, 94598

And which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Contra Costa, State of California, under the date of January 6, 1919. Case Number 8268.

The notice, of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to-wit:

4/25/2014

DATE: April 25, 2014

TO: Responsible
Agencies, Interested
Parties, and Organiza-
tions

SUBJECT: NOTICE OF
INTENT TO ADOPT AN
INITIAL STUDY AND
MITIGATED NEGATIVE
DECLARATION FOR
THE WEST ANTIOCH
CREEK CHANNEL IM-
PROVEMENT PROJECT

The City of Antioch Community Development Department Planning Division is the Lead Agency for the proposed West Antioch Creek Channel Improvement Project (Project). In compliance with the California Environmental Quality Act (CEQA), an Initial Study and Mitigated Negative Declaration (IS/MND) was prepared for the Project. The purpose of an IS/MND is to provide decision makers, public agencies, and the general public with an objective and informative document that facilitates a basic understanding of the Project and fully discloses the potential environmental effects associated with the Project, including direct, indirect, and cumulative environmental effects. The City of Antioch will use the IS/MND to obtain permits, agreements, and approvals from necessary agencies to implement the Project.

Project Location: The Project is located within the northern reach of West Antioch Creek in the City of Antioch, Contra Costa County, California.

Project Description: The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth Street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel with one concrete-lined segment near 4th Street that continues to north of the BNSF railroad trestle.

The Project would be divided into two work

RECEIVED

APR 28 2014

CITY OF ANTIOCH
FINANCE DEPT.

I certify (or declare) under the penalty of perjury that the foregoing is true and correct.

Executed at Walnut Creek, California.
On this 25th day of April, 2014.

Anna Darr
Signature

review Monday
through Thursday, be-
tween the hours of
8:00 a.m. and 11:30
a.m., and between the
hours of 1:00 p.m. and
5:00 p.m. by appoint-
ment only, at the City
of Antioch City Hall,
Community Develop-
ment Department, 3rd
and H Street, Antioch,
CA, except on speci-
fied holidays. The Mitig-
ated Negative Decla-
ration is also available
online at: www.ci.antioch.ca.us and at the
Contra Costa County
Public Library, at 501
W. Eighteenth Street,
Antioch, California.
ECT#5159206
April 25, 2014

RECEIVED

APR 28 2014

CITY OF ANTIOCH
FINANCE DEPT.

**West Antioch Creek Channel Improvement Project
Final IS/MND and Responses to Comments**

ATTACHMENT C

Draft Initial Study and Mitigated Negative Declaration West Antioch Creek Channel
Improvement Project



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

DRAFT
Initial Study and Mitigated
Negative Declaration
West Antioch Creek Channel
Improvement Project



April 2014

Lead Agency:

City of Antioch

200 H Street

Antioch, CA 94509

Prepared By:

ECORP Consulting, Inc.

2525 Warren Drive

Rocklin, CA 95677

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

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**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

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**Draft Initial Study and Mitigated Negative Declaration
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**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

ACRONYMS AND ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
BAC	Bollard Acoustical Consultants
BMP	Best Management Practices
BNSF	Burlington Northern Santa Fe railroad
BRA	Biological Resource Assessment
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CCC	Contra Costa County
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CO	carbon monoxide
CRHR	California Register of Historical Resources
CEPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CNPS	California Native Plant Society
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
dBA	Decibel
DOC	California Department of Conservation
EBRPD	East Bay Regional Park District
EIR	Environmental Impact Report
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FR	Federal Register
GHG	Greenhouse Gas
GIS	Geographic Information Systems
HCP	Habitat Conservation Plan
HHW	Household Hazardous Waste
HTE	Hultgren - Tillis Engineers
ITP	incidental take permit
KDA	KD Anderson and Associates
LDL	Larson Davis Laboratories
MBTA	Migratory Bird Treaty Act
MLD	Most Likely Descendant
MND	Mitigated Negative Declaration
MTC	Metropolitan Transportation Commission
NAHC	Native American Heritage Commission
NCCP	Natural Communities Conservation Plan
ND	Negative Declaration
NMFS	National Marine Fisheries Service
NOA	naturally occurring asbestos
NOAA	National Oceanic Atmospheric Administration
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Services
NRHP	National Register of Historic Places
OAP	ozone attainment plans
OS	Open Space
PBC	Planned Business Center
PCE	Primary Constituent Elements
PCF	Pounds per cubic feet
PIF	Partners in Flight
PJD	preliminary jurisdictional determination
PM	Particulate Matter
PM ₁₀	Particulate Matter 10 microns in diameter
PM _{2.5}	Particulate Matter 2.5 microns in diameter
PSF	Pounds per square foot
RECs	Recognized Environmental Concerns
ROG	Reactive Organic Gases
R/W	Right-of-Way
RWQCB	Regional Water Quality Control Board
SEL	Sound Exposure Level
SFBAAB	San Francisco Bay Area Air Basin
SFBD	San Francisco Bay Delta
SO ₂	sulfur dioxide
SR	State Route
SR-4	State Route 4
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminants
TMP	Traffic Management Plan
TPY	Tons per Year
TPH	Total Petroleum Hydrocarbons
UCMP	University of California Museum of Paleontology
US	United States
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground Storage Tank

SECTION 1. BACKGROUND

1.1 Summary

Project Title:	West Antioch Creek Channel Improvement Project
Lead Agency Name and Address:	City of Antioch 200 'H' Street Antioch, CA 94509
Contact Person and Phone Number:	Mindy Gentry, Senior Planner City of Antioch 200 'H' Street Antioch, CA 94509 (925) 779-6133
Project Location:	The Project is located within the northern reach of West Antioch Creek in the City of Antioch, Contra Costa County, California.
General Plan Designation:	Reach A-1 is designated as Open Space Reaches A-2 and B-1 are designated Commercial B-2 and B-3 are designated Business Park B-4 is designated as Dow Wetlands Preserve
Zoning:	Reach A-1 is Zoned U – Unincorporated Area (Not Zoned) Reaches A-2 and B-1 are Zoned Neighborhood/Community Commercial District (C-2) and High Density Residential (R-20) Reaches B-2 and B-3 are Zoned Planned Business Center (PBC) Heavy Industrial District Reach B-4 is Zoned OS – Open Space/Public Use District

1.2 Introduction

The City of Antioch Community Development Department Planning Division is the Lead Agency for this Initial Study. The Initial Study has been prepared to identify and assess the anticipated environmental impacts of the West Antioch Creek Channel Improvement Project. This document has been prepared to satisfy the California Environmental Quality Act (CEQA) (Pub. Res. Code, Section 21000 *et seq.*) and state CEQA Guidelines (14 California Code of Regulations (CCR) 15000 *et seq.*). CEQA requires that all state and local government agencies consider the environmental consequences of projects over which they have discretionary authority before acting on those projects. A CEQA Initial Study is generally used to determine which CEQA document is appropriate for a project (Negative Declaration [ND], Mitigated Negative Declaration [MND], or Environmental Impact Report [EIR]).

The West Antioch Creek Channel Improvement Project (Project) is located in the City of Antioch, Contra Costa County (Figure 1 *Vicinity*). The Project would reduce flood risk in the Project area by increasing the capacity of the West Antioch Creek channel between West Tenth Street and West Eighth Street and re-establishing the 25-year flood protection capacity of the channel downstream of West Eighth Street to the Burlington Northern Santa Fe (BNSF) railroad trestle.

1.3 Surrounding Land Uses/Environmental Setting

The West Antioch Creek Channel Improvement Project is located in the northwestern portion of the City of Antioch, in northern Contra Costa County California, approximately one-third of a mile from the San Joaquin River/Sacramento-San Joaquin Delta. The City of Antioch is located approximately 36 miles northeast of the City of San Francisco and 42 miles southwest of the City of Sacramento (Figure 1. *Vicinity*).

Land uses adjacent to the Project site include multi-family residential buildings, the Contra Costa County fairgrounds, a commercial building with automotive parts, repair, and maintenance shops, the Antioch Historical Society Museum, and commercial and industrial properties (Figure 2a. *Project Location/Surrounding Land Uses*). The Project site is an urban creek channel between West Tenth Street and approximately 200 feet north of the BNSF railroad trestle including adjacent vacant parcels for staging/stockpiling and access (Figure 2b. *Staging/Stockpiling Areas and Access Points*). The creek channel runs under West Tenth Street at the southern boundary, under a parking lot, then opens to a concrete lined channel, and then to an earthen channel that extends to Fourth Street. From Fourth Street a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues north beyond the BNSF railroad trestle. Surrounding land uses by reach are described below, from south to north:

- **Reach A-1.** This reach is located on the Contra Costa County Fairground site and under West Tenth Street. Adjacent uses include a commercial building with automotive maintenance and repair, auto glass replacement, car stereo installation, and remote controlled hobby vehicle sales (former Al Eames Ford dealership) to the north, additional Fairground lands to the south and west, and a strip of land with utility lines to the east.
- **Reach A-2.** This reach contains privately owned land at 1400 West Tenth Street, and land owned by the Contra Costa County Flood Control District. To the north of the reach is additional creek channel, to the east is apartments that front O Street, privately owned vacant land, O Street and residences, to the west is the former Al Eames Ford dealership, and to the south is the Contra Costa County Fairgrounds.
- **Reach B-1.** This reach is an earthen channel that runs from near Eighth Street to Fourth Street. To the north of the reach is Fourth Street/Auto Center Drive, to the west is Golf & Games Family Fun Center, Sixth Street, privately owned vacant property, and industrial buildings, and to the east is residences, businesses, and industrial businesses.
- **Reach B-2.** This reach is a concrete-lined channel that runs from Fourth Street to just northeast of the Antioch Historical Society Museum. To the west of the reach is the Antioch Historical Society Museum, to the south is Fourth Street/Auto Center Drive, and to the east are warehouses, industrial, and manufacturing space/buildings.
- **Reach B-3.** This reach is an earthen channel that runs from the Antioch Historical Society Museum to just south of the BNSF railroad trestle. To the north is the BNSF railroad trestle, to the west is the Bond Manufacturing facility, to the east is warehouses, industrial, and manufacturing space/buildings, and to the south is the Antioch Historical Society Museum.
- **Reach B-4.** This reach runs from the southern limit of the BNSF railroad trestle to approximately 200 feet north of the trestle. To the south is the BNSF railroad trestle and to the west, north and east is the Dow Wetlands Preserve.

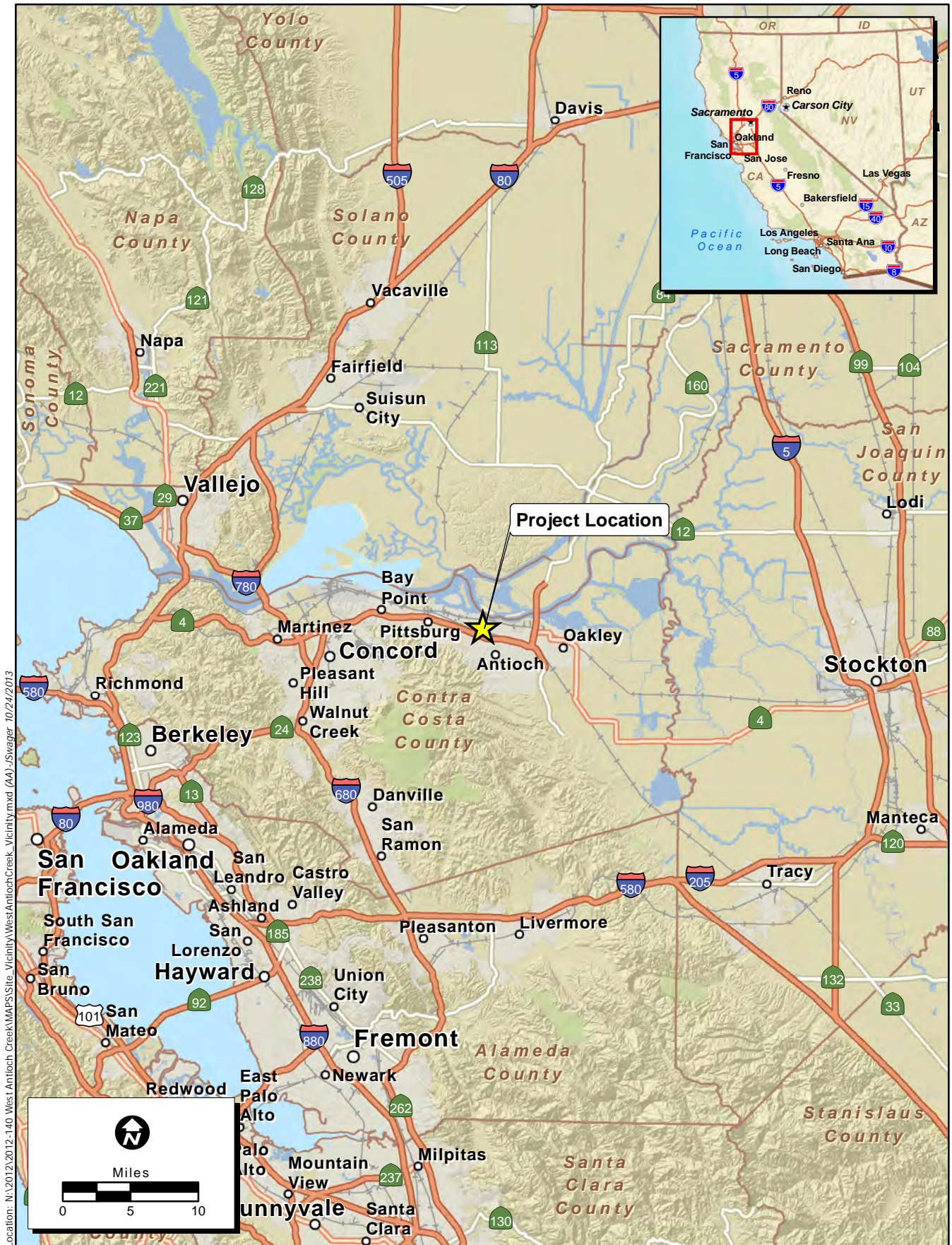


Figure 1. Vicinity

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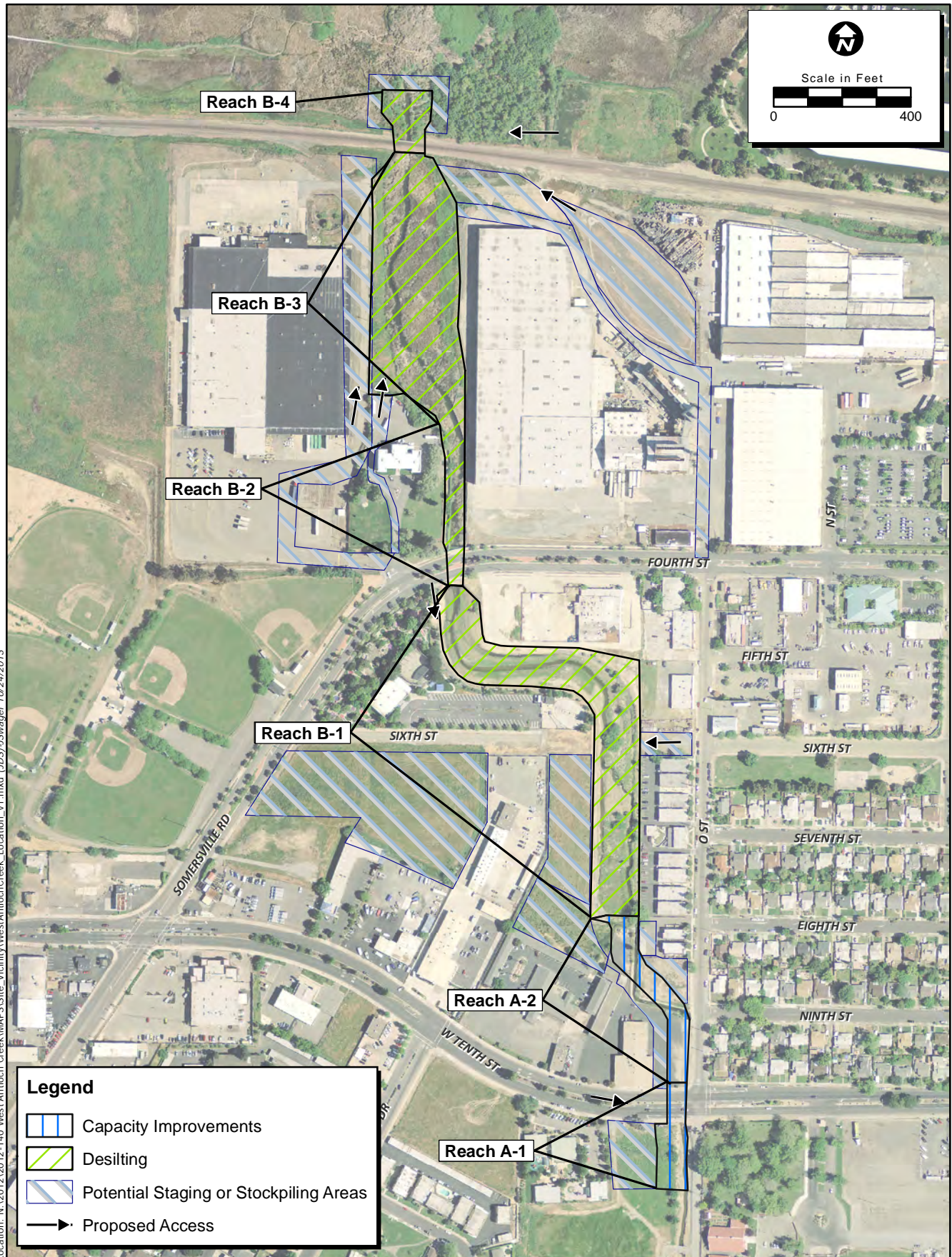
Location: N:\2012\2012-140 West Antioch Creek\WAPS\Site_Vicinity\WestAntiochCreek_Location_v1b.mxd (JDS)-Swager 4/17/2014

Map Date: 4/17/2014
 Photo Source: USGS 2011
 Base Data: RMC

Figure 2a. Project Location/Surrounding Land Uses

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Map Date: 10/24/2013
Photo Source: USGS 2011
Base Data: RMC

Figure 2b. Staging/Stockpiling Areas and Access Points

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SECTION 2. PROJECT DESCRIPTION

2.1 Project Background

In 1993, the Contra Costa County Flood Control District completed channel improvements for West Antioch Creek (1993 Project). The 1993 Project improved the conveyance capacity from approximately 200 feet north of the BNSF railroad crossing upstream (south) to around West Eighth Street to convey up to the 25-year storm event flows. The 25-year level of protection was the design conveyance criterion for the 1993 Project. The available funding at the time did not allow channel improvements to extend upstream of West Eighth Street. As a result, a 650-foot segment of undersized channel exists between the southern limits of the 1993 Project to the earthen trapezoidal channel on the Contra Costa County Fairgrounds property south of West Tenth Street (Figure 2a. *Project Location/Surrounding Land Uses*).

The 650-foot segment of channel described above transitions from an earthen trapezoidal channel near the Contra Costa County Fairgrounds to structural plate steel arch culverts under West Tenth Street, then to a 20- to 25-foot wide concrete ditch in the reach of the creek between West Tenth Street and West Eighth Street. This segment of the channel has the capacity to convey runoff from an approximately one- to two-year return period storm event. Furthermore, the 1993 Project has significantly diminished capacity due to sediment deposition. As a result, flooding can occur several times a year adjacent to West Antioch Creek near the intersection of West Tenth Street and O Street (Photo 1).

Flooding in this area is a public safety concern and results in property and economic damage. Frequent flooding results in numerous road closures several times a year. Road closures and flood damage result in the loss of commercial business, impacts adjacent residential properties, and the City of Antioch's Public Works maintenance yard. Furthermore, the effort by the City to enforce road closures, fight floodwaters, and to clean up debris after flooding recedes is a drain on the City's resources and budget. The Project was developed to increase the capacity of the West Antioch Creek channel to reduce flooding in the area and the impacts that result from it.



Photo 1. Flooding at the intersection of O and West Tenth Streets in 2006.



Photo 2. Existing culverts under West Tenth Street.

2.2 Project Characteristics and Alternatives

The Project is intended to reduce flooding in the Project area by designing for a 25-year level of protection. Currently within the Project area, the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth street (Photo 2), to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street (Photo 3), to an open concrete-lined ditch adjacent to a carport associated with a neighboring apartment building, to an earthen channel that extends to Fourth Street. From Fourth Street a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues north beyond the BNSF railroad trestle.

The Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and West Eighth Street. Project work in Reach B (desilting) would desilt the channel from around West Eighth Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity (Figure 2b. *Staging/Stockpiling Areas and Access Points*). Either reach can be improved independently from the other or concurrently, but work in both reaches must be completed to realize improved levels of flood protection. Additional photos of each reach can be found in section 4.1 Aesthetics.



Photo 3. Creek channel under wooden planking (north side of West Tenth and O streets) and apartment building on east side of creek channel.

Reach A – Conveyance Improvements

Five alternatives were proposed for Reach A. All alternatives would use a minimum of four pre-cast concrete box culverts measuring 14 feet wide and 7 feet high under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to near West Eighth Street. Table 1 lists the components of each alternative.

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Table 1. Alternatives for Reach A

Alternative	Pre-Cast Box Culvert	Channel Type	Property Acquisition/ Easement Requirements
Alternative 1 (Figure 3a)	Culvert would extend a length of approximately 300 feet from West Tenth Street north to West Ninth Street.	New re-aligned earthen channel from West Ninth Street north to West Eighth Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of privately-owned parcels at 1400 West Tenth Street (a commercial building with automotive uses) and at 804 O Street (occupied by an apartment complex), which adjoin the creek to the west and east, respectively. Removal and relocation of the apartment building's carport would also be required.
Alternative 2 (Figure 3b)	Culvert would extend a length of approximately 700 feet from West Tenth Street north to about West Eighth Street.	No earthen channel would be included.	City would need to acquire permanent and/or temporary construction easements from 1400 West Tenth Street .
Alternative 3 (Figure 3c)	Culvert would extend a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street north to West Eighth Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of privately-owned parcels at 1400 West Tenth Street and at 804 O Street, which adjoin the creek to the west and east, respectively. Removal and relocation of the apartment building's carport would also be required.
Alternative 4 (Figure 3d)	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West Eighth Street.	City would need to acquire all or most of the property at 1400 West Tenth Street and demolish all existing buildings.
Alternative 5 (Figure 3e)	Culvert would extend for a length of approximately 100 feet across West Tenth Street.	New re-aligned earthen channel from West Tenth Street to West Eighth Street.	City would need to acquire permanent and/or temporary construction easements as well as acquire a portion of the privately-owned parcels at 1400 West Tenth Street and at 804 O Street, which adjoin the creek to the west and east, respectively. Relocation of the apartment building's carport and demolition of the service bay building on the western edge of 1400 West Tenth Street would also be required.

Alternative Selection. The City evaluated all of the alternatives for Reach A based on the following criteria: hydraulics, property acquisition feasibility, permanent property impacts, change in channel impacts, and permitting feasibility to determine the preferred alternative. Table 2 shows the comparison of all alternatives.

Preferred Alternative. The City's preferred alternative is Alternative 3 because it reduces flooding in the area and has the least impacts to the channel. Alternative 3 provides for a feasible regulatory permitting process, minimizes impacts to adjacent properties, and is the most cost-effective alternative. Therefore, the City has determined that Alternative 3 is the preferred alternative for improvements to Reach A. This Initial Study evaluates the environmental impacts of implementing Alternative 3 but also evaluates the environmental impacts of the other alternatives. The analysis of the other alternatives includes sufficient information to allow meaningful evaluation and comparison with Alternative 3.

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Table 2. Alternative Comparison Matrix

Criteria	Alternative 1:	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:
Hydraulics	Effective for 25-year flows. 100-year flow conveyance capacity through culvert, limited by upstream and downstream channel capacity.	Effective for 25-year flows. 100-year flow conveyance capacity through culvert, limited by upstream and downstream channel capacity.	Effective for 25-year flows.	Effective for 25-year flows. Slight improvement over Alternative 3 due to elimination of bottleneck between 1400 West Tenth Street and 804 O Street.	Effective for 25-year flows. Slight improvement over Alternative 3 due to elimination of bottleneck between 1400 West Tenth Street and 804 O Street.
Property Acquisition Feasibility	Moderate to least difficult	Least difficult	Moderate difficulty	Most difficult	Moderate difficulty
	1400 West Tenth Street: Permanent Easement (for culvert): 0.3 acre Acquire (for earthen channel): 0.35 acre	1400 West Tenth Street: Permanent Easement (for culvert): 0.55 acre	1400 West Tenth Street: Acquire: 0.8 acre	1400 West Tenth Street: Acquisition of 1400 West Tenth is not considered feasible by City/County (purchase: 1.3 acres).	1400 West Tenth Street: Acquire: 0.85 acre
	804 O Street: Acquire/Swap (for adjacent County land): 0.02 acre	804 O Street: None	804 O Street: Acquire/Swap: 0.02 acres	804 O Street: None	804 O Street: Acquire/Swap: 0.02 acres
Permanent Property Impacts	1400 West Tenth Street: ~0.05 acre of paved area at edge of property would be part of earthen channel. Parking on top of the culvert would remain available. Northern section of parcel, including 0.2 acre of parking and access to service bays would be part of earthen channel, which would restrict access to the service bay buildings.	1400 West Tenth Street: No permanent impacts (parking on top of the culvert would remain available).	1400 West Tenth Street: 0.5 acre of paved area currently used for parking would be part of earthen channel. Northern section of parcel, including 0.2 acre of parking and access to service bays would be part of earthen channel, which would restrict access to the service bay buildings.	1400 West Tenth Street: Current buildings in the path of the channel would need to be demolished. Construction cost includes demolition and \$62k for asbestos and lead abatement.	1400 West Tenth Street: 0.5 acre of paved area currently used for parking would be part of earthen channel. Northern section of parcel, including 0.2 acre of parking and access to service bay building would be part of earthen channel. Service bay building on western portion of parcel would be demolished and paved to increase on-property parking.
	804 O Street: 40 linear feet of parking structure would need to be relocated.	804 O Street: No impact	804 O Street: 40 linear feet of parking structure would need to be relocated.	804 O Street: No impact	804 O Street: 40 linear feet of parking structure would need to be relocated.

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Criteria	Alternative 1:	Alternative 2:	Alternative 3:	Alternative 4:	Alternative 5:
Channel Impacts	Remove 400 feet of open, lined, channel (~0.25 acre), to be replaced by wider earthen channel (~0.85 acres earthen channel area).	Remove 400 feet of open, lined, channel (~0.25 acre), to be replaced by culvert and transition structure.	Replace 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).	Replaces 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).	Replace 400 feet of open, lined, channel (~0.25 acre) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres).
Permitting Feasibility	Moderate Difficulty	Most Difficult	Least Difficult	Least Difficult	Least Difficult

*Phase 1 Environmental Site Assessment (ESA) results indicated no contaminated soil/groundwater that would require special handling; it has been assumed that 10% of soils would require special handling. This assumption will be verified in the Phase 2 ESA. Source: RMC 2013

Reach B – Desilting

Project work in Reach B (desilting) would include the removal of accumulated sediment in the earthen channel that extends to Fourth Street. From Fourth Street a concrete-lined segment extends approximately 550 feet before transitioning to an earthen channel that continues approximately 200 feet north beyond the BNSF railroad trestle to restore design capacity (Figure 4. *Desilting Extent and Sections*). Approximately 3,000 linear feet of channel would be desilted. Approximately 30,000 cubic yards of sediment accumulated since the completion of the 1993 Project would be removed from the channel to re-establish the 1993 Project design contours thus restoring the design capacity of the channel to convey the 25-year storm event flows.

Project Implementation

The Project is the implementation of conveyance improvements in Reach A and the desilting of Reach B. These channel reaches have been further divided into sub-reaches based on anticipated construction techniques (Figure 2b. *Staging/Stockpiling Areas and Access Points*).

Construction Schedule

Construction would occur between 7:00 a.m. and 6:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. No construction would be allowed on Sundays and public holidays. The construction season would extend from March 15 to October 15 which is based on minimizing potential impacts to delta smelt. It is anticipated that the Project could be completed in one construction season. If work cannot be completed in one construction season, then the City would request an extension from the USFWS and other regulatory agencies with similar restrictions (Nomad 2013a).

Reach A – Implementation of Conveyance Improvements - Alternative 3

Improvements within Sub-Reaches A-1 and A-2 would have creek water bypass pumping implemented from a cofferdam at the upstream end of Reach A1, and potentially pumped to the existing storm drain outfall at the southwest corner of the Antioch Marina, approximately 1,000 feet east of the BNSF railroad trestle. Other bypass methods and locations may be considered. Bypass

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pumping or gravity conveyance could also be implemented at any drainage inlets to the creek. For operations and maintenance, staff gages would be installed at the entrance and exit of the Tenth Street culvert, and every 100 feet in the earthen channel bed. The gages would be embedded in the bank or pole mounted in the drainage channel.

Sub-Reach A-1 (culvert construction across West Tenth Street)

Access to the channel during construction of Sub-Reach A-1 would be from 1400 West Tenth Street (west side of the channel and north of West Tenth Street) and through the Contra Costa County Fairgrounds (west of the channel, south of West Tenth Street). To construct the culvert across West Tenth Street a cofferdam, sump, and bypass pipe would be installed upstream of the Project. During culvert construction, water flow from the channel would be piped downstream to West Eighth Street or other appropriate outfall location, through the bypass pipe.

West Tenth Street would be subject to temporary access restrictions and/or closure to traffic during construction of the culvert across West Tenth Street, from approximately 200 feet west of West Antioch Creek to O Street. The existing roadway would then be demolished and the existing steel arch culverts would be removed and replaced with four side-by-side pre-cast concrete box culverts. Once the culverts are constructed the creek bypass pipe would be relocated through the new pre-cast concrete box culverts. An eight-inch sewer pipe and water connection to the Contra Costa County Fairgrounds would be relocated as a result of construction. A cast-in-place culvert inlet structure would be constructed just south of West Tenth Street. The pre-cast concrete box culverts would then be back-filled and West Tenth Street would be reconstructed, repaved, and reopened for traffic.

Sub-Reach A-2 (earthen channel construction from north side of West Tenth Street to West Eighth Street)

The bypass piping of creek flows from the construction of Sub-Reach A-1 would continue through the construction of Sub-Reach A-2. Access to the channel during construction of Sub-Reach A-2 would be from 1400 West Tenth Street (west side of the channel), from Reach B-1 via West Sixth Street (east of channel), from O Street (vacant lot on the east of the channel) and from the south from within the channel.

The existing wooden planking, concrete channel, and paved parking at 1400 West Tenth Street would be demolished and removed. Soil would be excavated and a cast-in-place concrete culvert discharge structure would be constructed at the end of the pre-cast concrete box culverts on the north side of West Tenth Street. Excavation and shaping of the earthen channel would then occur from the discharge concrete structure downstream to West Eighth Street. A soldier pile retaining wall would be constructed along the east side of the channel adjacent to O Street. Riprap erosion barriers would be installed along the top of bank and slopes, and the channel bottom would be revegetated.

Reach B – Implementation of Desilting

Sub-Reaches B-1, B-2, B-3, and B-4 could be excavated in any order, or concurrently. Excavation could occur concurrently with or in sequence with construction of Reach A. Creek water bypass pumping would be implemented from the cofferdam at the upstream end of Reach A, and potentially pumped to the existing storm drain outfall at the southwest corner of the Antioch Marina, approximately 1,000 feet east of the BNSF railroad trestle. Other bypass methods and locations may be considered. Bypass pumping or gravity conveyance would also be implemented at any drainage

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inlets to the creek. For operations and maintenance, staff gages would be installed at the entrance and exit of the Fourth Street culvert, within the concrete U-frame channel downstream of the Fourth Street bridge and every 100 feet in the channel bed. The gages would be embedded in the bank or pole mounted in the drainage channel.

Sub-Reach B-1 (West Eighth Street to West Fourth Street)

Access to the channel during the desilting of Sub-Reach B-1 would be from West Sixth Street at O Street and West Fourth Street. Mudcats and excavators would be used to remove accumulated silt from the channel to re-establish the 1993 Project design contours. Top of bank areas, slopes, and the channel bottom would be revegetated.

Sub-Reach B-2 (Existing Concrete Channel Reach, West Fourth Street to approximately 400 feet north)

Access to the channel during the desilting of Sub-Reach B-2 would be through 1500 West Fourth Street (Antioch Historical Society) and 1700 West Fourth Street (north of West Fourth Street, west side of channel), and 1400 West Fourth Street (north of West Fourth Street, east side of channel). A silt/sediment barrier and cofferdam would be constructed at the BNSF railroad trestle to isolate the work area from the marsh to the north. The work area would then be dewatered by digging a sump and installing dewatering pumps and a conveyance pipeline to the Antioch Marina storm drain outfall or other appropriate outfall location. Mudcats and excavators would then be used to remove accumulated silt and decomposing vegetative material from the concrete lined channel.

Sub-Reach B-3 (Approximately 400 feet north of West Fourth Street to BNSF Railroad Trestle)

Access to the channel during the desilting of Sub-Reach B-3 would also be from the same properties identified for Sub-Reach B-2. Mudcats and excavators would then be used to remove accumulated silt and decomposing vegetative material from the channel to re-establish the 1993 Project design contours.

Sub-Reach B-4 (BNSF Railroad Trestle to 200 feet north)

Access to the channel during the desilting of Sub-Reach B-4 would be from the north of the BNSF railroad tracks, using the BNSF right-of-way (R/W) between Sub-Reach B-4 and L Street east of the channel. A silt/sediment barrier and cofferdam would be installed between the work area and the marsh to the north. The work area would then be dewatered by digging a sump and installing dewatering pumps and a conveyance pipeline to the Antioch Marina storm drain outfall or other appropriate outfall.

Mudcats and excavators would then be used to remove accumulated sediment and decaying vegetative material from the channel to re-establish the 1993 Project design contours.

Hauling and Disposal

Soils would be tested and depending on the characterization of the material, disposed of at an appropriate facility. Clean soils would be disposed of at Jersey Island, the Ironhouse Sanitary District treatment plant site, Keller Canyon Landfill, or suitable nearby facilities. In addition to the soils, the Project would remove approximately 8,000 cubic yards of decomposed marsh vegetation and sediment, which would be disposed of at Jersey Island, Keller Canyon Landfill, or a suitable nearby

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composting facility. Wet or contaminated soils, vegetation, and sediment would be stockpiled and aerated (bulldozers would turn over and aerate the material) in the proposed staging or stockpiling areas, as shown in Figure 2b, adjacent to the Project site to remove moisture to a point suitable for hauling off to a disposal site. Contaminated material would be hauled away for disposal at a suitable licensed facility. Front end loaders would be used to handle and load the material into double transfer tractor-trailer rigs for hauling off to a disposal site.

Access and Easement Requirements

Construction of the Project would require access to and use of several parcels in the vicinity of the Project area. The required permanent easements, R/W, and temporary construction easements are described in Table 3 and shown in Figure 5.

Table 3. Parcel Information and Easement Requirements

Parcel Information and Easement Requirements		
APN/Location	Permanent Easement or Right-of-Way (R/W) Acquisition	Temporary Construction Easement
067-010-003 (Government-owned) Contra Costa County Fairgrounds 1201 West Tenth Street <i>Southwest corner of O Street and West Tenth Street</i>	Permanent Easement – Required for construction of culvert transition structure and channel transition to upstream creek. Required for ongoing operations and maintenance.	Required for equipment and material hauling access from West Tenth Street.
074-130-060 and 074-130-061 (Privately-owned) Commercial building 1400 West Tenth Street <i>Northwest corner of O Street and West Tenth Street.</i>	Permanent Easement – Required for construction of culvert, culvert transition structure, and open channel. Required for ongoing operations and maintenance.	Required for equipment and material access to permanent easement.
074-130-050 (County-owned) <i>O Street between 074-130-060 and apartment buildings at 804 O Street (074-130-056, 057, 058)</i>	Permanent Easement – Required for construction of culvert, culvert transition structure, open channel, and for relocating the apartment complex carport and parking area. Required for ongoing operations and maintenance. R/W – Portion of the parcel would be conveyed to apartment complex owner for carport and parking area. Remainder would be R/W for West Antioch Creek.	Not Applicable
074-130-056, 057, -058 (Privately-owned) Apartments 804 O Street <i>O Street north of Contra Costa County Parcel (074-130-050)</i>	Permanent Easement – Required for open channel construction. Required for ongoing operations and maintenance.	Required for construction of channel, removal of carport and restoration of parking area.
074-130-XXX (City of Antioch) Creek Channel <i>West Antioch Creek from West Eighth Street to West Fourth Street.</i>	Permanent Easement – Required for construction of open channel and desilting of existing improved channel.	Not Applicable
074-130-076 (Privately-owned) <i>Vacant parcel north of motel and adjoins west side of channel.</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.

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Parcel Information and Easement Requirements		
APN/Location	Permanent Easement or Right-of-Way (R/W) Acquisition	Temporary Construction Easement
074-130-064 (Privately-owned) <i>Vacant parcel north of motel and adjoins west side of channel.</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.
074-130-081 (Eastern Contra Costa Transit - Public) <i>Vacant parcel east of Somersville Road/Auto Center Drive and south of West Sixth Street.</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, off-haul operations, and spoiling.
074-040-025 (Privately owned) <i>Large parcel north of West Fourth Street and south BNSF encompassing existing West Antioch Creek and RV storage facility.</i>	Permanent Easement – Required for desilting of West Antioch Creek north of West Fourth Street and south of BNSF and for ongoing operations and maintenance.	Required for equipment and material hauling access to east side of West Antioch Creek from West Fourth Street.
074-040-036 (Privately-owned) <i>Vacant parcel northeast of 074-040-025 (RV storage facility).</i>	Not Applicable	Required for excavated material stockpiling, aeration/drying, and off-haul operations.
074-040-044 (City-owned) <i>City parcel along south side of BNSF.</i>	Permanent Easement – Required for desilting of West Antioch Creek north of West Fourth Street and south of BNSF and for ongoing operations and maintenance.	Not Applicable
074-040-046 (Privately-owned) Antioch Historical Society	Not Applicable	Required for equipment and material hauling access to the west side of West Antioch Creek from West Fourth Street.
074-040-047 (Privately-owned) Bond Manufacturing <i>Adjacent to and west of West Antioch Creek.</i>	Not Applicable	Required for equipment and material hauling access to west side of West Antioch Creek from West Fourth Street.
074-040-XXX and 066-081-XXX BNSF Railroad R/W <i>North end of Project area, aligned east & west.</i>	Permanent Easement – Required for ongoing maintenance and operations.	Encroachment permit required for equipment and material hauling access to West Antioch Creek north of BNSF.
074-030-003 (Privately-owned) <i>North of BNSF and West Antioch Marina</i>	Permanent Easement – Required for desilting of West Antioch Creek north of BNSF and for ongoing operations and maintenance.	Required for desilting activities north of BNSF.

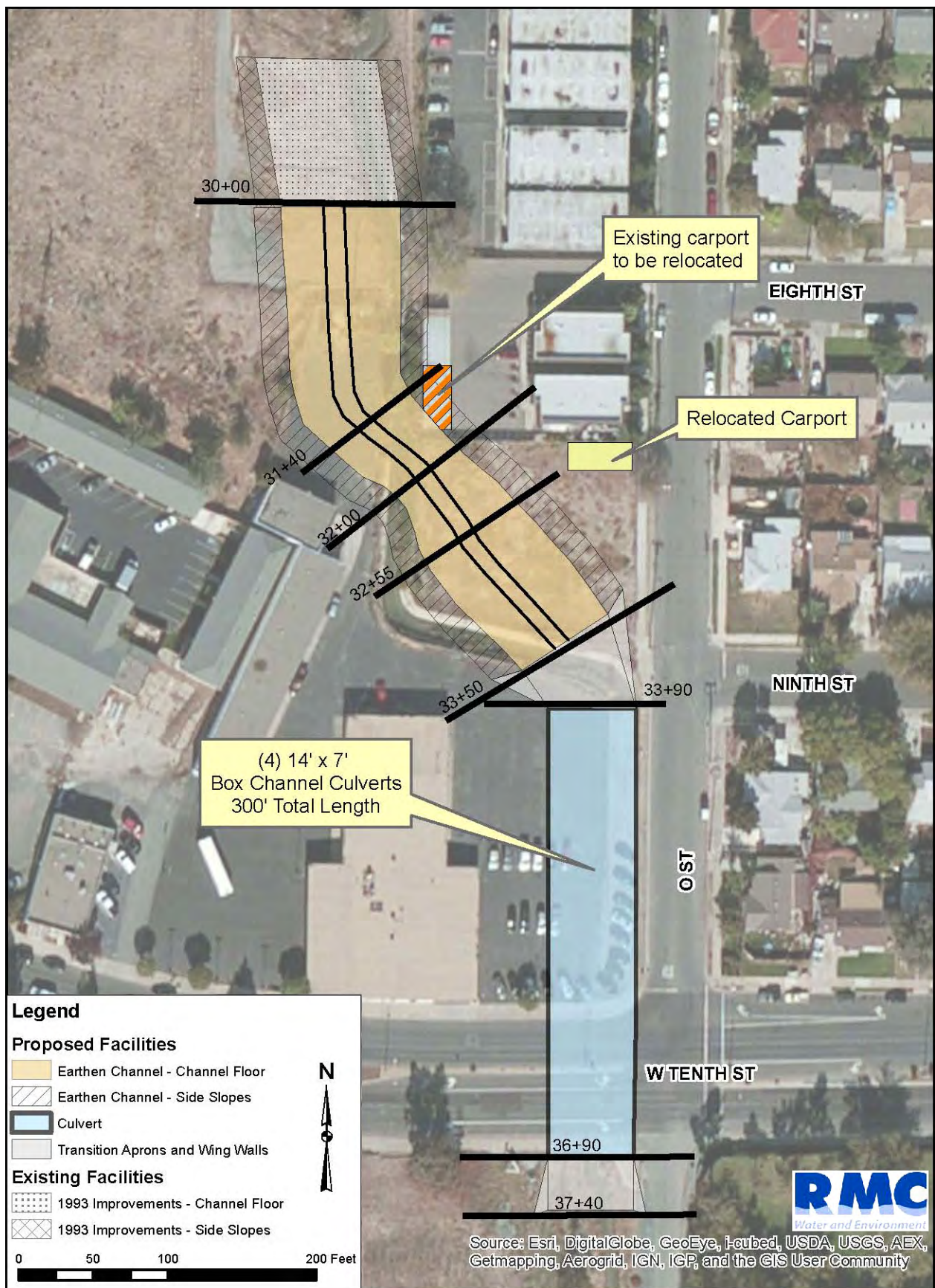


Figure 3a. Alternative 1 - Hybrid Option

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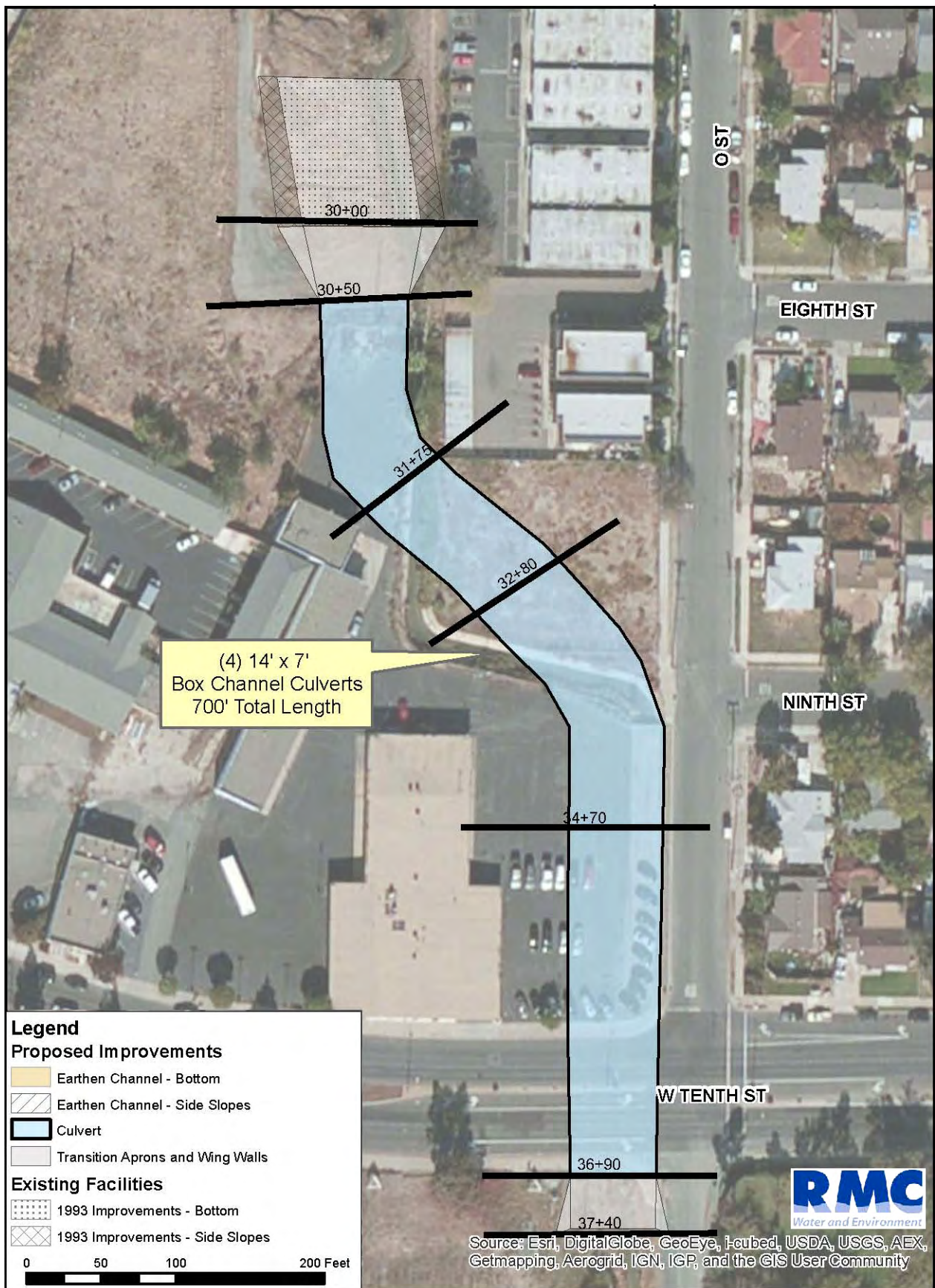


Figure 3b. Alternative 2 - Maximum Culvert Option

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Figure 3c. Alternative 3 - Minimum Culvert Option

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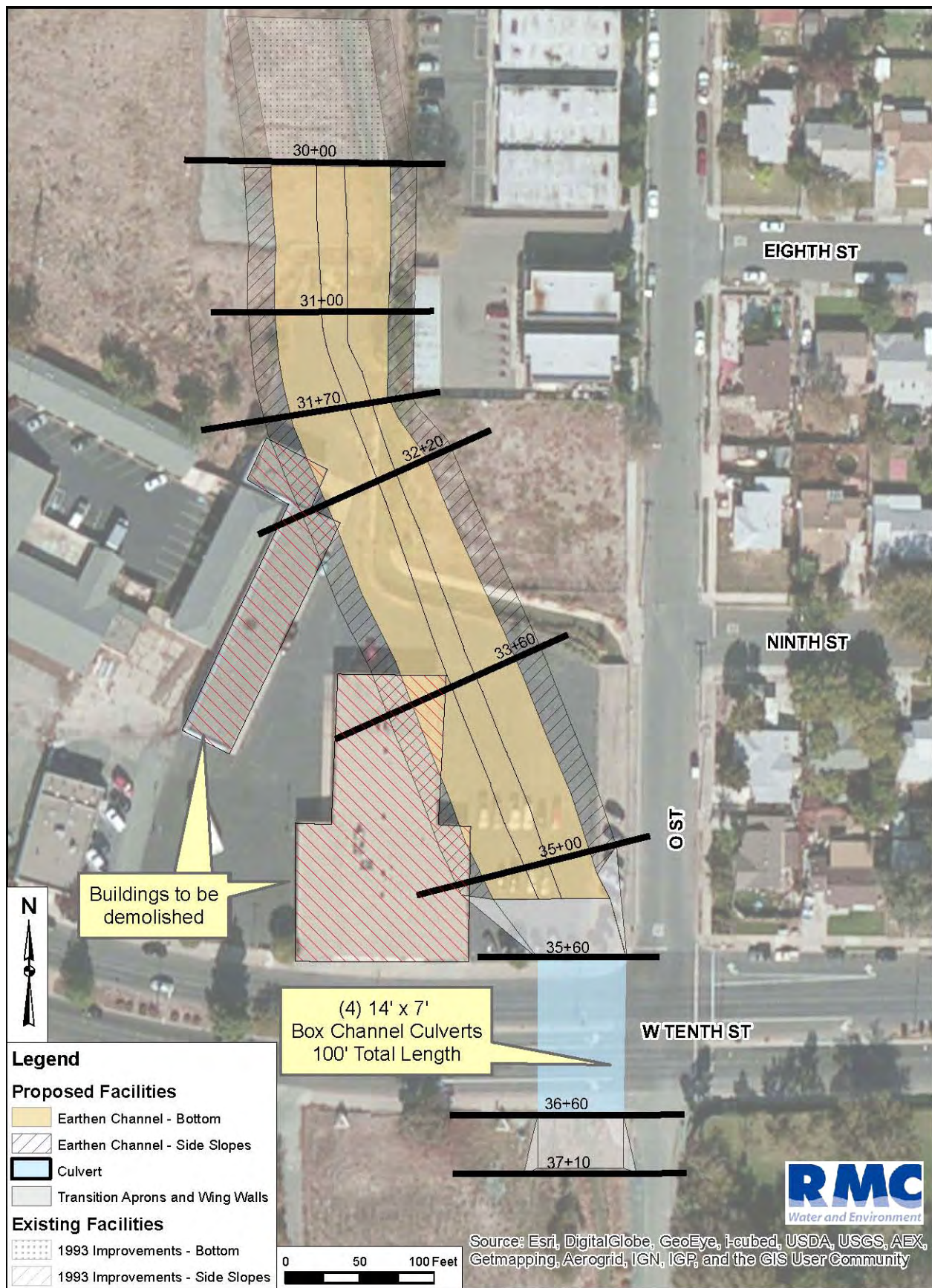


Figure 3d. Alternative 4 - Full Parcel Acquisition

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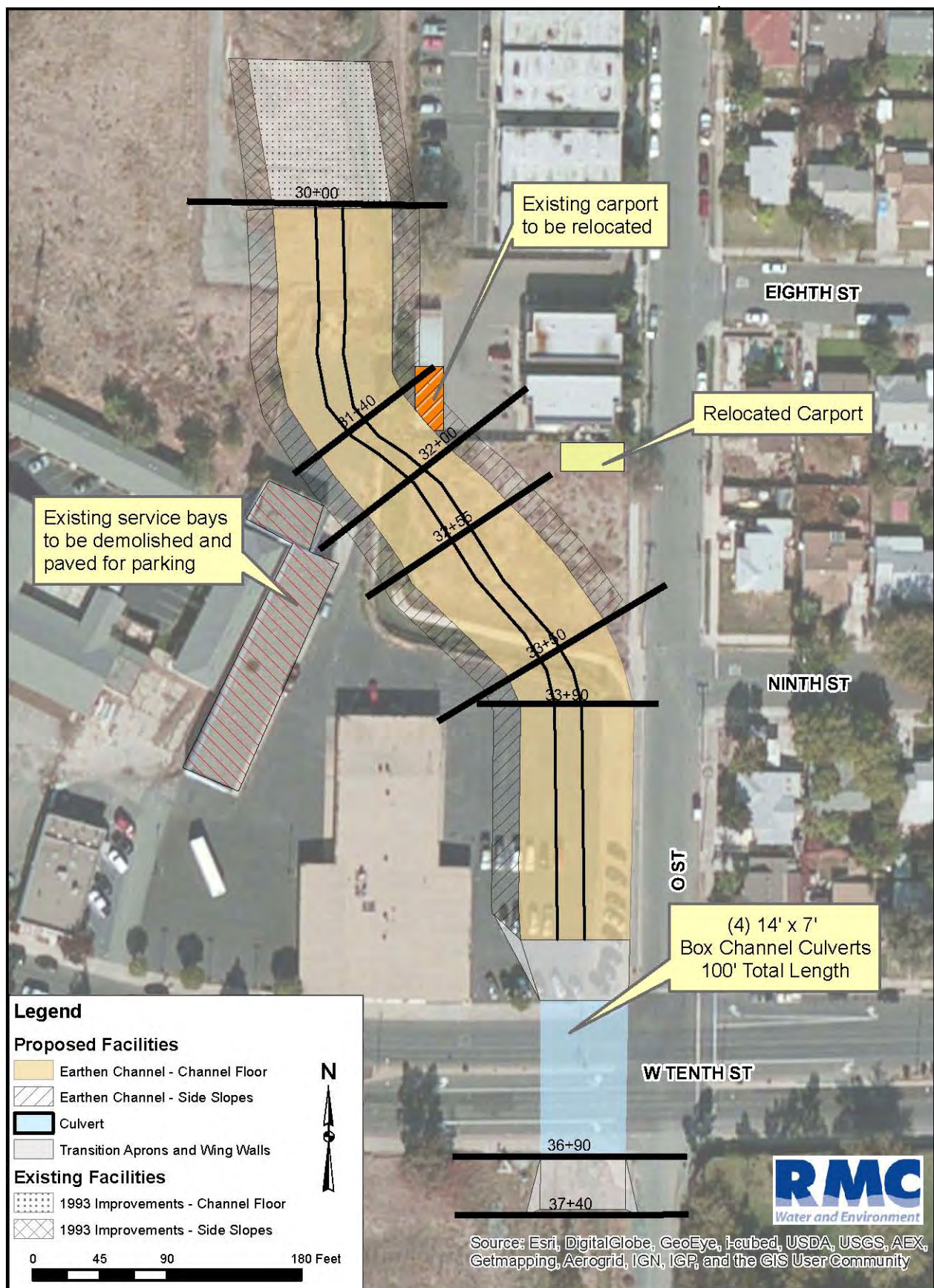


Figure 3e. Alternative 5 - Alternate Minimum Culvert Option

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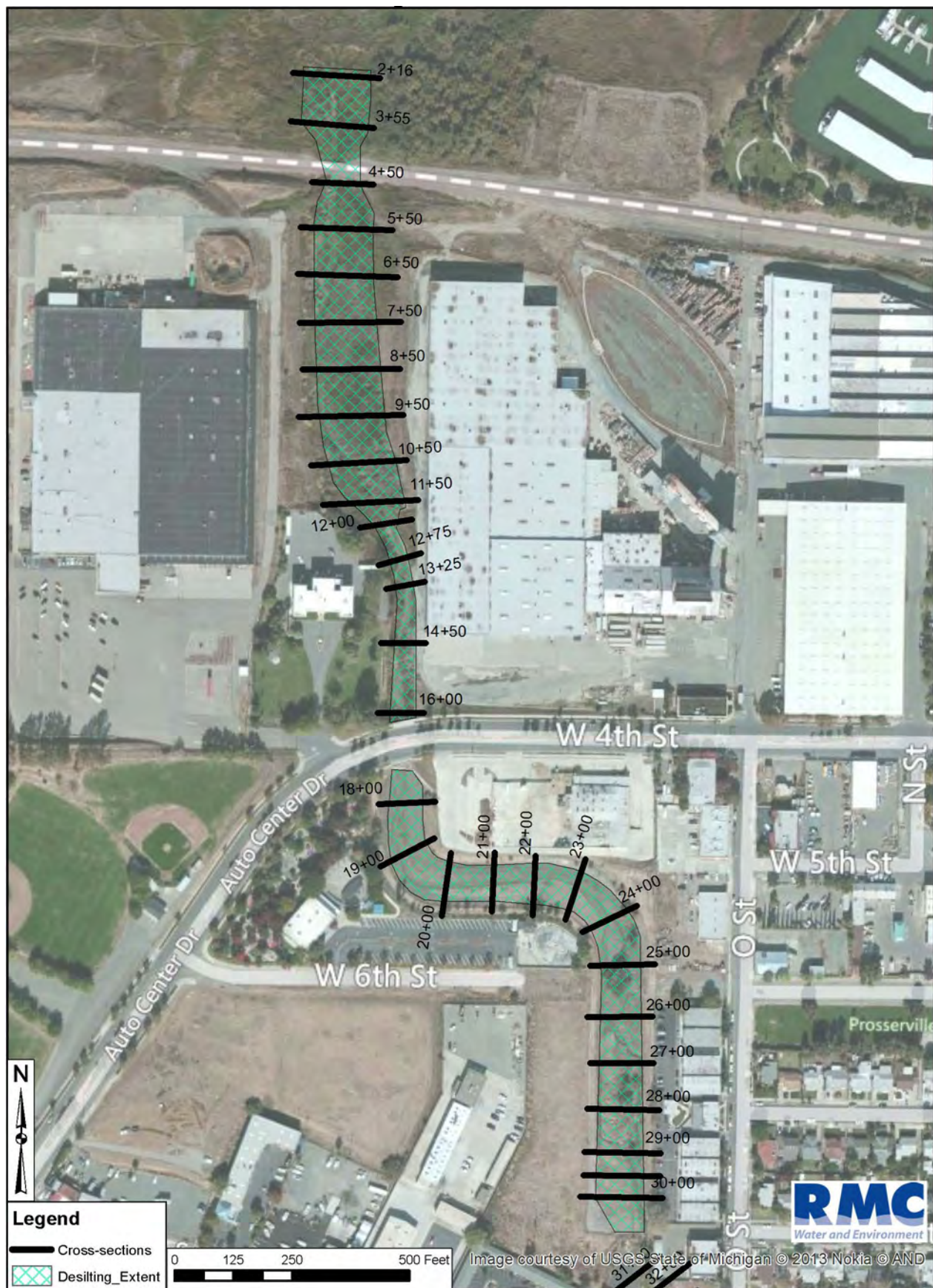


Figure 4. Desilting Extent and Sections

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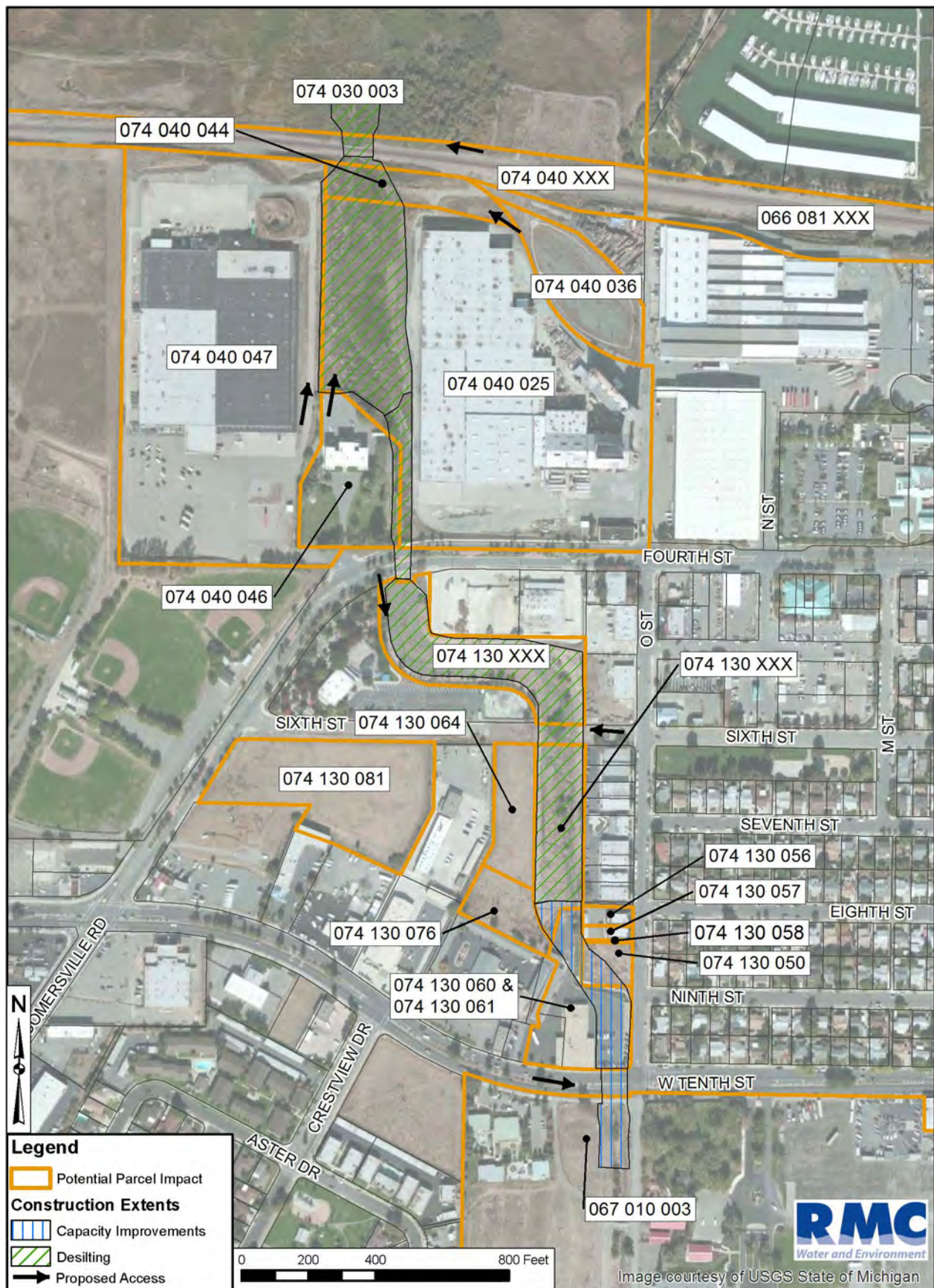


Figure 5. Potentially Impacted Parcels

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2.3 Operations and Maintenance

In the short term, the construction contractor, after initial hydroseeding, would be responsible for maintaining seeded areas until native grasses are established and would be required to minimize subsequent watering to prevent erosion or slope sloughing.

Upon completion of the installation of the new culverts, removal of accumulated sediment in Reach B, and revegetation, the City would be required to conduct routine monitoring and maintenance to preserve the 25-year flood capacity.

Monitoring

Monitoring activities would include:

- The channel sediment and vegetation monitoring would consist of a minimum of once-per-year inspections of staff gages in the earthen and concrete channels to determine accumulation of sediment levels;
- Inspections of channel banks may occur after every significant storm event for scour/sediment removal;
- Inspections of the channel bank grass cover may occur every three months for height of grass and erosion/bare areas;
- Inspections of the channel bed grasses are to occur at least once every year for height;
- Inspections of channel bed and banks at least once per year for presence of shrubs; and
- Inspections of the channel for trees, cattails, and other emergent vegetation would occur at least once per year.
- Inspection of maintenance roads prior to the wet season, after significant storm events, and following the wet season to identify damage or debris accumulation, and inspection of drainage outlets, outlet flap gates, and the channel for debris accumulation and erosion/scour following storm events would occur.

Sediment Maintenance

Sediment maintenance work would consist of sediment removal by equipment or by hand and would occur in maximum intervals of every five years and when sediment accumulation exceeds 2 feet. The sediment removal action would return the channel to design conditions. Excavation of sediment with equipment would be conducted from maintenance roads or benches to the extent possible. Sediment would be relocated to upland locations unless otherwise permitted. When sediment removal results in removal of bank stabilizing vegetation, seeding and erosion control to re-establish bank vegetation would be installed. If channel banks endure scour or erosion, maintenance would be conducted to protect the integrity of the bank. Bank stabilization techniques would include erosion control blankets, localized placement of soil, filter fabric, riprap and other methods and natural materials available to the City at the time. Erosion control materials would not include materials made of plastic or synthetic non-filament netting for fish and wildlife protection.

Vegetation Maintenance

Vegetation maintenance work would consist of mowing when grass height exceeds 24 inches, grass re-establishment with native grasses with hydroseeding or by hand after the first significant rain

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event of the water year, removal shrubs and trees during the dry season, and removal/cutting of reeds when 24-inch height is exceeded. Vegetation maintenance would be conducted with tractor mowers, hand equipment and tools, and chemical treatment as necessary using approved commercially available vegetation abatement products.

Structure Maintenance

Structure maintenance work would consist of clearing debris, sediment, and vegetation from maintenance roads, drainage channel, drainage outlets, and flap gates. Maintenance roads would require re-grading and replenishing gravel surfaces. Flap gates would be required to be greased at least once a year and repaired as necessary. Structure maintenance would be conducted using hand tools and mechanical equipment, herbicides as necessary using approved commercially available weed abatement products, and erosion/scour holes at outlets may be filled with soil, filter fabric, and riprap to re-establish scour protection below the outlet.

2.4 Regulatory Requirements, Permits, and Approvals

The City of Antioch is working in concert with Contra Costa County Flood Control District; however, the City of Antioch is the approval authority for the Project. Additional subsequent approvals and other permits that may be required from local, regional, state, and federal agencies including, but are not limited to:

- City of Antioch Building Permit and Encroachment Permit;
- Stormwater Construction General Permit (including the development and implementation of a Storm Water Pollution Prevention Plan) from the State Water Resources Control Board;
- Clean Water Act, Section 401 Water Quality Certification from the Central Valley Regional Water Quality Control Board;
- Clean Water Act, Section 404 Individual Permit from the U.S. Army Corps of Engineers-Sacramento District;
- California Fish and Game Code, Section 1602 Streambed Alteration Agreement from California Department of Fish and Wildlife; and
- Federal Endangered Species Act, Section 7, Biological Opinion from the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service and/or California Endangered Species Act, Section 2081, Incidental Take Permit (ITP) from the California Department of Wildlife.

The City would consult with the Contra Costa County Flood Control District and East Contra Costa County Habitat Conservancy to determine if Reach A of the Project can receive HCP/NCCP permit coverage. Reach A of the Project area is located largely within the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) inventory area. Although the City of Antioch is not a permittee of the HCP/NCCP, the Contra Costa County Flood Control District, an HCP/NCCP permittee, has jurisdiction over drainages that span city and county boundaries including a portion of West Antioch Creek. The Reach B portion (desilting) of the Project is located outside of the HCP/NCCP inventory area and would require separate consultation with regulatory agencies.

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**SECTION 3. ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED
AND DETERMINATION**

Environmental Factors Potentially Affected:

The environmental factors checked below would be potentially affected by this Project, involving at least one impact that is a "Potentially Significant Impact" as indicated by the checklist on the following pages.

- | | | |
|---|---|--|
| <input type="checkbox"/> Aesthetics | <input type="checkbox"/> Greenhouse Gas Emissions | <input type="checkbox"/> Population and Housing |
| <input type="checkbox"/> Agriculture and Forestry Resources | <input checked="" type="checkbox"/> Hazards/Hazardous Materials | <input type="checkbox"/> Public Services |
| <input checked="" type="checkbox"/> Air Quality | <input type="checkbox"/> Hydrology/Water Quality | <input type="checkbox"/> Recreation |
| <input checked="" type="checkbox"/> Biological Resources | <input type="checkbox"/> Land Use and Planning | <input checked="" type="checkbox"/> Transportation/Circulation |
| <input checked="" type="checkbox"/> Cultural Resources | <input type="checkbox"/> Mineral Resources | <input type="checkbox"/> Utilities and Service Systems |
| <input checked="" type="checkbox"/> Geology and Soils | <input checked="" type="checkbox"/> Noise | <input type="checkbox"/> Mandatory Findings of Significance |

Determination

On the basis of this initial evaluation:

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

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

I find that the 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 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 Project, nothing further is required. ☐

Mindy Gentry
Senior Planner

Date

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SECTION 4. ENVIRONMENTAL CHECKLIST AND DISCUSSION

Reach A has a Preferred Alternative (Alternative 3) and four other alternatives for increasing the capacity of the creek channel. The details of the alternatives for Reach A can be found in Table 1 and the comparative differences can be found in Table 2, both in Section 2, Project Description. The Preferred Alternative is analyzed in this section and the other alternatives are compared to the Preferred Alternative. For each impact checklist item, there is a statement as to the similarity or differences of the Preferred Alternative compared to the other alternatives.

4.1 Aesthetics

4.1.1 Environmental Setting

Regional Setting

The City of Antioch is located along the bank of the San Joaquin River/Sacramento-San Joaquin Delta on the north side with a backdrop of the foothills of Mt. Diablo to the south, the City of Pittsburg to the west, and the City of Oakley to the east. State Route (SR) 4 and the BNSF Railroad both run east to west bisecting the City. Antioch currently has a population of more than 100,000 people.

Visual Setting

The Project would be in the northwestern portion of the City of Antioch in a residential, commercial, and industrial area. West Antioch Creek is an urban creek channel that flows northward into the San Joaquin River/Sacramento-San Joaquin Delta. The Project area starts at the Contra Costa County Fairgrounds at the south end, goes northward or downstream towards the BNSF Railroad at the north end, and ends in the Dow Wetlands Preserve. SR-4 is 0.75 mile to the south, and Tenth Street, which becomes the Pittsburg-Antioch Highway west of Verne Roberts Circle, runs through the south end of the Project site just north of the Fairgrounds. The parcels immediately adjacent to the Project consist of vacant land, apartment buildings, the Antioch Historical Society Museum, a large parking lot, commercial uses, and large industrial buildings (Figure 2a. *Project Location/Surrounding Land Uses*).

Visual Character of the Project Site

The Project area including access, staging, stockpiling, and construction, encompasses approximately 26 acres and is intended to reduce frequent flooding.

Reach A-1 of the Project is the portion of West Antioch Creek channel that transitions from an earthen channel at the Contra Costa County Fairgrounds, to two structural plate steel arch culverts under West Tenth Street (Photo 4). Reach A-1 transitions to Reach A-2 in a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street on the north side of West Tenth Street (Photo 5). This reach is a few feet from and runs parallel to O Street.

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Photo 4. Reach A-1, north view of channel looking downstream/along O Street, showing earthen channel at the Fairgrounds property. (Nomad 2013a)



Photo 5. Reach A-1/Reach A-2 Transition Point, view of channel looking south, from west side of O Street. (Nomad 2013a)

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Photo 6. Reach A-2, open concrete channel, looking north with the carport on the right and vacant county owned land on the right and left. (Nomad 2013a)

Reach A-2 transitions from the concrete-lined ditch covered by wooden planking to an open concrete-lined ditch, with an adjacent apartment building on the east side, and a security fence on the west side (Photo 6).

Reach B-1 transitions from the open concrete-lined ditch to an earthen low-flow channel within a wider channel (approximately 90 feet) that can handle a larger capacity of water flow (Photos 7 and 8).



Photo 7. Reach B-1, earthen channel looking north towards the culverts at Fourth Street. (ECORP 2013a)

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Photo 8. Reach B-1, earthen channel looking south. (Nomad 2013a)

Reach B-2 transitions from box culverts under Fourth Street to a channel with a concrete bottom and concrete walls on both sides. The channel is heavy in vegetation in this channelized section along the Historical Society's property. (Photo 9)



Photo 9. Reach B-2, looking south towards West Fourth Street with industrial building on the left/east. (ECORP 2013a)

Reach B-3 is a meandering earthen low-flow channel within a wider channel approximately 150 feet across. This reach supports extensive vegetation (Photo 10).

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Photo 10. Reach B-3, looking south with industrial buildings on east and west and the Historical Society's building in the center background. (ECORP 2013a)

Reach B-4 is a meandering earthen channel that transitions from a narrowing at the railroad tracks to a large wetland preserve to the north of the tracks. This wetland preserve is on the south side of the San Joaquin River/Sacramento-San Joaquin Delta and west of the Antioch City Marina (Photo 11).



Photo 11. Reach B-4, looking northeast towards the Dow Wetlands Preserve north of the railroad tracks. (ECORP 2013a)

The access, staging and stockpiling areas for the Project consist of vacant open space, open hardscape areas around the warehouse, manufacturing, and industrial facilities, and existing roads (see Figures 2b. *Staging/Stockpiling Areas and Access Points* and 5. *Potentially Impacted Parcels*).

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4.1.2 Aesthetics (I.) Environmental Checklist and Discussion

a)	Would the project have a substantial adverse effect on a scenic vista?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Scenic vistas or resources mentioned in the City of Antioch General Plan consist of views of Mt. Diablo, ridgelines, and the San Joaquin River/Sacramento-San Joaquin Delta. The improvements required to implement the Project would be at street level or below and, therefore, would not obstruct or limit views of the City's scenic resources. No impacts would occur.

Alternatives Analysis

The alternatives would not have a substantial adverse effect on a scenic vista. The impact analysis above for the Project would be applicable to all of the alternatives.

b)	Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is not located adjacent to a state scenic highway (Caltrans 2013). According to the California Scenic Highway Mapping System and the Contra Costa County General Plan, SR-24, located southeast of Antioch and approximately 15 miles from the Project site, is officially designated as a state scenic highway and SR-160 is an eligible state scenic highway but not officially designated. The scenic portion of SR-4 and SR-160 is more than 3.5 miles to the east and the Project site would not be visible from this distance. No impact would occur.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives.

c)	Would the project substantially degrade the existing visual character or quality of the site and its surroundings?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

For Reach A, the project in the long term would not substantially degrade the existing visual character or quality of the site and its surroundings. The Project would improve the visual character of the creek channel in Reach A-2 by opening 200 feet of the creek channel to daylight, improving the visual character of this area once the Project is fully implemented. In the near term, the visual

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character and quality of the site would be negatively affected by the demolition and construction of the culverts and channel expansion.

For Reach B, the Project in the long term would not substantially degrade the existing visual character or quality of the site and its surroundings. However, in the near term visual character or site quality would be negatively affected. Reach B would be stripped of the vegetation that currently exists and sediment would be stockpiled to dry before being hauled off site. In the long term, the channel would be revegetated with native species and regularly maintained to prevent overgrowth of non-native vegetation and the consequent loss of design flood conveyance capacity. A less than significant impact would occur for Reach A and B.

Alternatives Analysis

All four alternatives for Reach A would be located in generally the same area. The Preferred Alternative for Reach A would have the same impacts as Alternatives 4 and 5, shortening the enclosed portion of the channel from 300 feet to 100 feet. Both of these alternatives would also demolish either one or both buildings at 1400 West Tenth Street. However, these buildings are not eligible for the National Register (ECORP 2013a) and are not designated as locally scenic by the City. Alternatives 4 and 5 would not degrade the existing visual character or quality of the site and its surroundings; and would improve the visibility of the creek channel. Alternative 1 would have the same visual effect as the current condition, so the same amount of creek channel would be visible. Alternative 1 would not degrade the existing visual character or quality of the site and its surroundings. Alternative 2 would enclose more of the creek channel, extending the enclosed portion from its current 300 feet to 700 feet of culvert. Alternative 2 would not degrade the existing visual character or quality of the site and its surroundings permanently. Implementation of any of these alternatives would result in a less than significant impact on the visual character of the site.

d)	Would the project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project consists of replacing existing culverts, removing debris, relocating a car port, and daylighting a portion of an existing urban creek channel. The Project would primarily be at or below street level and does not consist of any surfaces (such as glass or metal) that are potential producers of glare. No impacts would occur.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives.

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4.2 Agriculture and Forestry Resources

4.2.1 Environmental Setting

The Project site is an urban creek channel in the northwestern portion of the City of Antioch. The channel is covered by a road and a parking lot before it opens up into a concrete-lined ditch and eventually an earthen channel. The Project site has the following zoning designations: Reach A-1 is Zoned U – Unincorporated Area (Not Zoned); Reaches A-2 and B-1 are Zoned Neighborhood/Community Commercial District (C-2) and High Density Residential (R-20); Reaches B-2 and B-3 are Zoned Planned Business Center (PBC); Reach B-4 is Zoned OS – Open Space/Public Use District (City of Antioch 2013a).

The County of Contra Costa does participate in the California Land Conservation Act or Williamson Act (DOC 2010). However, the Project site is not designated as Prime Farmland nor is it under a Williamson Act contract. Therefore, no local policies for agricultural resources apply to the Project site.

4.2.2 Agriculture and Forestry Resources (II.)Environmental Checklist and Discussion

a) Would the project convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project site is not located on Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, and the Project would not convert such farmland to non-agricultural use (CCC 2005, 2013, City of Antioch 2003, NRCS 2013, DOC 2010). No impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. No impact would occur.

b) Would the project conflict with existing zoning for agricultural use, or a Williamson Act contract?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

As discussed above in the environmental setting, the Project is not located in an agricultural use zone. Therefore, the Project would not result in a conflict with an agricultural zoning designation or a Williamson Act contract. No impact would occur.

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Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. No impact would occur.

c)	Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project involves improvements to an urban creek channel and the Project site is not zoned for forest land, timberland, or timberland production (City of Antioch 2003) so there would be no zoning conflicts. Further, the Project site does not contain forest or timber resources. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. No impact would occur.

d)	Would the project result in the loss of forest land or conversion of forest land to non-forest use?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is within an urban creek channel and is not zoned for forestland, timberland, or timberland production (City of Antioch 2003). The Project site does not contain forest or timber resources. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. No impact would occur.

e)	Would the project involve other changes in the existing environment, which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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The Project would not change the land use of the urban creek channel. The Project site and surrounding area is not zoned or used for agriculture, and it is not considered farm land or forest land. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. No impact would occur.

4.3 Air Quality

An Air Quality Study was prepared for the Project by KD Anderson & Associates (KDA 2014; Appendix A). The findings of the Air Quality Study are summarized in this section.

4.3.1 Environmental Setting

The Project site is located within the San Francisco Bay Area Air Basin (SFBAAB) and is within the jurisdiction of the Bay Area Air Quality Management Air District (BAAQMD). The Project area is designated a nonattainment area for federal and state standards for ozone and fine particulate matter smaller than 2.5 microns in diameter (PM_{2.5}), and for the state standard for particulate matter smaller than 10 microns in diameter (PM₁₀). The Project area is designated attainment or unclassified for federal and state carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂) standards, and the federal PM₁₀ standard (KDA 2014).

4.3.2 Air Quality (III.) Environmental Checklist and Discussion

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. The BAAQMD prepares ozone attainment plans (OAP) for the national ozone standard and clean air plans for the California standard, both in coordination with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG). In 1999, the BAAQMD issued the document BAAQMD CEQA Guidelines to address and include thresholds of significance for determining the significance of air quality impacts. (KDA 2014).

In 2010, the BAAQMD adopted updated significance thresholds to assist in the review of projects under CEQA. However, "on March 5, 2012 the Alameda County Superior Court issued a judgment finding that the Air District had failed to comply with CEQA when it adopted the Thresholds. The court did not determine whether the Thresholds were valid on the merits, but found that the adoption of the Thresholds was a project under CEQA. The court issued a writ of mandate ordering the District to set aside the Thresholds and cease dissemination of them until the Air District had complied with CEQA. The Air District has appealed the Alameda County Superior Court's decision. The Court of Appeal of the State of California, First Appellate District, reversed the trial court's decision. The Court of Appeal's decision was appealed to the California Supreme Court, which granted limited review, and the matter is currently pending there." (BAAQMD 2014)

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Based on the above, this Project is evaluated using the Bay Area 1999 CEQA Guidelines. The Project would not conflict with or obstruct the implementation of the Bay Area 1999 CEQA Guidelines because construction, operation, and maintenance emissions would be mitigated thru implementation of the control measures in the guidelines (see response to III. b) below). Implementation of the control measures listed in Mitigation Measure AQ-1 would reduce air quality impacts associated with construction emissions to less than significant.

Alternatives Analysis

The potential air quality impact associated with each Reach A alternative is considered similar to the Project because the control measures would be implemented for all alternatives. The potential air quality impact associated with each Reach A alternative is considered similar to the Project because the control measures would be implemented for all alternatives. With the implementation of the control measures listed in Mitigation Measure AQ-1 the alternative impacts associated with construction emissions would be less than significant.

b) Would the project violate any air quality standard or contribute substantially to an existing or projected air quality violation?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project's air quality impacts are mainly attributable to short-term construction activities. The significance of construction-related criteria pollutant emissions was determined by assessing the size of the construction area in acres and, based on methods presented in the BAAQMD CEQA Guidelines, determining the need for mitigation measures.

In the long term, the Project would be considered to result in significant air quality impacts if it would result in emissions greater than the BAAQMD December 1999 operational thresholds presented in Table 4.

Table 4. Bay Area Air Quality Management District Operational Thresholds

Type and source of Emissions	Operational Related	
	Average Daily Emissions (lbs./day)	Maximum Annual Emissions (tpy)
Reactive Organic Gas (ROG)	80	15
Nitrogen Oxides (NOx)	80	15
PM ₁₀ (Emissions)	80	15

Notes: lbs./day = pounds per day, tpy = tons per year,
Source: KDA 2014

4.3.2.1 Construction Impacts

Construction of the Project would generate air pollutant emissions. Construction activities such as demolition, grading, excavation and travel on unpaved surfaces would generate dust, and can lead to elevated concentrations of PM₁₀ and PM_{2.5}.

The determination of significance with respect to construction emissions should be based on a consideration of the control measures to be implemented. From the BAAQMD's perspective,

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quantification of construction emissions is not necessary (although a Lead Agency may elect to do so - see Section 3.3 of the Guidelines, "Calculating Construction Emissions," for guidance). The Lead Agency should review Table 2 in the guidelines. If all of the control measures indicated in Table 2 of the guidelines (as appropriate, depending on the size of the project area) will be implemented, then air pollutant emissions from construction activities would be considered a less than significant impact. If all of the appropriate measures in Table 2 of the guidelines will not be implemented, then construction impacts would be considered to be significant (unless the Lead Agency provides a detailed explanation as to why a specific measure is unnecessary or not feasible). Implementation of the control measures listed in Mitigation Measure AQ-1 would reduce impacts associated with construction emissions to less than significant.

Mitigation Measure

AQ-1: Basic Measures from Table 2 of the BAAQMD CEQA Guidelines

The following are the Basic Measures from Table 2 of the BAAQMD CEQA Guidelines. Table 2 notes, "The following controls should be implemented at all construction sites."

- A. Water all active construction areas at least twice daily.
- B. Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least two feet of freeboard.
- C. Pave, apply water three times daily, or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas and staging areas at construction sites.
- D. Sweep daily (with water sweepers) all paved access roads, parking areas and staging areas at construction sites.
- E. Sweep streets daily (with water sweepers) if visible soil material is carried onto adjacent public streets.

The following are the Enhanced Measures from Table 2 of the BAAQMD CEQA Guidelines. Table 2 notes, "The following additional measures should be implemented at construction sites greater than four acres in area."

- F. Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- G. Enclose, cover, water twice daily or apply (non-toxic) soil binders to exposed stockpiles (dirt, sand, etc.)
- H. Limit traffic speeds on unpaved roads to 15 mph.
- I. Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- J. Replant vegetation in disturbed areas as quickly as possible.

The following are the Optional Measures from Table 2 of the *BAAQMD CEQA Guidelines*. Table 2 notes, "The following control measures are strongly encouraged at construction sites that are large

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in area, located near sensitive receptors or which for any other reason may warrant additional emissions reductions.”

- K. Install wheel washers for all exiting trucks, or wash off the tires or tracks of all trucks and equipment leaving the site.
- L. Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- M. Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 mph.
- N. Limit the area subject to excavation, grading and other construction activity at any one time.

4.3.2.2 Long-Term Operational Impacts

Long-term operation and maintenance of the Project would include infrequent vehicular trips for short-term maintenance and monitoring activities as described in Section 2.3. The maintenance activities would involve substantially less equipment and activities than the initial construction of the Project, would not geographically re-distribute vehicle travel, and would not result in a change in stationary source emissions. Therefore, the Project would result in a minor change in long-term operational ROG, NO_x, and PM₁₀ emissions, and would have a less than significant impact on ozone and particulate matter concentrations (KDA 2014). Therefore, long-term operational impacts would be less than significant.

Alternatives Analysis

The potential air quality impact associated with each Reach A alternatives is considered to be similar to the Project because the control measures would be implemented for all alternatives. Even though, Alternative 4 or 5 would require the demolition of existing buildings at 1400 West Tenth Street and would require additional equipment work, with the implementation of the control measures, the difference would not be significant. With the implementation of the control measures listed in Mitigation Measure AQ-1 the alternative impacts associated with construction emissions would be less than significant.

c) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

As noted earlier, the Project area would be within a designated a nonattainment area for federal and state standards for ozone and PM_{2.5}, and for the state standard for PM₁₀. As described in the response to III. b) above, neither short-term construction nor long-term operation and maintenance of the Project would exceed thresholds for ozone, PM_{2.5}, and PM₁₀ (KDA 2014). Implementation of

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Mitigation Measure AQ-1 would reduce PM₁₀ construction emissions associated with fugitive dust to a less-than-significant level. Because the Project would not result in a significant impact, the Project would not result in a cumulatively considerable net increase in ozone and PM₁₀ emissions. Therefore, with the implementation of Mitigation Measure AQ-1, this impact is considered less than significant.

Alternatives Analysis

The potential for the Reach A alternatives to result in a cumulatively considerable net increase of ozone and PM₁₀ is considered to be similar to the Project because the control measures would be implemented for all of the alternatives. Even though, Alternative 4 or 5 would require the demolition of existing buildings on 1400 West Tenth Street and would require additional equipment work, with the implementation of the control measures, the difference would not be significant. With the implementation of the control measures listed in Mitigation Measure AQ-1 the alternative impacts associated with construction emissions would be less than significant.

d) Would the project expose sensitive receptors to substantial pollutant concentrations?		Less than Significant		
	Potentially Significant Impact	With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Air quality regulators typically define sensitive receptors as schools (preschool – 12th grade), hospitals, resident care facilities, residences, day-care centers, or other facilities that may house individuals with health conditions that would be adversely impacted by changes in air quality. A project would have a significant impact on a sensitive receptor if it would result in an unacceptable health risk due to exposure to toxic air contaminant (TAC) emissions. The Air Quality Study investigated the Project's emissions of two types of TACs including naturally-occurring asbestos (NOA) and construction-related diesel particulate matter (KDA 2014).

The Project site is not located in an area considered likely to contain NOA (KDA 2014). Construction activities would result in emissions of diesel particulate matter from heavy equipment used on site and truck traffic to and from the site, as well as minor amounts of TAC emissions from motor vehicles. Health effects attributable to exposure to diesel particulate matter are long-term effects based on chronic exposure to emissions. Health effects are generally evaluated based on a lifetime (70 years) of exposure. Due to the short-term nature of construction at the site, no adverse health effects would be anticipated from construction-related diesel particulate emissions. Motor vehicle emissions would not be concentrated in any one area but would be dispersed along travel routes and would not be anticipated to pose a significant health risk to receptors. (KDA 2014).

Long-term operation and maintenance of the Project would include infrequent maintenance activities that would involve less equipment than the initial construction of the Project; therefore, impacts to sensitive receptors by exposure to substantial pollutant concentration from long-term operation and maintenance would be less than significant.

For the reasons described above and with the implementation of Mitigation Measure AQ-1, the Project would not expose sensitive receptors to substantial pollutant concentrations. The impact with the implementation of Mitigation Measure AQ-1 would be less than significant.

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Alternatives Analysis

The potential for each alternative to expose sensitive receptors to substantial pollutant concentrations is considered to be similar to the Project because all alternatives would be located in the same area and heavy equipment required for construction are similar for all alternatives. With the implementation of the control measures listed in Mitigation Measure AQ-1 the alternative impacts associated with construction emissions would be less than significant.

e) Would the project create objectionable odors affecting a substantial number of people?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Construction of the Project could result in minor amounts of odor compounds associated with diesel heavy equipment exhaust. However, because construction equipment would be operating at various locations throughout the Project site, and because any operations near existing receptors would be temporary, impacts associated with odors during construction are considered less than significant. Long-term operation and maintenance of the Project would include infrequent maintenance activities that would involve less equipment than the initial construction of the Project; therefore, odor impacts from long-term operation would be less than significant. Objectionable odor impacts with the implementation of Mitigation Measure AQ-1 would be less than significant.

Alternatives Analysis

The heavy equipment required for construction and hours of construction for all Reach A alternatives would be similar to the requirements for the Project. As a result, Reach A alternatives would result in similar amounts of odor compounds associated with diesel heavy equipment exhaust. Therefore, the analysis above for the Project is considered representative for all Reach A alternatives.

4.4 Biological Resources

4.4.1 Environmental Setting

A Biological Resource Assessment report (BRA) was prepared for the Project by Nomad Ecology (Nomad 2013a; Appendix B). The purpose of the report was to provide an assessment of existing conditions, evaluate habitat suitability for special-status plant and wildlife species, analyze potential Project impacts to biological resources, and provide recommendations for impact avoidance and minimization. In addition, the BRA identifies Planning Level Surveys and avoidance and minimization measures required by the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) and addresses biological resources as required by CEQA.

The Project area is located in the City of Antioch approximately 0.75-mile north of SR 4. It extends from just south of the intersection of O Street and West Tenth Street north to the marsh that borders the San Joaquin River/Sacramento-San Joaquin Delta. The Project area lies approximately 10 miles northeast of the peak of Mount Diablo. Topography is fairly level, gradually sloping downstream, and ranges from approximately 10 to 30 feet in elevation.

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The single hydrologic feature on-site is an approximately 0.79-mile stretch of West Antioch Creek that is highly urbanized. West Antioch Creek is characterized as an intermittent “blue-line” stream on the Antioch North and Antioch South USGS 7.5-minute quadrangles and in the HCP/NCCP. However, it receives local runoff from adjacent development, which may contribute to surface water flow all year. West Antioch Creek originates in the Mount Diablo foothills, more specifically in Black Diamond Mines Regional Park, to the south and drains north into the San Joaquin River/Sacramento-San Joaquin Delta by flowing north into Antioch Municipal Reservoir, where it continues north and is joined by several tributaries near SR 4. Markley Creek flows into West Antioch Creek approximately 0.5-mile south of the study area. West Antioch Creek flows through the study area and empties into the San Joaquin River/Sacramento-San Joaquin Delta, immediately north of the Project area.

Vegetation Communities

A total of six sensitive communities were observed in the Project area: alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream (Figure 6. *HCP/NCCP Land Cover Types*). Seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream are considered sensitive natural communities as they may qualify as a water of the U.S. and/or Waters of the State under U.S. Army Corps of Engineers (USACE) and Regional Water Quality Control Board (RWQCB) jurisdictions through the Clean Water Act and the Porter Cologne Water Quality Act. Alkali grassland is listed as an uncommon vegetation alliance in the HCP/NCCP.

Land Cover Types observed within the Project site include ruderal grassland, alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, stream and urban, which follow land cover types described in the HCP/NCCP (Nomad 2013a). Other vegetation classification systems used to describe vegetation on-site include those described by Robert F. Holland in the *Preliminary Description of the Terrestrial Natural Communities of California* and *A Manual of California Vegetation, Second Edition* by John O. Sawyer, et al (Nomad 2013a).

The ruderal grassland is characterized by sparse non-native, weedy vegetation occupying vacant parcels surrounded by developed areas. These areas include banks of the berms adjacent to the channelized creek and open fields within the Project site. Plants typical of ruderal grassland vegetation on-site include ripgut brome (*Bromus diandrus*), wild oats (*Avena fatua*), hare barley (*Hordeum murinum* ssp. *leporinum*), Italian ryegrass (*Festuca perennis*), Bermuda grass (*Cynodon dactylon*), johnsongrass (*Sorghum halepense*), charlock (*Sinapsis arvensis*), milk thistle (*Silybum marianum*), white-stemmed filaree (*Erodium moschatum*), and red-stemmed filaree (*Erodium cicutarium*), among many others.

A small area of alkali grassland is present in the northern portion of the Project area, just south of the railroad tracks, on the edge of an access road. It is dominated by saltgrass (*Ditrichlis spicata*), with small amounts of Italian ryegrass, Mediterranean barley (*Hordeum marinum* ssp. *gussoneanum*), alkali mallow (*Malvella leprosa*), and five-hook bassia (*Bassia hyssopifolia*).

Seasonal wetlands are present on the margins and floodplain of the West Antioch Creek low-flow channel, and extend from 1400 West Tenth Street downstream (north) to West Fourth Street. Plant species characteristic of seasonal wetlands in the Project area include Italian ryegrass, wild oats, burclover (*Medicago polymorpha*), rabbitsfoot grass (*Polypogon monspeliensis*), barnyard grass (*Echinochloa crus-galli*), birdfoot trefoil (*Lotus corniculatus*), tall flatsedge (*Cyperus eragrostis*), water bentgrass (*Polypogon viridis*), and many others.



Figure 6. HCP/NCCP Land Cover Types

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A small area of alkali wetland is present in the northern portion of the Project area, just south of the railroad tracks. It borders a dense stand of permanent wetland dominated by narrow-leaved cattail (*Typha angustifolia*). Plants species characteristic of the alkali wetland on-site include saltgrass, rabbitfoot grass, Italian ryegrass, Mediterranean barley, and alkali mallow.

Permanent wetland is represented by one vegetation community alliance, *Typha angustifolia* Herbaceous Alliance (Cattail Marshes). Narrow-leaved cattail is dominant or co-dominant. Within the Project area, cattail marsh is located adjacent to the low-flow channel of West Antioch Creek downstream of West Fourth Street and at the margin of the San Joaquin River/Sacramento-San Joaquin Delta. These areas are tidally influenced and contain brackish water. Other plant species present in this community include tall flatsedge, perennial pepperweed (*Lepidium latifolium*), Himalayan blackberry (*Rubus armeniacus*), pampas grass (*Cortaderia jubata*), and western goldentop (*Euthamia occidentalis*), with scattered arroyo willow (*Salix lasiolepis*).

Riparian woodland/scrub is represented by one vegetation alliance within the Project area, the *Salix lasiolepis*, Shrubland Alliance (Arroyo Willow Thicket). Arroyo willow is dominant or co-dominant. Arroyo willow shrubland is present in the channel, along a tributary ditch, and north of the railroad tracks. Scattered red willow (*Salix laevigata*), Fremont cottonwood (*Populus fremontii* ssp. *fremontii*) and Himalayan blackberry are also present.

The stream vegetation community is represented by West Antioch Creek within the ordinary high water mark. The low-flow channel is mostly unvegetated, with small amounts of permanent wetland plants species scattered along the margins of the creek, such as tall flatsedge, narrowleaf cattail, and watercress (*Nasturtium officinale*). Two plant species considered to be “unusual plants” (rare or threatened locally, but possibly more common elsewhere in the State) by the East Bay Chapter of the California Native Plant Society (EBCNPS) were found within West Antioch Creek (Nomad 2013b). These are American water horehound (*Lycopus americanus*) and rough bugleweed (*Lycopus asper*). Both are considered “A-1” species, which are species currently known from two or less regions in Alameda and Contra Costa County (EBCNPS 2013). Within California, American water horehound has been found in 32 counties and rough bugleweed in six counties (Calflora 2013). These two species are widely distributed throughout California.

During the course of this study, many non-native plant species were encountered within the study area. Of the non-native (e.g. invasive, noxious) plant species tracked by the California Invasive Plant Council (Cal-IPC 2013) and California Department of Food and Agriculture (CDFA 2005), a total of 11 plant species with elevated threat rankings were observed, including yellow star thistle (*Centaurea solstitialis*), jubata grass (*Cortaderia jubata*), fennel (*Foeniculum vulgare*), English ivy (*Hedera helix*), broadleaf peppergrass (*Lepidium latifolium*), Himalayan blackberry (*Rubus armeniacus*), black mustard (*Brassica nigra*), bull thistle (*Cirsium vulgare*), poison hemlock (*Conium maculatum*), and stinkwort (*Dittrichia graveolens*).

Potential Waters of the U.S.

A wetland delineation was prepared for the Project area in April 2013 (Nomad 2013c) (Figures 7a. and 7b. *Potentially Jurisdictional Wetlands and Waters*). This delineation has not been verified by the USACE, however, potential waters of the U.S. mapped during this effort totaled 9.859 acres, including 8.285 acres of wetlands (i.e., seasonal wetland, coastal brackish marsh, and Central Coast riparian scrub) and 1.574 acres of other waters of the U.S. (i.e., stream).

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Figure 7a. Potential Jurisdictional Wetlands and Waters

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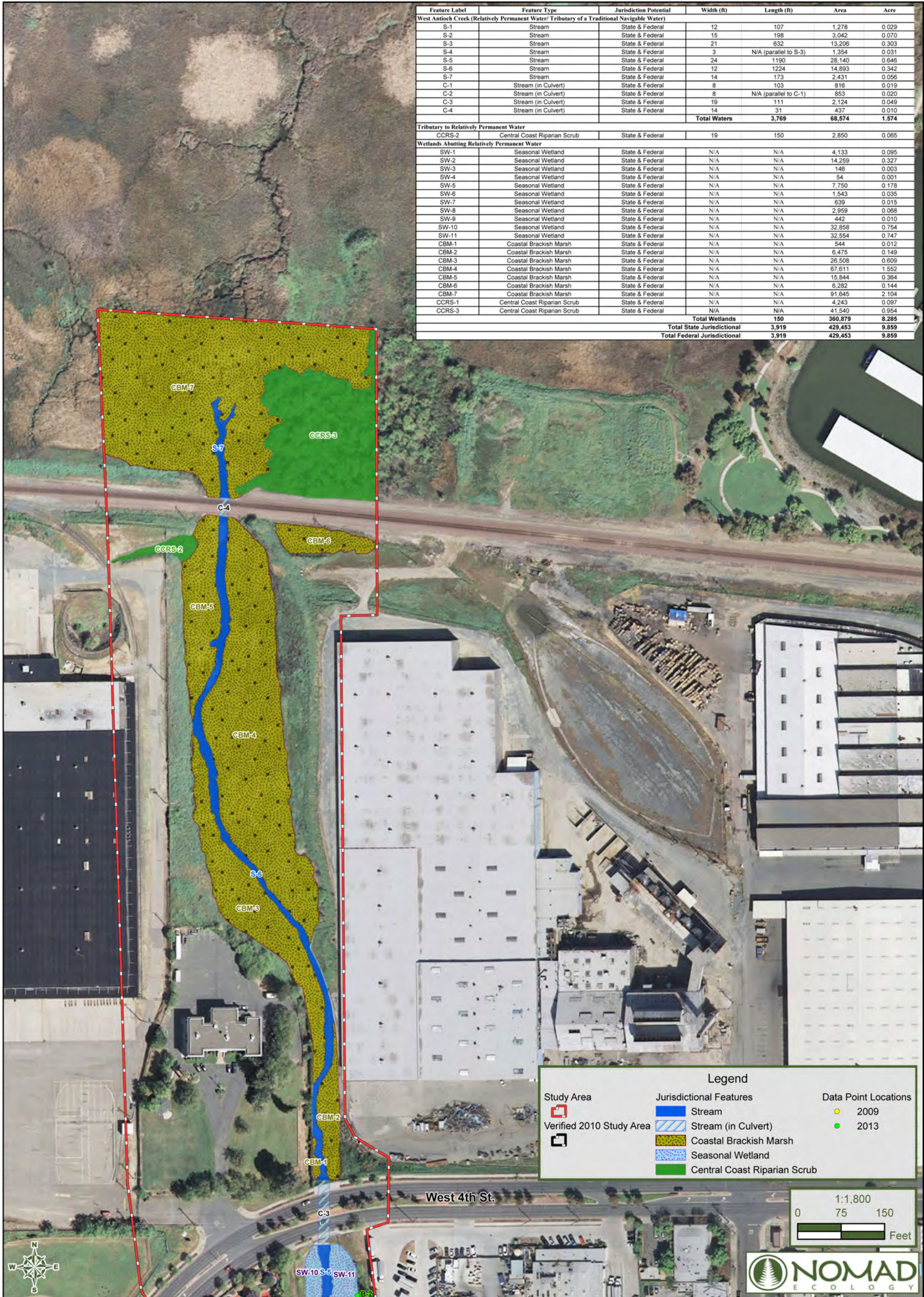


Figure 7b. Potential Jurisdictional Wetlands and Waters

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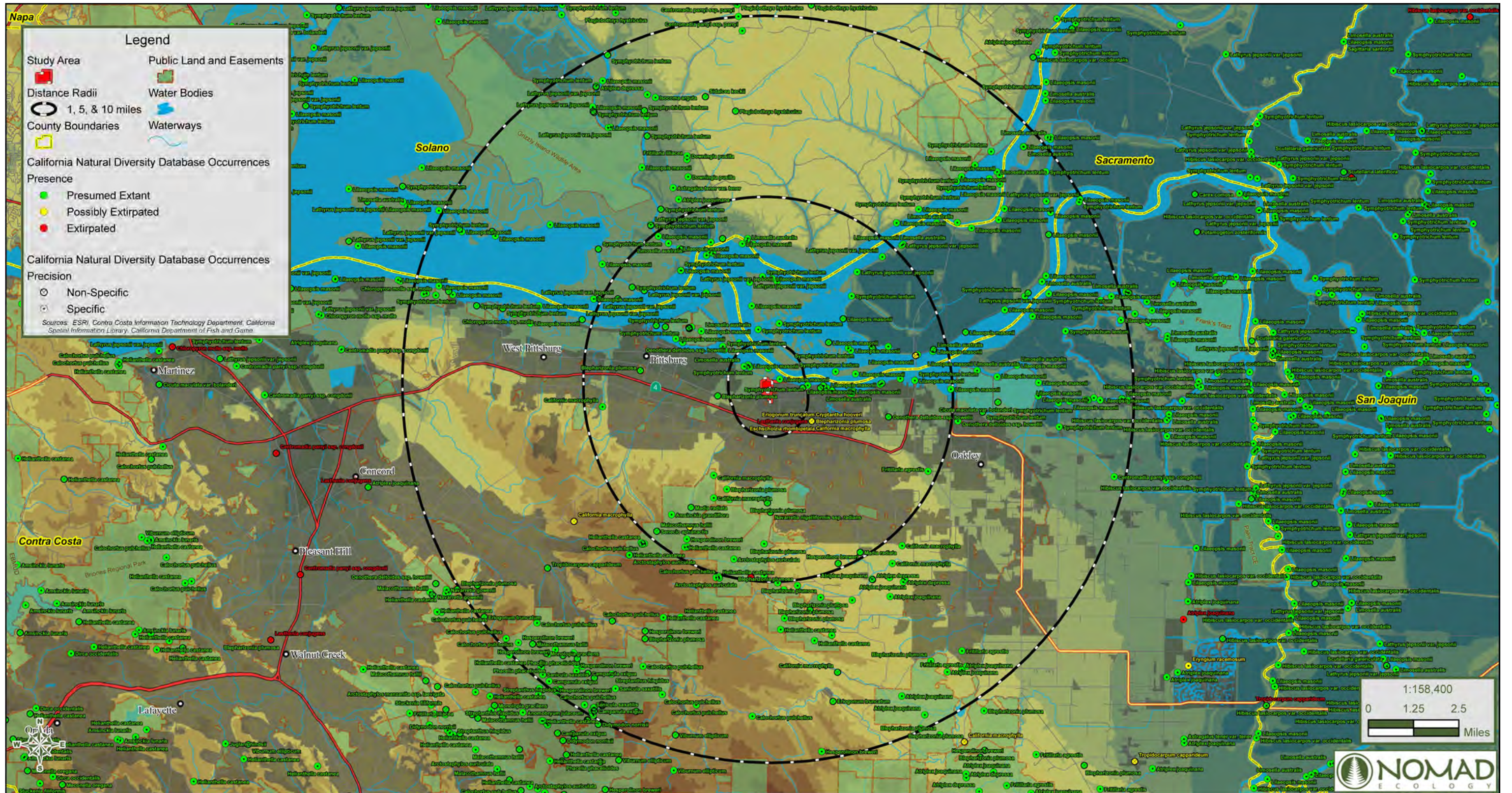


Figure 8a. Special Status Plant Species within the Vicinity

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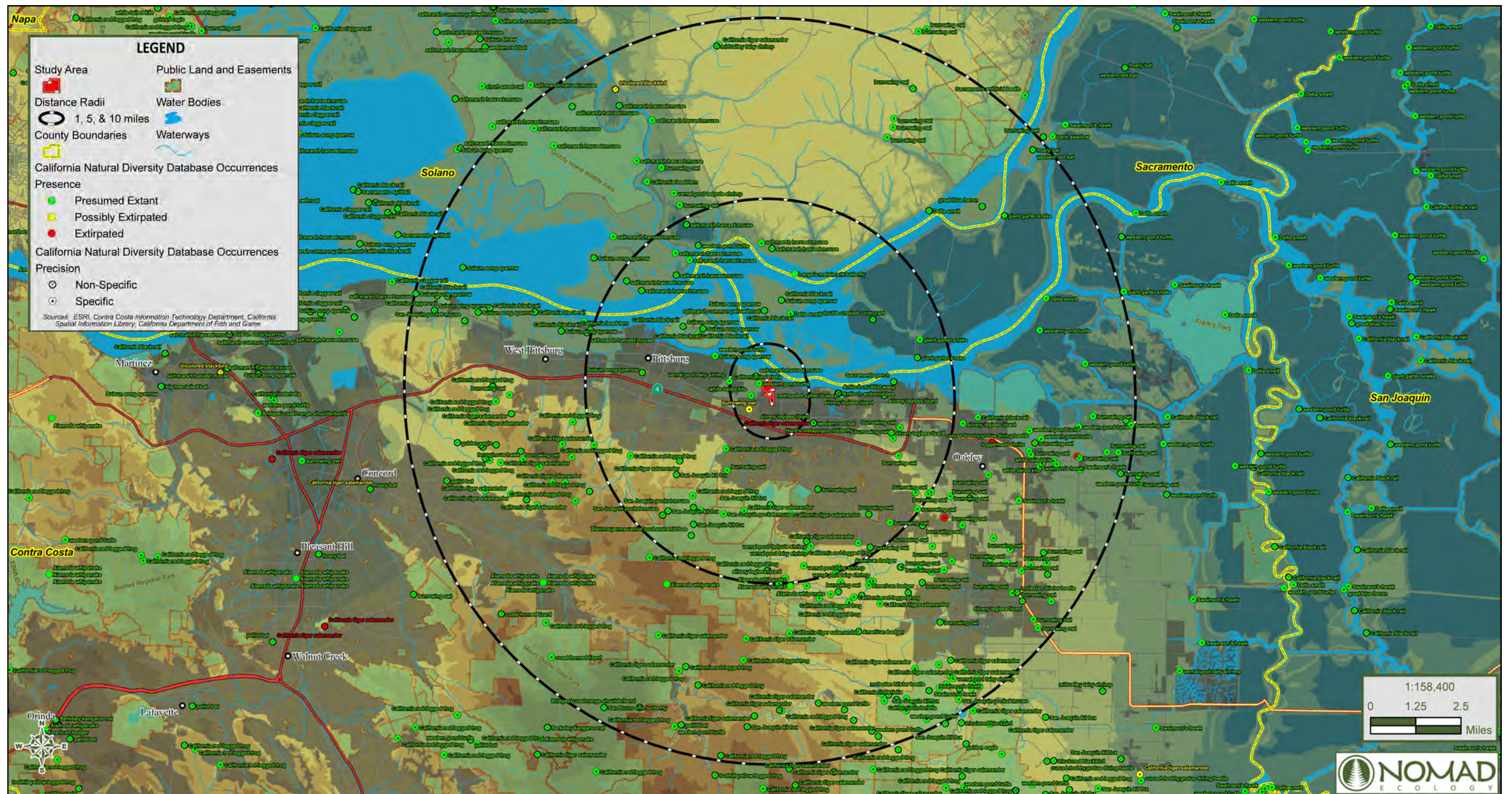


Figure 8b. Special Status Wildlife Species within the Vicinity

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Prior to that, a wetland delineation was prepared by Nomad Ecology in 2009 and revised in 2010 (Nomad 2009, 2010) for a 4.9-acre portion (Drainage Area 55 Box Culvert at West Tenth Street) of the Project area, which was subsequently verified by the USACE in a preliminary jurisdictional determination (PJD) letter dated March 10, 2012 (USACE Regulatory 2010-00109). A total of 0.894 acre of waters of the U.S. were mapped and verified. This includes 0.422 acre of seasonal wetlands and 0.472 acre of stream (West Antioch Creek).

As part of the Project design, the City of Antioch is working with the USACE and the USFWS to develop a strategy to mitigate for potential impacts to wetlands and suitable habitat for special-status species generated from the preferred Project. Although a wetland impact analysis has not been finalized to date, several acres of wetlands may be affected by the Project. For this reason, quantification of wetland impacts has not been completed.

Special-Status Plants

Rare plant surveys were conducted by Nomad Ecology during June, July, and August 2013 (Nomad 2013b). There are 71 special-status plant species known from the region. (Figure 8a. *Special-Status Plant Species within the Vicinity*). Of these 71 special-status plant species, 11 species are federal and/or state listed. Based on the field investigations, review of available databases and literature, familiarity with local flora, and on-site habitat suitability, two federal and/or state listed and California rare plant species were considered to have the potential to occur within the study area: soft bird's-beak (*Chloropyron molle* subsp. *molle*) and Mason's lilaeopsis (*Lilaeopsis masonii*). These two species were considered targets for rare plant surveys conducted in June, July, and August 2013 (Table 5). The surveys on the Project site found no special-status federal and/or state listed plant species (Nomad 2013b).

Of the 71 regionally potential species, 60 species are California Native Plant Society listed. Based on the field investigations, review of available databases and literature, familiarity with local flora, and on-site habitat suitability, six species are considered to have the potential to occur within the study area: Bolander's water hemlock (*Cicutamaculata* var. *bolanderi*), woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Delta mudwort (*Limosella australis*), side-flowering skullcap (*Scutellaria lateriflora*), and Suisun Marsh aster (*Symphyotrichum lentum*). These six species were considered targets for rare plant surveys conducted in June, July, and August 2013 (Table 5). The surveys on the Project site found no special-status CNPS listed plant species (Nomad 2013b).

Table 5. Potentially Occurring and Surveyed Federal and/or State and CNPS Listed Plant Species

Potentially Occurring Special-Status Plant Species	Listing Status ¹	Potential for Occurrence
Federal/State Listed Species		
<i>Chloropyron molle</i> subsp. <i>Molle</i> Soft bird's-beak	FE, SR CRPR 1B.2	Not observed during 2013 rare plant surveys.
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	SR CRPR 1B.1	Not observed during 2013 rare plant surveys.
California Rare Plant Rank Species		
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water hemlock	CRPR 2.1	Not observed during 2013 rare plant surveys.
<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i> Woolly rose-mallow	CRPR 2.2	Not observed during 2013 rare plant surveys.

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Potentially Occurring Special-Status Plant Species	Listing Status ¹	Potential for Occurrence
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	CRPR 1B.2	Not observed during 2013 rare plant surveys.
<i>Limosella australis</i> Delta mudwort	CRPR 2.1	Not observed during 2013 rare plant surveys.
<i>Scutellaria lateriflora</i> Side-flowering skullcap	CRPR 2.2	Not observed during 2013 rare plant surveys.
<i>Symphotrichum lentum</i> Suisun Marsh aster	CRPR 1B.2	Not observed during 2013 rare plant surveys.

Notes:

¹Explanation of State and Federal Listing Codes and HCP/NCCP Coverage

Federal listing codes:

FE Federally listed as Endangered

California listing codes:

SR State listed as Rare

California Native Plant Society codes:

1B Rare or Endangered in California and elsewhere

2 Rare or Endangered in California, more common elsewhere

California Native Plant Society Threat Codes:

.1 Seriously Endangered in California (over 80% of occurrences Threatened / high degree and immediacy of threat)

.2 Fairly Endangered in California (20-80% occurrences Threatened)

Source: Nomad Ecology 2013a

There are 17 listed plant species that are covered by and designated as no-take plant species in the HCP/NCCP. The HCP/NCCP Planning Survey Report also lists Land Cover Types that provide habitat for each of the covered and no-take species. Of the 17 covered/no-take species, all were ruled out as occurring on-site because there is no suitable habitat and they would have been detected during rare plant surveys conducted in June, July, and August 2013.

Special-Status Wildlife

Based on the field investigation conducted by Nomad Ecology (Nomad 2013a), review of available databases and literature, familiarity with local fauna, and on-site habitat suitability, a total of 90 special-status fish and wildlife species were considered as part of the assessment. Eighteen (18) species were determined to have the potential to occur within the study area and could be affected by the Project. (Table 6. Potentially Occurring Special-Status Fish and Wildlife Species) Special-status fish and wildlife species recorded in the California Natural Diversity Database are depicted in Figure 8b. The following list (Table 6) has four species listed as threatened or endangered, or designated by the state as fully protected, and 14 special-status species considered to be locally rare, sensitive or declining by agency or non-governmental watch lists. An additional twelve (12) species are not expected to occur on-site, but could not be entirely ruled out based on marginal habitat conditions, limited distribution information, or the lack of available life history data. A complete list of all species considered as part of this assessment, their regulatory status, habitat requirements, local distribution, and potential for occurrence are listed in the BRA. (Appendix B)

This reach of West Antioch Creek does not likely support suitable California red-legged frog habitat due to its isolation from known occurrences, presence of warm-water predatory fish, and absence of riparian shade/cover. Therefore, California red-legged frog is not further discussed because significant impacts to the species are not likely to occur.

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Table 6. Potentially Occurring Special-Status Fish and Wildlife Species within Project Area

Potentially Occurring Special-Status Wildlife Species	Listing Status ¹	HCP/NCCP Status	Critical Habitat	Potential for Occurrence
Invertebrates				
<i>Helminthoglypta nickliniana bridgesi</i> Bridge's coast range shoulderband	Fed: None CA: None Other: SA	Not Covered	No	Possible
Fish				
<i>Hypomesus transpacificus</i> Delta smelt	Fed: FT, CH CA: ST, Other: AFS-T	Not Covered	Yes	Possible
<i>Pogonichthys macrolepidotus</i> Sacramento splittail	Fed: None CA: SSC, Other: AFS-V	Not Covered	No	Possible
Amphibians				
<i>Rana draytonii</i> California red-legged frog	Fed: FT, CH CA: SSC Other:	Covered	Not within study area	Possible
Reptiles				
<i>Emys marmorata</i> Western pond turtle	Fed: None CA: None Other: SA	Covered	No	Possible
Birds				
<i>Accipiter cooperii</i> Cooper's hawk (nesting)	Fed: None CA: WL Other:	Not Covered	No	Possible
<i>Agelaius tricolor</i> Tricolored blackbird (nesting colony)	Fed: None CA: SSC, Other: ABC, BCC	Covered	No	Possible
<i>Asio flammeus</i> Short-eared owl (nesting)	Fed: None CA: SSC, Other: ABC	Not Covered	No	Possible
<i>Athene cunicularia</i> Western burrowing owl (burrow sites & some wintering sites)	Fed: None CA: SSC, Other: BCC	Covered	No	Possible
<i>Baeolophus inornatus</i> Oak titmouse (nesting)	Fed: None CA: Other: SA, ABC	Not Covered	No	Possible
<i>Circus cyaneus</i> Northern harrier (nesting)	Fed: None CA: SSC Other:	Not Covered	No	Possible
<i>Elanus leucurus</i> White-tailed kite (nesting)	Fed: None CA: FP Other:	Covered (No Take)	No	Possible
<i>Geothlypis trichas sinuosa</i> Saltmarsh common yellowthroat	Fed: None CA: SSC, Other: BCC	Not Covered	No	Possible
<i>Icteria virens</i> Yellow-breasted chat (nesting)	Fed: None CA: SSC Other:	Not Covered	No	Possible
<i>Lanius ludovicianus</i> Loggerhead shrike (nesting)	Fed: None CA: SSC, Other: BCC	Not Covered	No	Possible

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Potentially Occurring Special-Status Wildlife Species	Listing Status ¹	HCP/NCCP Status	Critical Habitat	Potential for Occurrence
<i>Laterallus jamaicensis coturniculus</i> California black rail	Fed: None CA: ST, FP Other: ABC, BCC	Not Covered	No	Possible
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	Fed: None CA: SSC Other: BCC	Not Covered	No	Possible
<i>Picoides nuttallii</i> Nuttall's woodpecker (nesting)	Fed: None CA: None Other: SA, ABC, BCC	Not Covered	No	Possible
Mammals				
None				

Notes:

¹ Explanation of State and Federal Listing Codes

Federal listing codes:

- FT Federally listed as Threatened
- CH Critical Habitat (Designated or Proposed)

California listing codes:

- ST State listed as Threatened
- FP Fully Protected
- SSC California Species of Special Concern
- WL Watch List

Other Codes for locally sensitive and rare:

- ABC The American Bird Conservancy maintains a Green List of all the highest priority birds for conservation in the continental United States and Canada. Based off the species assessments prepared by Partners in Flight (PIF) and has been expanded to include shorebirds, waterbirds and waterfowl.
- AFS American Fisheries Society identifies marine, estuarine and diadromous fish species that are at risk of extinction in North America. The AFS has designated the following four classifications in order of conservation importance E – Endangered, T – Threatened, V – Vulnerable, and CD – Conservation Dependent.
- BCC U.S. Fish and Wildlife Service Birds of Conservation Concern. List of migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service's highest conservation priorities.
- SA "Special Animals" is a general term that refers to all of the taxa the CNDDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of "species at risk" or "special status species." The CDFW considers the taxa on this list to be those of greatest conservation need.

Source: Nomad Ecology 2013a

Wildlife/Movement/Corridors

The Project area is almost entirely surrounded by urban development, limiting potential migration, dispersal and home range movement to and from West Antioch Creek and its associated riparian corridor. West Antioch Creek is a relatively narrow, channelized and earthen stream corridor crossing through the northern portion of the City of Antioch. The creek and associated floodplain and riparian corridor meet open tidally influenced marshlands of the San Joaquin River at the northern Project terminus. West Antioch Creek extends southward along a narrow, channelized corridor through dense urban habitat before going underground. Connection to the undeveloped lands of the northern Diablo Mountain Range is restricted by urbanization and SR-4, limiting movement of special-status and common species. The Project area provides connection for aquatic, marshland and riparian species to adjacent ruderal habitat and large contiguous tidally-influences marshlands to the north. A number of species observed along West Antioch Creek may travel along the creek corridor and through the study area including western pond turtle (*Actinemys marmorata*), river otter (*Lontra canadensis*), muskrat (*Ondatra zibethicus*), raccoon (*Procyon lotor*), Virginia opossum (*Didelphis virginiana*), and striped skunk (*Mephitis mephitis*). The corridor also provides connectivity for invasive species such as the New Zealand mud snail (*Potamopyrgus antipodarum*), signal crayfish (*Pacifastacus leniusculus*), Louisiana red swamp crayfish (*Procambarus clarkia*), red-eared slider turtles (*Trachemys scripta elegans*), house mouse (*Mus musculus*), roof rat (*Rattus rattus*),

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and brown rat (*Rattus norvegicus*). Habitat upstream of the study area becomes increasingly urbanized, culverted, and undergrounded, thereby preventing the upstream movement of resident and anadromous fish species.

4.4.2 Regulatory Setting

Federal Regulations

Federal Endangered Species Act (FESA)

The FESA protects plants and wildlife that are listed as endangered or threatened by the USFWS and the National Marine Fisheries Service (NMFS). Section 9 of FESA prohibits the taking of endangered wildlife, where taking is defined as “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct” (50CFR 17.3). For plants, this statute governs removing, possessing, maliciously damaging, or destroying any endangered plant on federal land and removing, cutting, digging-up, damaging, or destroying any endangered plant on non-federal land in knowing violation of state law (16 USC 1538). Under Section 7 of FESA, federal agencies are required to consult with the USFWS if their actions, including permit approvals or funding, could adversely affect a listed (or proposed) species (including plants) or its critical habitat. Through consultation and the issuance of a biological opinion, the USFWS may issue an incidental take statement allowing take of the species that is incidental to an otherwise authorized activity provided the activity will not jeopardize the continued existence of the species. Section 10 of FESA provides for issuance of incidental take permits (ITP) where no other federal actions are necessary provided a HCP is developed.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements international treaties between the U.S. and other nations devised to protect migratory birds, any of their parts, eggs, and nests from activities such as hunting, pursuing, capturing, killing, selling, and shipping, unless expressly authorized in the regulations or by permit. As authorized by the MBTA, the USFWS issues permits to qualified applicants for the following types of activities: falconry, raptor propagation, scientific collecting, special purposes (rehabilitation, education, migratory game bird propagation, and salvage), take of depredating birds, taxidermy, and waterfowl sale and disposal. The regulations governing migratory bird permits can be found in 50 CFR part 13 General Permit Procedures and 50 CFR part 21 Migratory Bird Permits. The State of California has incorporated the protection of birds of prey in Sections 3800, 3513, and 3503.5 of the California Fish and Game Code.

Federal Clean Water Act

The federal Clean Water Act's (CWA) purpose is to “restore and maintain the chemical, physical, and biological integrity of the nation's waters.” Section 404 of the CWA prohibits the discharge of dredged or fill material into “waters of the United States” without a permit from the U.S. Army Corps of Engineers (USACE). The definition of waters of the U.S. includes rivers, streams, estuaries, the territorial seas, ponds, lakes and wetlands. Wetlands are defined as those areas “that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions” (33 CFR 328.3 7b). The U.S. Environmental Protection Agency (EPA) also has authority over wetlands and may override a USACE permit.

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Substantial impacts to wetlands may require an Individual Permit from the USACE. Projects that only minimally affect wetlands may meet the conditions of one of the existing USACE Nationwide Permits. A Water Quality Certification or waiver pursuant to Section 401 of the CWA is required for Section 404 permit actions; this certification or waiver is issued by the Regional Water Quality Control Board (RWQCB).

State or Local Regulatory Requirements

California Endangered Species Act

The CESA generally parallels the main provisions of the FESA, but unlike its federal counterpart, the CESA applies the take prohibitions to species proposed for listing (called “candidates” by the state). Section 2080 of the California Fish and Game Code prohibits the taking, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit or in the regulations. Take is defined in Section 86 of the Fish and Game Code as “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” CESA allows for incidental take to otherwise lawful development projects. State lead agencies are required to consult with the California Department of Fish and Wildlife (CDFW) to ensure that any action they undertake is not likely to jeopardize the continued existence of any endangered or threatened species or result in destruction or adverse modification of essential habitat.

East Contra Costa County Habitat Conservation Plan/Natural Communities Conservation Plan

The East Contra Costa County Habitat Conservation Plan/Natural Communities Conservation Plan (HCP/NCCP) (Nomad 2013a) has obtained authorization for take of covered species under FESA and CESA. Covered species are those species fully addressed in the HCP/NCCP and are included in the ESA and NCCP ITPs by evaluating and complying with avoidance and minimization requirements at a regional scale. In addition, the HCP/NCCP covers “no-take” species, which are species for which take is not authorized under the Natural Community Conservation Plan Act (NCCPA). In order to comply with the terms of the HCP/NCCP, the applicant must avoid all direct and indirect impacts on no-take species. Reach A of the Project area is located within the HCP/NCCP inventory area. The Reach B portion (desilting) of the Project is located outside of the HCP/NCCP inventory area and would require separate consultation with regulatory agencies.

Fully Protected Species

The State of California first began to designate species as “fully protected” prior to the creation of the CESA and FESA. Lists of fully protected species were initially developed to provide protection to those animals that were rare or faced possible extinction, and included fish, mammals, amphibians and reptiles, birds and mammals. Most fully protected species have since been listed as threatened or endangered under CESA and/or FESA. The regulations that implement the Fully Protected Species Statute (California Fish and Game Code Section 4700) provide that fully protected species may not be taken or possessed at any time. Furthermore, CDFW prohibits any state agency from issuing ITPs for fully protected species, except for necessary scientific research.

Native Plant Protection Act

The Native Plant Protection Act (NPPA) of 1977 (California Fish and Game Code Sections 1900-1913) was created with the intent to “preserve, protect and enhance rare and endangered plants in this State.” The NPPA is administered by CDFW. The Fish and Game Commission has the authority to designate native plants as “endangered” or “rare” and to protect endangered and rare plants from

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take. The CESA of 1984 (California Fish and Game Code Section 2050-2116) provided further protection for rare and endangered plant species, but the NPPA remains part of the California Fish and Game Code.

California Streambed Alteration Notification/Agreement

Section 1602 of the California Fish and Game Code requires that a Streambed Alteration application be submitted to CDFW for 1) any activity that may substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake; 2) substantially change or use any material from the bed, channel, or bank of, any river, stream, or lake; or 3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake. CDFW reviews the proposed actions and, if necessary, submits to the Applicant a proposal for measures to protect affected fish and wildlife resources. The final proposal that is mutually agreed upon by CDFW and the Applicant is the Streambed Alteration Agreement. Often, projects that require a Streambed Alteration Agreement also require a permit from the USACE under Section 404 of the CWA and the RWQCB under Section 401 of the CWA. In these instances, the conditions of the Section 401 and 404 permits and the Streambed Alteration Agreement may overlap.

CEQA Significance Criteria

- Section 15064.7 of the CEQA Guidelines encourages local agencies to develop and publish the thresholds that the Lead Agency uses in determining the significance of environmental effects caused by projects under its review. However, agencies may also rely upon the guidance provided by the expanded Initial Study checklist contained in Appendix G of the CEQA Guidelines, which provides examples of impacts that would normally be considered significant.

An evaluation of whether or not an impact on biological resources would be substantial must consider both the resource itself and how that resource fits into a regional or local context. Substantial impacts would be those that would diminish, or result in the loss of, an important biological resource, or those that would obviously conflict with local, state, or federal resource conservation plans, goals, or regulations. Impacts are sometimes locally important but not significant according to CEQA. The reason for this is that although the impacts would result in an adverse alteration of existing conditions, they would not substantially diminish, or result in the permanent loss of an important resource on a population-wide or region-wide basis.

City of Antioch, Code of Ordinances, Title 9, Ch. 5, Article 12-Tree Preservation and Regulation

(A) Within the city there exist many native and non-native trees that greatly add to the aesthetic quality of the city. The older parts of the city adjacent to the San Joaquin River/Sacramento-San Joaquin Delta contain several horticultural trees planted by early settlers that have since become landmarks.

(B) The city recognizes that the retention of existing trees enhance the built environment, thus beautifying the community and benefiting the city with increased property values. It is the intent of this chapter to regulate the removal of trees, with the goal of retaining as many trees as possible while recognizing individuals' property rights.

Protected trees include established indigenous trees (blue, Valley, coast live, canyon live and interior live oaks, California buckeye, and California bay at least 10 inches diameter at 4.5 feet above grade), landmark trees (48 inches diameter and/or in excess of 40 feet in height), mature trees (at least 26 inches diameter), and street trees.

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4.4.3 Biological Resources (IV.)Environmental Checklist and Discussion

a) Would the project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Special-status Plants

No special-status plants were found within the Project area during protocol-level surveys conducted in 2013 (Nomad 2013b). Therefore, there are no impacts to special-status plants, and no further studies are necessary.

Special-status Wildlife

Bridge's Coast Range Shoulderband Snail

Suitable habitat is present within the ruderal grassland vegetation community types within the Project area. Given the relatively limited design of the Project and highly disturbed ruderal vegetation on the site, any impacts to Bridges' coast range shoulderband snails are expected to be minimal and not considered significant.

Delta Smelt, Sacramento Splittail

There is 6.47 acres of delta smelt habitat in the Project area (including portions of the Dow wetlands). The Project is likely to affect 4.44 acres of delta smelt habitat and could result in mortality or injury to any or all delta smelt life history stages if present in the Project area by increasing turbidity, reducing water quality, temporarily altering shallow water habitat, and changing water velocities. The Project may also reduce recruitment, increase the risk of predation, reduce feeding success, and temporarily degrade overall habitat quality, resulting in a potentially-significant impact.

Suitable Sacramento splittail habitat is present within the Project area. There is a possibility of Sacramento splittail occurring within the lower reaches of West Antioch Creek within the Project area, as no in-stream barriers to movement are present between the Project area and San Joaquin River/Sacramento-San Joaquin Delta.

To reduce potential impacts to delta smelt and Sacramento splittail, Mitigation Measure BIO-1 and BIO-2 will be implemented.

Mitigation Measure

BIO-1 Delta Smelt, Sacramento Splittail

- A. To minimize take of delta smelt and Sacramento splittail and minimize disturbance to suitable habitat, desilting activities will be confined to a single calendar year. However, based on the extent of desilting required, in-stream work will be conducted during an

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extended work window from March 15 to October 15. If work cannot be completed by October 15, the City will request an extension from the United States Fish and Wildlife Service (USFWS).

- B. Standard Best Management Practices (BMPs) will be implemented to maintain water quality and control sedimentation. (See Mitigation Measures AQ-1 and G-1)
- C. Prior to dewatering and cofferdam installation/removal, a USFWS- and CDFW approved biologist will conduct a fish rescue for native fish and immediately relocate them to a suitable location upstream or downstream of the Project site as approved by the USFWS and CDFW. The USFWS/CDFW-approved biologist will be on-site during initial dewatering activities to ensure any fish that remain in the drawdown area are relocated to nearby suitable habitat. The City will submit the qualifications of qualified biologists to the USFWS for review and approval at least thirty (30) calendar days prior to Project initiation.
- D. Temporary fills including cofferdams and access roads will be completely removed following Project completion.
- E. If dewatering is necessary, pump intakes will be screened with mesh in accordance with National Oceanic Atmospheric Administration (NOAA) and National Marine Fisheries Services (NMFS) fish screening criteria for anadromous salmonids (NOAA 1997) to prevent uptake of fish that may be present in the creek.
- F. Sediment curtains will be placed downstream of the construction area during the installation and removal of the cofferdam to minimize downstream sediment transfer.
- G. A spill prevention plan for potentially hazardous materials will be prepared that includes procedures for handling and storing potentially hazardous materials, as well as cleanup and reporting of any spills. If necessary, containment berms will be constructed to prevent spilled materials from reaching the creek channel.
- H. Equipment and materials will not be stored within 50 feet of the creek unless it is on established paved areas. However, if it is necessary to store equipment or materials within 50 feet of the creek, temporary containment berms will be constructed around the equipment/materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents will be located outside of the stream channel and banks. Secondary containment will be provided for stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the West Antioch Creek to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to the creek will be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life.
- I. No fueling, cleaning or maintenance of vehicles or equipment, or placement of trash will occur within 50 feet of the creek or floodplain as measured from the top of bank unless it occurs in designated refueling/staging areas on existing paved surfaces with secondary containment in place. Contractors will inspect all equipment/vehicles for leaks prior to using on the Project site and will be inspected regularly throughout the Project duration.
- J. All temporarily disturbed areas will be revegetated with native species suitable for the area. Thus preventing construction activities from becoming vectors for invasive non-native plant species, reduce the need for long-term use of herbicides, and reduce the potential for spreading seed within West Antioch Creek, as well as to neighboring parcels.

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Mitigation Measure

BIO-2 New Zealand mudsnail

- A. The New Zealand mudsnail (*Potamopyrgus antipodarum*) is a small aquatic snail native to New Zealand. It is listed as a regulated species by the California Aquatic Invasive Species Management Plan (CDFG 2008). Due to the presence of New Zealand mud snails (a non-native species that range in size from a grain of sand to 1/8 inch in length and are black or brown in color) within West Antioch Creek, which are classified as an invasive species by CDFW, the following precautions are advised:
1. All Project personnel shall be trained in the identification, preventative measures, and physical and chemical cleaning methodologies for New Zealand mud snails prior to working on the Project. Brochures or identification cards shall be available to all Project personnel and CDFW informational posters shall be installed at the Project site.
 2. After work in West Antioch Creek, all waders, boots, gear, and other equipment will be thoroughly inspected for New Zealand mud snails. A cleaning station will be established on the Project site and maintained throughout the Project duration employing both physical and chemical cleaning methodologies. The cleaning station will implement the preventative and treatment methodologies in accordance with CDFW available at <http://www.dfg.ca.gov/invasives/mudsnail/>.
 3. A designated cleaning area will be established for heavy equipment and vehicles. All heavy equipment will be cleaned prior to leaving the site in accordance with CDFW guidelines.
 4. Fish and Western pond turtles shall be relocated to a safe location outside the work area, but shall not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.

Western Pond Turtle

There is 8.71 acres of western pond turtle habitat in the study area, 6.64 acres of which could be temporarily affected. The Project could result in direct mortality or injury to individual western pond turtles and cause abandonment, reduced feeding success, loss of nests if breeding on-site, decreased recruitment, increased risk to predation, or subject individuals to poor water quality during construction. To reduce potential impacts to western pond turtles to a less than significant level, Mitigation Measure BIO-2 and BIO-3 shall be implemented.

Mitigation Measure

BIO-3 Western Pond Turtles

- A. A qualified biologist will conduct a preconstruction survey for western pond turtles immediately prior to work activities within the creek or floodplain downstream from the concrete-lined channel in Reach A-2. If western pond turtles are detected within the work area, no work will occur until they move or are captured and relocated outside of the work area. The on-site biologist will determine, in consultation with CDFW, if capturing and relocating the individual(s) is necessary. If authorized by CDFW, only a biologist in possession of a valid Scientific Collecting Permit will handle or relocate the turtles.

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- B. Western pond turtles should be relocated to a safe location outside the work area, but should not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.

Western Burrowing Owl

There is 18.27 acres of suitable nesting habitat in the study area; 3.15 acres are in the Project extent and 10.46 acres may be used for staging areas. The Project could result in direct mortality or injury to breeding, resident or transient burrowing owls or cause harassment from noise or increased human activity. To reduce potential impacts to western burrowing owl to a less than significant level, Mitigation Measure BIO-4 will be implemented. Mitigation Measure BIO-4 is consistent with HCP/NCCP Conservation Measures (HCP/NCCP Chapter 6, Section 6.4.3) and the CDFG guidelines.

Mitigation Measure

BIO-4 Western Burrowing Owl

Preconstruction Survey

- A. Prior to any ground disturbance related to covered activities, a USFWS/CDFW-approved biologist will conduct a preconstruction survey in areas identified in the planning surveys as having potential burrowing owl habitat. The surveys will establish the presence or absence of western burrowing owl and/or habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFG 2012).

On the parcel where the activity is proposed, the biologist will survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys will take place near sunrise or sunset in accordance with CDFW guidelines. All burrows or burrowing owls will be identified and mapped. Surveys will take place no more than 30 days prior to construction. During the breeding season (February 1 – August 31), surveys will document whether burrowing owls are nesting in or directly adjacent to disturbance areas. During the nonbreeding season (September 1 – January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

Avoidance and Minimization Measures and Construction Monitoring

- A. If burrowing owls are found during the breeding season (February 1 – August 31), the Project proponent will avoid all nest sites that could be disturbed by Project construction during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below). Construction may occur during the breeding season if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31), the Project proponent shall avoid the owls and the burrows they are using, if possible. Avoidance will include the establishment of a buffer zone (described below).

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If occupied burrows for burrowing owls cannot be avoided, passive relocation will be implemented during the non-nesting season (September 1-January 31). Owls will be excluded from burrows in the immediate impact zone and within a 160-foot buffer zone by installing one-way doors in burrow entrances. These doors will be in place for 48 hours prior to excavation. The Project area will be monitored daily for 1 week to confirm that the owl has abandoned the burrow. Whenever possible, burrows will be excavated using hand tools and refilled to prevent reoccupation (CDFG 2012). Plastic tubing or a similar structure shall be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.

California Black Rail

There is 4.93 acres of nonbreeding habitat in the Project area. Desilting of the lower reach of West Antioch Creek downstream of Fourth Street would result in the loss of 3.01 acres of nonbreeding habitat through the removal of cattails. To reduce potential impacts to California black rail to a less than significant level, Mitigation Measure BIO-5 shall be implemented.

Mitigation Measure

BIO-5 California Black Rail

- A. Within 700 feet of the Project footprint, focused preconstruction surveys for active California black rail nests, broods and calling centers will be conducted by a CDFW-approved biologist(s) within two weeks prior to the start of construction and monthly thereafter throughout the duration of the nesting season from February 1 to September 30. If active nests – nests with egg(s) or young present – broods, or calling centers are located in the survey area, all construction activities within 700 feet of the nest, brood or call center will cease immediately, CDFW will be notified within 24 hours of the observation and a 700 foot no-disturbance buffer will be established until the young have fledged unless otherwise directed by CDFW.
- B. A CDFW-approved biologist(s) will be present on site to monitor for California black rails during construction activities occurring downstream of Fourth Street. The biological monitor will have the authority to stop work if deemed necessary for any reason to protect federally listed species. If a California black rail is found in the work area, work within 100 feet of the rail(s) shall cease immediately and the CDFW-approved biologist(s) will monitor the rail until it leaves the work area. If the rail does not leave the work area, work will not restart until after the CDFW have made a decision on how to proceed with further construction activities. CDFW will be notified within 24 hours of an observation of a California black rail.

Nesting Birds

The Project would not likely result in the loss of known white-tailed kite, Cooper's hawk, northern harrier, short-eared owl, or other protected raptor nests, but may result in the loss of potential nesting habitat (e.g. trees or ground nesting species) and foraging habitat. If present, the Project could result in harassment to nesting individuals and may temporarily disrupt foraging activities.

Removal of trees, shrubs, cattails and other emergent vegetation would result in the loss of potential nesting and foraging habitat for Nuttall's woodpecker, loggerhead shrike, oak titmouse, saltmarsh common yellowthroat, yellow-breasted chat, Suisun song sparrow, and tricolored blackbird. If nesting within the study area, the Project could result in short-term impacts such as

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failure to breed, nest abandonment, lower numbers of eggs, and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

All native birds, including raptors, are protected under the Fish and Game Code and the Federal MBTA. To ensure that there are no impacts to protected active nests, Mitigation Measure BIO-6 shall be implemented to reduce potentially adverse effects to nesting birds to a less than significant level.

Mitigation Measure

BIO-6 Nesting Birds

A. Nesting Raptors

- a. The removal or trimming of trees within 250 feet of the Project footprint will be conducted during the non-breeding season, i.e. between September 1 and February 1, to avoid impacts to nesting raptors. If tree removal during the non-breeding season is infeasible, trimming or delimbing of suitable trees to discourage nesting shall be conducted during the non-breeding season.
- b. If Project construction begins during the breeding season, i.e. February 1 to August 31, preconstruction surveys for raptors will be conducted within the Project footprint and a 300-foot buffer, by a qualified biologist no more than two weeks prior to equipment or material staging, pruning/grubbing or surface-disturbing activities.
- c. If active raptor nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 300 feet of the Project footprint, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.

B. Protected Under the Migratory Bird Treaty Act

- a. If active nests (i.e. nests in the egg laying, incubating, nestling or fledgling stages) are found within 50 feet of the Project footprint during the preconstruction survey described under A. b. above, non-disturbance buffers will be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work will occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size will be determined in cooperation with CDFW or USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that Project activities are resulting in nest disturbance, work will cease immediately and the CDFW or USFWS shall be contacted for further guidance.

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Alternatives Analysis

All four alternatives for Reach A would result in direct impacts similar to the Project. The impact analysis above for the Project would be applicable to all of the alternatives, however, implementation of Alternatives 1 and 2 would result in less available habitat than the other alternatives due to the use of more extensive culverts in Reach A-1. This would not result in different or more severe impacts beyond those described under the Project and no additional mitigation would be required.

b)	Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A total of six sensitive communities were found in the Project area: alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream. Seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream are considered sensitive natural communities as they likely qualify as waters of the U.S. and/or Waters of the State falling under U.S. Army Corps of Engineers, Regional Water Quality Control Board, and California Department of Fish and Wildlife jurisdictions through the Clean Water Act, the Porter Cologne Water Quality Act and the State Fish and Game Code. Impacts to these sensitive communities would be reduced to a less than significant level with the incorporation of Mitigation Measure BIO-7, discussed under Item c). Alkali grassland is a sensitive non-wetland community that would be avoided. Therefore, there would be no anticipated impacts to alkali grassland. Preventing construction activities from becoming vectors for invasive non-native species, as discussed in the environmental setting, should be pursued as a way to protect native plant communities on-site, reduce the need for long-term use of herbicides, and to reduce the potential for spreading seed within West Antioch Creek, as well as to neighboring parcels.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives, however, implementation of Alternatives 1 and 2 would result in less potential for reestablishment of riparian habitat than the other alternatives due to the use of more extensive culverts in Reach A-1. This would not result in different or more severe impacts beyond those described under the Project and no additional mitigation would be required.

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c)	Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

As discussed earlier, potential waters of the U.S./State mapped within the Project area totaled 9.859 acres, and included 8.285 acres of wetlands (i.e., seasonal wetland, coastal brackish marsh, and Central Coast riparian scrub) and 1.574 acres of other waters of the U.S. (i.e., stream). The Project as designed has the potential to impact several acres of wetlands depending on the nature of the impacts (e.g. direct removal during de-silting). Given the preliminary impact analysis, mitigation may consist of several measures to reduce impacts to a less than significant level, as described below in Mitigation Measure BIO-7.

Mitigation Measure

BIO-7 Wetlands

- A. As part of the permitting process, the City will obtain a jurisdictional determination from the USACE of the prepared wetland delineation.
- B. Based on the preliminary design, a Section 404 permit application will be submitted to the USACE that includes a detailed analysis of mitigation that results in no net loss of wetlands. Wetland impacts of greater than 0.5 acre or greater than 300 feet of stream may be permitted under a Letter of Permission or an Individual Permit.
- C. Prepare a CDFW 1602 Streambed Alteration Agreement to quantify impacts to riparian and aquatic habitat.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives, however, implementation of Alternatives 1 and 2 would result in less potential for reestablishment of wetland habitat than the other alternatives due to the use of more extensive culverts in Reach A-2. This would not result in impacts beyond those described under the Project and no additional mitigation would be required.

d)	Would the project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project area is almost entirely surrounded by urban development, limiting potential migration, dispersal and home range movement to the channel of West Antioch Creek and its associated

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riparian corridor. West Antioch Creek is a relatively narrow, channelized and earthen stream corridor crossing through the northern portion of the City of Antioch. The creek, associated floodplain, and riparian corridor meet open tidally influenced marshlands of the San Joaquin River at the northern Project terminus. West Antioch Creek extends southward along a narrow, channelized corridor through dense urban habitat before being channelized, covered, and culverted. Connection to the undeveloped lands of the northern Diablo Mountain Range is restricted by urbanization and SR-4, limiting movement of special-status and common species. The Project area provides connection for aquatic, marshland and riparian species to adjacent ruderal habitat and large contiguous tidally-influenced marshlands to the north. Habitat upstream of the study area is increasingly urbanized thereby preventing the upstream movement of resident and anadromous fish species.

Impacts associated with the Project would be limited to the construction, operation and maintenance. These activities would be short term and would not significantly alter the ability of the stream corridor to serve as a movement corridor in the long term. For the species described in the environmental setting, the impacts from the construction, operation and maintenance of the Project would be temporary and less than significant with the implementation of Mitigation Measures BIO-1 through 7.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives; however, implementation of Alternative 2 would restrict wildlife movement more than the other alternatives but the corridor is already highly restricted already. Therefore, the implementation of this alternative would not result in a significant impact to wildlife movement within this corridor and no additional mitigation would be required.

e)	Would the project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project may result in the removal of protected trees under the City of Antioch, Code of Ordinances, Title 9, Ch. 5, Article 12-Tree Preservation and Regulation. Implementation of Mitigation Measure BIO-8 would reduce impacts to protected trees to less than significant level.

Mitigation Measure

BIO-8 Tree Removal

Prior to the removal of trees (if necessary) protected under the City of Antioch, Code of Ordinances, Title 9, Ch. 5, Article 12-Tree Preservation and Regulation, the City or its contractor will:

- A. Prepare and submit an application to the City's Department of Parks, Leisure and Community Services for the removal of established trees.
- B. Replace trees that are legally removed, as follows:

All trees that are legally removed shall be replaced according to the following schedule:

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- Each established tree: two 24 inch box trees.
- Each mature tree: two 48 inch box trees.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives.

f)	Would the project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A portion of the Project area (Reach A) is located within the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) inventory area. Although the City of Antioch is not a permittee of the HCP/NCCP, the Contra Costa County Flood Control District, an HCP/NCCP permittee, has jurisdiction over drainages that span city and county boundaries including a portion of West Antioch Creek. The City would consult with the Contra Costa Flood Control District and East Contra Costa County Habitat Conservancy to determine if the Project can receive HCP/NCCP permit coverage. The Reach B portion (desilting) of the Project is located outside of the HCP/NCCP inventory area and would require separate consultation with regulatory agencies.

Reach A would be subject to provisions of the East Contra Costa County HCP/NCCP (Nomad 2013a). In order to comply with the terms of the HCP/NCCP, the City will avoid all direct and indirect impacts on no-take species. With implementation of the Mitigation Measures described above in this section, there will be no direct or indirect impact on no-take species.

Alternatives Analysis

All four alternatives for Reach A would be located in the same area as the Project. The impact analysis above for the Project would be applicable to all of the alternatives.

4.5 Cultural Resources

4.5.1 Environmental Setting

Cultural Resources

A Cultural Resources Survey Letter Report was prepared by ECORP Consulting, Inc. (ECORP 2013a, Appendix C) for the Project to amend an original report prepared in 2010 for a portion of the Project area to determine if additional cultural resources were present in or adjacent to the newly Project area as well as to assess the sensitivity of the Project area for undiscovered or buried cultural resources. The Project area is located within a built environment. It is primarily bounded to the north by the Dow Wetland Preserve, on the east by residential and industrial development, on the south by the Contra Costa County Fairgrounds, and on the west by commercial and industrial development. A portion of the Project area is paved along the west side of the creek at 1400 West Tenth Street. Scattered vacant lots also occur within the developed areas

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The analysis of cultural resources was based on the original 2010 report, a new records search, various literature reviews, a historic map and aerial search, and a pedestrian survey of the entire Project area. The updated records search and literature review was conducted at the Northwestern Information Center of the California Historical Resources Information System at California State University-Sonoma on May 20, 2013, and the field survey was conducted August 23, 2013.

The records and literature search identified 19 previous cultural resource investigations that had been conducted between 1976 and 2010 within 1.0 mile of the Project area, covering approximately 25 percent of the total area surrounding the Project area within the record search radius. These studies revealed the presence of historical period resources including railroads, refuse dumps, residences, and school buildings.

The results of the records search indicate that areas along the creek have been previously surveyed for cultural resources through several linear and block surveys. The records search also determined that ten previously recorded historic-era cultural resources are located within 1.0 mile of the Project area; however, none are located within the Project area. Results of the literature review and Native American coordination are in the attached letter report (Appendix C).

A search of the Sacred Lands File by the Native American Heritage Commission (NAHC) showed no Native American cultural resources in the Project area.

The Antioch Historical Society and the Contra Costa County Historical Society were also contacted for historical information relevant to the Project. The report is included as Appendix C and the findings are summarized below.

The pedestrian field survey resulted in no newly identified cultural resources. The Project area has no known archaeological sites and the West Antioch Creek Canal was evaluated as not eligible for the California Register of Historical Resources (CRHR) and not eligible for the National Register of Historic Places (NRHP) by ECORP (Appendix C).

The Project area contains two buildings at 1400 West Tenth Street. The Project does not intend to affect or demolish these buildings; however, Alternative 4 would demolish both buildings and Alternative 5 would demolish one building. Mead & Hunt (2013; Appendix C) conducted a literature review, researched the history and architecture of the buildings, completed a physical inspection of the buildings, and found no evidence to suggest the buildings possess qualities that qualify them for listing in the NRHP or CRHR.

There are no cultural resources evaluated as eligible for the CRHR or NRHP in the Project area. Therefore, no known Historical Resources, as defined by CEQA, would be affected by the Project, and no known Historic Properties, as defined in Section 106 of the National Historic Preservation Act, would be affected.

Paleontological Resources

A paleontological assessment was prepared by ECORP Consulting, Inc. (ECORP 2013b, Appendix E) for the Project to determine if paleontological resources were present in or adjacent to the Project area and assess the sensitivity of the Project area for undiscovered paleontological resources. The University of California Museum of Paleontology (UCMP) database results, more details about the geology, and the probability of finding fossil specimens can be found in the assessment in Appendix E.

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A paleontological database search of the UCMP paleontology locality and specimen collection records for Contra Costa County was conducted in October 2013. The UCMP has 11,888 paleontological specimens from 2,476 localities in Contra Costa County. Not all specimens in the UCMP collections have been cataloged and digitized, resulting in other specimens potentially have been recorded within the vicinity of the Project area. At least 17 UCMP records are recorded in Antioch where the Project is located and Most of these occurrences are mammalian species from the Pleistocene epoch of the Quaternary period found in clay and fluvial sand soil types. Additional information from a review of regional geologic maps from the California Geological Survey, and a review of existing literature on paleontological resources of Contra Costa County was used to provide information about paleontological resources.

According to the 2010 Geologic Map of California and the Geologic Map of the Sacramento Quadrangle, the underlying geologic formation for the Project area is classified as older alluvium, lake, playa, and terrace deposits with intertidal deposits at the north end of the Project area from the Quaternary period (ECORP 2013b, Appendix E). The records search determined that there are fossil vertebrate localities located in proximity to the Project area and the geology underlying the Project area has high potential for containing nonrenewable paleontological resources. (ECORP 2013b, Appendix E).

4.5.2 Regulatory Setting

Cultural Resources Obligations Under CEQA

To meet the regulatory requirements of the Project, a cultural resources investigation was conducted pursuant to the provisions for the treatment of cultural resources contained within CEQA (Pub. Res. Code § 21000 et seq.). The goal of CEQA is to develop and maintain a high-quality environment that serves to identify the significant environmental effects of the actions of a Project and to either avoid or mitigate those significant effects where feasible. CEQA pertains to all Projects that require state or local government agency approval, including the enactment of zoning ordinances, the issuance of conditional use permits, and the approval of development Project maps.

CEQA (Title 14, CCR, Article 5, Section 15064.5) applies to cultural resources of the historical and prehistoric periods. Any Project with an effect that may cause a substantial adverse change in the significance of a cultural resource, either directly or indirectly, is a Project that may have a significant impact on the environment. As a result, such a Project would require avoidance or mitigation of impacts to those affected resources. Significant cultural resources must meet at least one of four criteria that define eligibility for listing on either the California Register of Historical Resources (CRHR) (Pub. Res. Code § 5024.1, Title 14 CCR, Section 4852) or the National Register of Historic Places (NRHP) (36 CFR 60.4). Cultural resources eligible for listing on the NRHP are considered Historic Properties under 36 CFR Part 800 and are automatically eligible for the CRHR. Resources listed on or eligible for inclusion in the CRHR are considered to be Historical Resources (significant) under CEQA.

The Lead Agency is responsible for ensuring compliance with mitigation measures for Historical Resources, as defined by CEQA, in order to reduce impacts. Section 15097 of Title 14, Chapter 3, Article 7 of CEQA, Mitigation Monitoring or Reporting, states "the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the Project and the measures it has imposed to mitigate or avoid significant environmental effects. A public agency may delegate reporting or monitoring responsibilities to another public agency or to a private entity which accepts the delegation; however, until mitigation measures have been completed the lead

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agency remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program."

4.5.4 Cultural Resources (V.)Environmental Checklist and Discussion

a) Would the project cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No historical resources were identified in the Project area as a result of the records search and field survey. However, there always remains a possibility that unrecorded cultural resources are present beneath the ground surface, and that such resources could be exposed during Project construction. CEQA requires the lead agency to address any unanticipated cultural resource discoveries during Project construction. The following mitigation measure would reduce potential adverse impacts to less than significant.

Mitigation Measure

C-1 Unanticipated Discovery:

If subsurface deposits believed to be cultural or human in origin are discovered during construction, then all work will halt within a 100-foot radius of the discovery. A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeologist, will be retained to evaluate the significance of the find, and will have the authority to modify the no-work zone radius as appropriate, using professional judgment. A Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission (NAHC), will be required if the nature of the unanticipated discovery is prehistoric.

Work cannot continue within the no-work zone radius until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the National Register of Historical Places (NRHP) or the California Register of Historic Resources (CRHR).

If a potentially-eligible resource is encountered, then the archaeologist and the City will arrange for either 1) total avoidance of the resource, if possible; or 2) test excavations to evaluate eligibility and, if eligible, total data recovery as mitigation. The determination will be formally documented in writing as verification that the provisions in CEQA/NEPA for managing unanticipated discoveries have been met.

In the event that evidence of human remains is discovered, construction activities within 100 feet of the discovery will be halted or diverted and the requirements for an unanticipated discovery will be implemented. In addition, the provisions of Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and AB 2641 will be implemented. When human remains are discovered, state law requires that the discovery be reported to the County Coroner (Section 7050.5 of the Health and Safety Code) and that reasonable protection measures be taken during construction to protect the discovery from disturbance (AB 2641). If the Coroner determines the remains are Native

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American, the Coroner notifies the NAHC, which then designates a Native American Most Likely Descendant (MLD) for the Project (Section 5097.98 of the Public Resources Code). The designated MLD then has 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains (AB 2641). If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (Section 5097.94 of the Public Resources Code). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (Section 5097.98 of the Public Resources Code). This will also include either recording the site with the NAHC or the Northwest Information Center at Sonoma State University; using an open space or conservation zoning designation or easement; or recording a document with the county in which the property is located (AB2641).

In the event that fossils are encountered, they shall be analyzed to a point of identification and curated at an established accredited museum repository with permanent retrievable paleontological storage. A technical report of findings shall be prepared with an appended itemized inventory of identified specimens and submitted with the recovered specimens to the curation facility.

Alternatives Analysis

The Alternatives 1 and 2 for Reach A are located in the same area as the Project. Potential adverse impacts would be less than significant with the incorporation of Mitigation Measure C-1.

Alternative 4 would demolish both buildings and Alternative 5 would demolish one building at 1400 West Tenth Street. Mead & Hunt (2013; Appendix C) conducted an evaluation of both of these buildings and found no evidence to suggest the buildings possess qualities that qualify them for listing in the NRHP or CRHR. Therefore, they are not Historical Resources as defined by CEQA and impacts to the buildings would not be significant. Potential adverse impacts for the alternatives would be less than significant with the incorporation of Mitigation Measure C-1.

b)	Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

No archaeological resources were found during the records search and field survey. Therefore, impacts do not vary between Reach A and Reach B, and do not vary between the Reach A Alternatives. A less than significant impact to buried resources, if present, would occur with implementation of Mitigation Measure C-1 (See item a) discussion above.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. Potential adverse impacts would be less than significant with the incorporation of Mitigation Measure C-1.

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c)	Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

As discussed above, the Project area has a high potential for containing nonrenewable paleontological resources. To prevent potentially adverse impacts to paleontological resources during construction activities, Mitigation Measures C-1 and C-2 would be implemented to reduce impacts to a less than significant level in Reach A. Monitoring is not required during desilting activities which include the removal of accumulated sediment within Reach B. Impacts to paleontological resources would be less than significant with the implementation of Mitigation Measure C-1 for Reach B (desilting activities).

Mitigation Measure

C-2 Paleontological Monitoring for Reach A

Paleontological monitoring will be required in Reach A during all subsurface ground-disturbing activities in undisturbed native soils and geological formations. The monitoring will be conducted by a qualified vertebrate paleontologist. The monitor will be equipped to recover fossils and sediment samples during excavation, and shall have the authority to temporarily halt or divert equipment to allow for recovery of large or numerous fossils.

Alternatives Analysis

The four alternatives for Reach A are located in the same area as the Project. Potential adverse impacts would be less than significant with the incorporation of Mitigation Measure C-2.

d)	Would the project disturb any human remains, including those interred outside of formal cemeteries?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A search of the Sacred Lands File by the NAHC failed to indicate the presence of Native American cultural resources in the Project area (ECORP 2013a). While there is no reason to suspect the presence of human remains in the Project area, it is possible that currently unknown remains may occur. Therefore, impacts do not vary between Reach A and Reach B, and do not vary between the Reach A Alternatives. In the event that evidence of human remains is discovered the requirements of Mitigation Measure C-1 would be implemented. With implementation of Mitigation Measure C-1, this impact would be less than significant (see item a) discussion above.

Alternatives Analysis

The four alternatives for Reach A are located in the same location as the Project. Potential adverse impacts would be less than significant with the incorporation of Mitigation Measure C-1.

4.6 Geology and Soils

4.6.1 Environmental Setting

Geomorphic Setting

The City of Antioch is located in the central Coast Ranges Geomorphic Province of California. The Coast Ranges Geomorphic Province consists of mountain ranges and valleys trending northwest generally between 2,000 and 6,000 feet in elevation. These ranges are subparallel to the San Andreas Fault where the North American and Pacific lithospheric plates meet (CCC 2013). This province is between the Great Valley and the Pacific Ocean and is the largest geomorphic province in California extending from the northwestern corner of the state to west of Santa Barbara. The City of Antioch and the Project site are located between the hilly terrain of the Diablo Range and the terrace deposits at the entrance of the San Joaquin River/Sacramento-San Joaquin Delta.

Regional Seismicity and Fault Zones

An “active fault,” according to California Department of Conservation, Division of Mines and Geology, is a fault that has indicated surface displacement within the last 11,000 years. A fault that has not shown geologic evidence of surface displacement in the last 11,000 years is considered “inactive”.

There are no faults subject to the Alquist-Priolo Earthquake Fault Zone Act (AP Act) within the City of Antioch (City of Antioch, 2003). No known active faults pass through the Project site (HTE 2013). Although no known active faults are located in the City of Antioch, the Project is within a few miles of the Hayward, Calaveras, Concord-Green Valley, and Marsh Creek-Greenville faults, which are all “active faults” (evidence of movement within the last 200 years) (City of Antioch 2003). For Contra Costa County, there is no volcanic activity, however, the San Andreas Fault is the largest regional fault, approximately 45 miles west, and is expected to be the source of future major earthquakes (CCC 2013). The City's General Plan states these faults will produce a magnitude 6.7 or greater earthquake before 2030 with the major fault having a 70 percent probability and the smaller faults having a 30 percent probability.

Soils

Five soil types are identified within the Project area according to the Project's Custom Soil Resource Report for Contra Costa County, California (NRCS 2013). The Project area contains five soil mapping units: Brentwood clay loam; Joice muck; Marcuse clay; Rincon clay loam (9-15% slopes); and Sycamore silty clay loam. The parent material of four soil types is alluvium and one is organic material. The organic soil type is located at the north end of the Project area at the railroad tracks and north into the wetlands preserve area. The other four soils are high in clays and range from well drained to very poorly drained. A geotechnical evaluation of the Project site was completed and determined that near surface soils have a moderate to high expansion potential (HTE 2013). Expansive soils change in volume with changes in their moisture content. Uneven changes in moisture content can cause differential movement within expansive soil (HTE 2013). These soils all occur at elevations of 10 to 300 feet, in a climate with mean annual rainfall of 10 to 18 inches, with hot dry summers and cool moist winters. The mean annual temperature is about 61 degrees Fahrenheit and the frost free season is 250 to 300 days.

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4.6.2 Geology and Soils (VI.) Environmental Checklist and Discussion

<p>a) Would the project expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:</p> <p>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.</p>	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>ii) Strong seismic ground shaking?</p>	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>iii) Seismic-related ground failure, including liquefaction?</p>	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<p>iv) Landslides?</p>	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

i and ii) The Project site is not located in a Fault-Rupture Hazard Zone/Alquist-Priolo Earthquake Fault Zone. The risk of fault rupture within the site is low due to the absence of known active faults in the site or surrounding area. The site is expected to experience strong ground shaking caused by moderate to strong earthquakes from nearby faults during the anticipated life expectancy of the Project. The potential for damage due to ground shaking would be minimized by proper design of the Project as recommended by the geotechnical study (HTE 2013) and in accordance with applicable building codes. A less than significant impact would occur.

iii) Liquefaction is a phenomenon where water-saturated granular soil loses shear strength during strong ground shaking produced by earthquakes. The loss of soil strength occurs as a consequence of cyclic pore water pressure increases below the groundwater surface. Potential hazards due to liquefaction include loss of bearing strength beneath structures, possibly causing foundation failure and/or significant settlements and differential settlements. Liquefaction generally occurs in areas where the ground water table is less than 50 feet below the surface.

According to the United States Geological Survey (USGS) Earthquake information on the Contra Costa County Interactive GIS Map, the Project site is located in an area with a medium liquefaction susceptibility given the depth of the ground water table, geomorphology and soil morphology.

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According to the Geotechnical Investigation report by Hultgren – Tillis Engineers (2013), soil conditions consist predominately of clay; ground water was measured at 7.0-7.5 feet below the ground surface, and therefore, the risk of liquefaction is low. A less than significant impact would occur.

iv) The California Department of Conservation Landslide Inventory map (CCC 2013) was used to identify possible landslide problem areas. The Project site is located in a creek channel in fairly level terrain and is not located in an area with a probability of landslides. Landslides in areas that have steep slopes can be caused by seismic activity and/or extended periods of rain resulting in high water saturation of soils. Only the earthen channel banks would be subject to a slide if bank stabilization is not maintained or vegetation is removed. However, regular inspections and maintenance of the channel and banks would occur after Project completion. No impact would occur.

Alternatives Analysis

Impacts from the rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, including liquefaction, and/or landslides on the four alternatives for Reach A would be similar to the impacts that would occur on the Project, as discussed above.

b) Would the project result in substantial soil erosion or the loss of topsoil?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Best Management Practices (BMPs) are included as part of the Storm Water Pollution Prevention Plan (SWPPP) and permits prepared for the Project and would be implemented to manage erosion and the loss of topsoil during construction-related activities (see Hydrology and Water Quality (IX.)). Further, routine inspections and maintenance would be conducted on the channel, banks, outfalls, maintenance roads, and vegetation as part of the operation and maintenance outlined in Section 2.3. Therefore, soil erosion impacts would be reduced to a less than significant impact.

Alternatives Analysis

Substantial soil erosion or loss of topsoil impacts from the four alternatives for Reach A would be similar to the impacts of the Project, as discussed above. Impacts would be less than significant.

c) Would the project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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The Project area is mostly level except for the drainage channel banks. The Project site is underlain predominately by fine-grained lean and fat clay (HTE 2013). The Project site is located in an area categorized as stable and very stable in regards to slope stability; therefore, landslides would not be a concern (City of Antioch 2003). The Project site's liquefaction potential is low (HTE 2013). Seismic ground shaking is probable due to the Project site's proximity to major faults in the region; however, the Project would be designed and constructed in accordance with seismic safety requirements. Potential impacts from unstable soil that could result in lateral spreading, subsidence, and/or collapse would be less than significant with the incorporation of Mitigation Measure G-1.

Mitigation Measure

G-1 Geotechnical Report Recommendations

The Project will follow all applicable recommendations made in the *Geotechnical Investigation West Antioch Creek Channel Improvements Antioch, California* prepared by Hultgren – Tillis Engineers.

Alternatives Analysis

All alternatives would be generally located in the same location as the Project; therefore, the soil conditions described above would be the same soil conditions that the four alternatives for Reach A would be subject to. Potential impacts from unstable soil that could potentially result in lateral spreading, subsidence, and/or collapse would be less than significant with the incorporation of Mitigation Measure G-1.

d) Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project site is comprised of five soil types. These soils at the Project site, mapped by the Natural Resource Conservation Services, have moderate to high shrink/swell potential. Reach A-1 is Brentwood clay loam with a high shrink-swell potential, Reach A-2 is Brentwood clay loam and Sycamore silty clay loam with a moderate shrink-swell potential, and Reach B would not have structures installed that would be affected by expansive soils. Moderate to high expansion potential can cause differential movement within expansive soil causing structures and other Project improvements located directly on expansive soil to heave and settle in response to these movements. However, the base of the proposed box culverts would be below the seasonal zone of moisture change which would limit the potential for movement after installation (HTE 2013). The Project in Reach A would be culverts surrounded by a non-expansive fill material. A less than significant impact would occur with implementation of Mitigation Measure G-1.

Alternatives Analysis

All alternatives would be generally located in the same location as the Project; therefore, the soil conditions described above would be the same soil conditions that the four alternatives for Reach A would be subject to. Impacts from expansive soil would be less than significant with the incorporation of Mitigation Measure G-1.

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e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Septic tanks or alternative wastewater disposal systems are not part of the Project design. No impacts would occur.

Alternatives Analysis

The four alternatives for Reach A would not include septic tanks or alternative wastewater disposal systems. No impact would occur.

4.7 Greenhouse Gas Emissions

An Air Quality Study, which includes an analysis of greenhouse gas emissions, was prepared for the Project by KD Anderson & Associates (KDA 2014; Appendix A). The findings of the Air Quality Study are summarized in this section.

4.7.1 Environmental Setting

The main source of greenhouse gas (GHG) emissions associated with the Project would be combustion of fossil fuels during short-term construction activities. The generation of GHG emissions has the potential to affect climate on a global scale. Pursuant to AB 32, the California Air Resources Board (CARB) prepared and adopted the Climate Change Scoping Plan. The Climate Change Scoping Plan outlines the State's strategy to achieve the year 2020 GHG emissions limits specified in AB 32. The Climate Change Scoping Plan includes a comprehensive set of actions designed to reduce overall GHG emissions in California.

4.7.2 Greenhouse Gas Emissions (VII.)Environmental Checklist and Discussion

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

As previously stated in the Environmental Setting, the main source of GHG emissions associated with the Project would be combustion of fossil fuels during short-term construction activities. The construction phase of the Project is temporary, but would result in GHG emissions from the use of heavy construction equipment and construction-related vehicle trips. Estimates of construction-related GHG emissions associated with the Project are shown on Table 7.

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Table 7. Construction Greenhouse Gas Emissions

Reach	Sub-Reach	Activity	Construction Period CO ₂ Emissions (Metric Tons)
A	A-1	Demolition/Excavation	26.1
		Culvert Placement	36.6
		Road Reconstruction	26.3
A	A-2	Demolition	12.6
		Excavation	85.7
		Material Removal/Hauling	57.2
B	B-1	Desilting	173.8
B	B-2	Desilting	79.6
B	B-3	Desilting	184.1
B	B-4	Desilting	118.0
Construction Period Total			800.0
BAAQMD Significance Threshold			1,100
Notes: All values are expressed as metric tons of carbon dioxide emissions for the construction period. BAAQMD = Bay Area Air Quality Management District CO ₂ = Carbon Dioxide Source: KDA 2014			

The BAAQMD does not specify a significance threshold for construction-related GHG emissions. The BAAQMD does provide significance thresholds for operational GHG emissions. To provide a quantitative basis for determining the significance of GHG impacts, the BAAQMD operational significance threshold of 1,100 MT of CO₂ per year is applied to Project construction-related activities. The Project is considered to have a significant impact on GHG emissions if it would exceed this threshold.

As shown in Table 7, the Project would result in 800.0 metric tons of CO₂ emissions during the construction period which would be less than the BAAQMD significance threshold of 1,100 metric tons of CO₂ emissions. Impacts would be less than significant.

Long-term operation and maintenance as (discussed in section 2.3) of the Project would not geographically re-distribute vehicle travel, and would not result in a change in stationary source emissions. Therefore, the Project would not result in a change in operational GHG emissions. Impacts would be less than significant.

Alternatives Analysis

All Reach A alternatives would involve similar hours of construction and similar heavy construction equipment requirements as the Project. It is expected that each Reach A alternative would result in similar GHG emissions as the Project. Therefore, the impact analysis above for the Project is considered representative for all Reach A alternatives.

b) Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

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As previously stated in the Environmental Setting, pursuant to AB 32, CARB prepared and adopted the Climate Change Scoping Plan. The Climate Change Scoping Plan outlines the State's strategy to achieve the year 2020 GHG emissions limits specified in AB 32. The Climate Change Scoping Plan includes a comprehensive set of actions designed to reduce overall GHG emissions in California. However, CARB has not yet determined what amount of GHG reductions it recommends from local government operations. The Climate Change Scoping Plan states that the ultimate GHG reduction assignment to local government operations is to be determined.

The BAAQMD established a Climate Protection Program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB. The Climate Protection Program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy all of which assist in reducing emissions of GHG and in reducing air pollutants that affect the health of residents. The BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders.

The Project would not conflict with AB 32, BAAQMD's Climate Protection Program, or other applicable plans, policies, or regulation adopted for the purpose of reducing the emissions of greenhouse gases because the total construction GHG emissions estimated for the Project would be below the BAAQMD significance threshold. Furthermore, the Project would only generate construction-related emissions, which would be temporary and only occur once. The Project would not have an effect on long-term operational emissions. No impacts from conflicts with applicable plans, policies, or regulations are expected.

Alternatives Analysis

All Reach A alternatives would involve similar hours of construction and similar heavy construction equipment requirements as the Project. It is expected that each Reach A alternative would result in similar GHG emissions as the Project. Therefore, the impact analysis above for the Project is considered representative for all Reach A alternatives.

4.8 Hazards and Hazardous Materials

4.8.1 Environmental Setting

A Phase I Environmental Site Assessment (ESA) for Reach A of West Antioch Creek was completed in 2007 (Ninyo & Moore 2007). No hazardous materials were observed within Reach A of West Antioch Creek during the reconnaissance site visit (Ninyo & Moore 2007). A search of environmental databases did not list West Antioch Creek. The Phase I ESA for Reach A found no limitations, evidence, or indication of recognized environmental conditions (RECs) or conditions indicative of releases or threatened releases of hazardous materials on or in the vicinity of Reach A of West Antioch Creek (Ninyo & Moore 2007).

A Phase I ESA for 1400 West Tenth Street was completed in 2013 (Weiss Associates 2013). Current uses of 1400 West Tenth Street include automotive maintenance and repair, auto glass replacement, car stereo installation, and remote controlled hobby vehicle sales. Prior uses include potential agricultural activities and an auto dealership. An estimated 83 cubic yards of soil beneath the 1400 West Tenth Street parcel contain residual total petroleum hydrocarbons (TPH) from a leak of waste oil from a 500-gallon underground storage tank (UST) (TPH-diesel greater than 600 parts per million

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[ppm]). The tank was removed in 1989 and soil and groundwater investigations and remediation were conducted between 1989 and 2003.

In 2003, the Regional Water Quality Control Board (RWQCB) had found that hydrocarbons in groundwater were present in the area of the tank excavation, but were not migrating quickly or off-site. TPH-diesel was detected at 270 microgram per liter (ug/L) in a sample collected in 2003, but had not been detected at other times of that same year or in other wells. On May 27, 2005, the RWQCB issued a letter of "no further action". Waste oil typically contains regulated metals. No metals in the soil or groundwater around the UST were discovered during the investigation (Weiss Associates 2013). While the regulatory agency has closed the UST case, it should be noted that residual petroleum hydrocarbons are present in the soils on the site and constitute a REC. The residual hydrocarbons may also present a risk of vapor intrusion into structures on the site which may warrant additional evaluation depending on future land uses of the site. The original location of the UST was approximately 60 feet from the Project excavation boundary and approximately 18 feet from the staging boundary.

Historical use of the site for agricultural activities prior to 1960 creates the potential for the presence of persistent pesticides in site soils. Potential presence of asbestos-containing materials and lead-containing paint were identified in all structures on the property (Weiss Associates 2013). One property in the vicinity was reviewed as a possible source of environmental concern for the Project site. A gasoline and waste oil UST leaked at a nearby Mazzei Pontiac-Cadillac site, and while the site has been remediated and the case was closed, there is some probability of off-site migration of residual contaminants in groundwater (Weiss Associates 2013).

4.8.2 Hazards and Hazardous Materials (VIII.) Environmental Checklist and Discussion

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The construction phase of the Project may include the transport, storage, and short-term use of petroleum-based fuels, lubricants, and other similar materials. Best Management Practices (BMPs) stipulating proper storage of hazardous materials and vehicle fueling would be implemented during construction as part of the Stormwater Pollution Prevention Plan (SWPPP).

All transport, handling, use, and disposal of substances such as petroleum products, paints, and solvents related to the operation and maintenance of the Project would comply with all Federal, State, and local laws regulating the management and use of hazardous materials. Impacts from the transport, use, and disposal of hazardous materials during Project operation and maintenance would be less than significant.

The Phase I ESA completed for Reach A of West Antioch Creek (West Tenth Street to Eight Street) found no limitations, evidence, or indication of RECs or conditions indicative of releases or threatened releases of hazardous materials within this reach of the creek (Ninyo & Moore 2007).

The Phase I ESA completed for 1400 West Tenth Street noted the presence of residual petroleum hydrocarbons in the soil on the site associated with a former waste oil UST located on the site

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(Weiss Associates 2013). The waste oil site was located on the east side of the main building on 1400 West Tenth Street (Figure 9. *Former 500 Gallon Waste Oil UST*). As previously noted, the waste oil UST was removed in 1989 and soil surrounding the location of the UST was over-excavated to a depth of 12 feet. The excavation was extended beyond the sides of the UST approximately 16.5 feet in the north-south direction and 14 feet in the east-west direction. Soil contamination calculations estimate 12.37 cubic yards of soil with TPH-d greater than 1000 ppm and about 69.93 cubic yards of soil with TPH-d greater than 600 ppm (this includes the soil greater than 1,000 ppm) remain on-site adjacent to and beneath the service building (RWQCB 2004). Hydrocarbons are about 200 ppm in the soils up to 27 feet from the former UST excavation at the farthest point. The 600 ppm soil gradient shows a maximum distance traveled from the tank excavation of less than 20 feet which has occurred over a 14 year period. The lack of mobility is probably due to the clayey native soils surrounding the excavation (RWQCB 2004). On May 27, 2005, the RWQCB issued a letter of "no further action." While the regulatory agency has closed the UST case, residual petroleum hydrocarbons are present in the soils on the site and constitute a REC (Weiss Associates 2013).

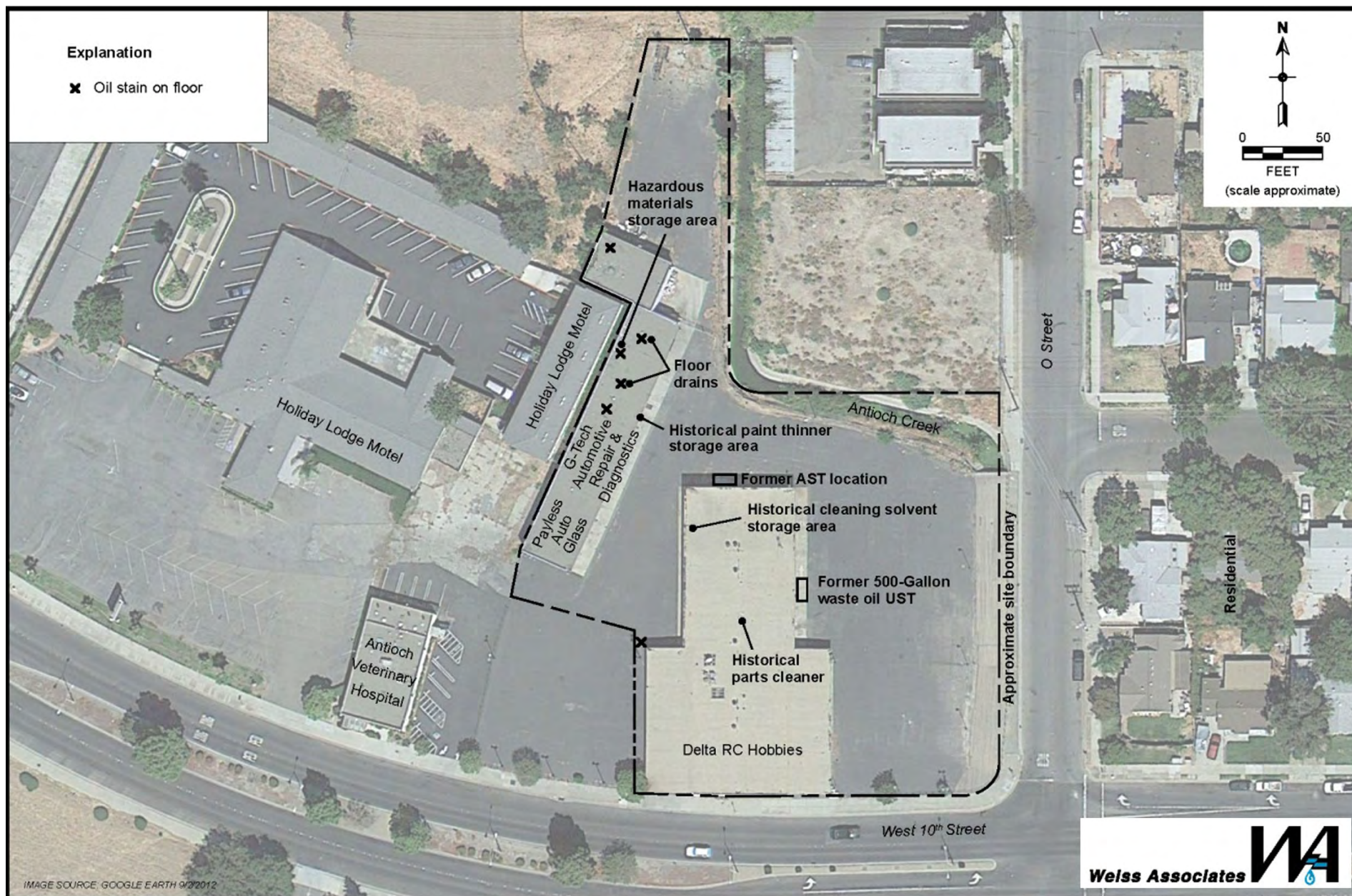
Construction of the Project would require the excavation of soils in Reach A to install the pre-cast concrete culverts under West Tenth Street and to shape the new earthen channel. Excavation would also occur along the eastern side of 1400 West Tenth Street, which could potentially disturb soils contaminated with residual petroleum hydrocarbons from the waste oil UST that was previously located on the parcel. The distance from the former waste oil UST to the Project excavation would be approximately 60 feet and the distance from the staging area would be 18 feet. (See Figure 9 *Former 500-Gallon Waste Oil UST - 1400 West Tenth Street*). As long as staging area activities do not disturb soil or remove concrete/asphalt, Reach A activities for the Project are not expected to disturb contaminated soil.

Impacts to the public and construction workers from exposure to contaminated soils in Reach A would be mitigated to a level that is less than significant with the implementation of Mitigation Measure HM-2.

Sediment in Reach B would also be excavated to re-establish the 1993 Project design contours. The previously prepared Phase I ESAs by Ninyo & Moore (2007) and Weiss Associates (2013) did not characterize the soils within Reach B. There is a potential for soils in Reach B to be contaminated by runoff and unknown releases from the surrounding and upstream land uses, which include industrial, commercial, and residential uses. Impacts to the public and construction workers from exposure to unknown contaminated soils within Reach B would be mitigated to a level that is less than significant with the implementation of Mitigation Measures HM-1 and HM-2.

Excavated soils would be used as fill and excess soil would be disposed of at Jersey Island, Ironhouse Sanitary District treatment plant site, Keller Canyon Landfill, or other suitable nearby facilities.

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**Figure 9. Former 500 Gallon Waste Oil UST,
1400 West Tenth Street
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Mitigation Measure

HM-1 Soil Sampling (Reach B)

Soils within Reach B of the West Antioch Creek channel will be sampled in accordance with a Sampling and Analysis Plan to be prepared by a qualified environmental professional in compliance with federal, state and local regulations and industry standards subject to approval by the Regional Water Quality Control Board. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility. If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.

HM-2 Avoidance and Minimization Measures for Personnel

- A. All personnel working on the Project site shall be informed of the possibility that contaminated soil, soil vapor, and/or groundwater may be encountered on the job site.
- B. If previously unknown contaminated soils are encountered in the field during demolition or grading, ground disturbance activities in the vicinity of the discovery shall cease until a qualified hazardous materials management specialist can assess the potentially hazardous substances and, if necessary, develop appropriate management measures in coordination with the appropriate regulatory agencies.

Alternatives Analysis

Alternatives 1 or 2 for Reach A would be located in generally the same area as the Project and would require the excavation of soils near 1400 West Tenth Street along the east side of the property, which are known to contain residual petroleum hydrocarbons. Impacts to the public and construction workers from exposure to unknown contaminated soils within Reach A for Alternatives 1 and 2 would be mitigated to a level that is less than significant with the implementation of Mitigation Measure HM-2. Alternatives 4 or 5 would require the excavation of soils at 1400 West Tenth Street along the east side of the property. The excavation of contaminated soils can result in impacts to the public and construction workers from exposure. Impacts to the public and construction workers from exposure to unknown contaminated soils within Reach A would be mitigated to a level that is less than significant with the implementation of Mitigation Measures HM-2 and HM-3.

Alternative 4 or 5 would require the demolition of existing buildings on 1400 West Tenth Street. All structures located at 1400 West Tenth Street have the potential to contain asbestos-containing materials and lead-containing paint. Demolition of these buildings would result in additional hazardous material impacts that would not occur with implementation of the preferred alternative (Alternative 3). Implementation of Alternative 4 or 5 may result in impacts to the public and construction workers from exposure to asbestos-containing materials and lead-containing paint. With the implementation of Mitigation Measure HM-4 impacts would be less than significant.

Mitigation Measure

HM-3 Contaminated Soil from Closed UST Site (Only Reach A Alternatives)

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If soils in Reach A are to be excavated within 27 feet of the former waste oil underground storage tank (UST), a sampling protocol will be developed by a qualified environmental professional in compliance with federal, state, and local regulations and industry standards. Samples will be sent to a qualified lab to be tested for contaminants. If contaminants are not found, the soils may be excavated and re-used on the Project site as fill or may be disposed at a suitable facility. If contaminants are found, a qualified hazardous materials management specialist will be retained to assess the contaminated soil and to manage the excavation, storing, hauling, and disposal of the contaminated materials in compliance with federal, state, and local regulations.

HM-4 Hazardous Materials Survey (Only Reach A Alternatives)

Prior to the demolition of buildings or structures located on 1400 West Tenth Street, a survey for building-related hazardous materials will be conducted by qualified and properly certified individuals. Asbestos surveys will be conducted by a California Division of Occupational Safety and Health-certified asbestos consultant or site surveillance technician. Surveys for lead-based/bearing substances and lead-containing surface coatings will be conducted by a California Department of Health Service-certified lead inspector/risk assessor. If present, all recommendations regarding the removal and disposal of hazardous materials in accordance with federal, state, and local regulations will be implemented.

b)	Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Some hazardous materials, such as diesel fuel, would be used during construction and herbicides would be used in vegetation maintenance. The potential release of hazardous materials to the environment would be minimized through the implementation of BMPs listed in the SWPPP and permits as discussed in Hydrology and Water Quality (IX.), which includes the preparation of a spill prevention plan.

Please see the discussion regarding contaminated soils under a) above. Implementation of Mitigation Measures HM-1 and HM-2 would reduce the potential for significant hazards to the public and construction workers from exposure to contaminated soils or other hazards to a less than significant level.

Alternatives Analysis

Please see the Alternatives Analysis discussion under a) above.

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c) Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Construction, operation and maintenance of the Project would include the use of common hazardous materials, such as diesel fuel, lubricants, and detergents. The handling of these common hazardous materials would be consistent with state and federal regulations. Antioch Charter Academy So Big Co-Op Preschool is located approximately 900 feet to the southeast of the Project site and Antioch High School is located approximately half a mile to the southeast of the Project site. Please see the response to a) above. Impacts related to hazardous emissions or handling of hazardous or acutely hazardous materials, substances, or waste would be less than significant with the implementation of Mitigation Measures HM-1 and HM-2.

Alternatives Analysis

Please see the Alternatives Analysis discussion under a) above.

d) Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Environmental database searches did not return any listings for West Antioch Creek (Ninyo & Moore 2007). Environmental database searches returned 10 listings for 1400 West Tenth Street (Weiss Associates 2013); it was listed under the Conditionally Exempt Small Quantity Generators, the Facility Index System/Facility Registry System, the Historical Hazardous Waste & Substance Site List, Leaking Underground Storage Tank, the Facility Inventory Database, the Hazardous Substance Storage Container Database, the Contra Costa County Site List, the Statewide Environmental Evaluation and Planning System, Proposition 65 Records List, and the Facility and Manifest Data Database.

As discussed above, an UST of waste oil located at 1400 West Tenth Street was identified in 1989 to have leaked and was excavated and removed. While the RWQCB issued a “no further action” letter, the soils around the former UST location likely contain residual contamination. Impacts to the public and construction workers from potential exposure to contaminated soils would be mitigated to a level that is less than significant with the implementation of Mitigation Measures HM-1 and HM-2.

Alternatives Analysis

Please see the Alternatives Analysis discussion under a) above.

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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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project site is not located within an airport land use plan and there are no airports located within two miles of the Project site. The closest airport is the Buchanan Field Airport located approximately 13 miles west of the Project site. Given the distance between the airport and the Project site there would be no safety hazards for people residing or working in the Project area. No impact would occur.

Alternatives Analysis

The other alternatives are in the same location as the Project and therefore, no impact would occur.

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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

There are no private airstrips within the vicinity of the Project site. No impact would occur.

Alternatives Analysis

The other alternatives are in the same location as the Project and therefore, no impact would occur.

g)	Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Construction of the Project has the potential to interfere with emergency response access to the areas near the Project site. Operation and maintenance of the Project would not interfere with an adopted emergency response plan. Impacts to emergency access would be less than significant with the implementation of Mitigation Measure T-1.

Alternatives Analysis

Impacts from the construction of all alternatives would be similar to the impacts discussed above for the Project.

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h) Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is located in a developed area of the City of Antioch; there are no wildlands in the vicinity of the Project. No impacts would occur.

Alternatives Analysis

All alternatives would be located generally in the same area; therefore, the impact analysis above for the Project would be applicable to all alternatives.

4.9 Hydrology and Water Quality

4.9.1 Environmental Setting

Regional Hydrology

The Project is geographically situated on the western edge of the Great Valley within the West Side Fans and Alluvial Terraces subsection of California Ecoregions. The West Side Fans and Alluvial Terraces consist of terraces and alluvial fans along the western edge of the San Joaquin Valley, adjacent to the South Coast Ranges which are characterized by a hot and semi-arid to sub-humid climate. The West Side Fans and Alluvial Terraces range in elevation from 0 feet to about 1,500 feet. This ecological subsection is mainly comprised of Quaternary alluvium, and some Plio-Pleistocene sediments. The alluvium is predominantly from sedimentary rock sources in the South Coast Ranges. Most of the soils are well drained; however, some poorly drained soils also occur where calcium carbonates and even sodium can accumulate. For this subsection, the mean annual precipitation ranges from 8 to 16 inches and is almost entirely rainfall. The mean annual temperature is generally between 59° to 62°F, and the mean freeze-free period is from 250 to 275 days (Nomad 2013c).

Hydrologically, streams of the West Side Fans and Alluvial Terraces subsection drain into the San Joaquin River/Sacramento-San Joaquin Delta, and all but the largest streams are generally dry during the summer (Nomad 2013c). The Project site is located approximately 0.25 miles south of the San Joaquin River/Sacramento-San Joaquin Delta. The Project is under the jurisdiction of the Central Valley RWQCB, and is part of the Sacramento-San Joaquin Delta watershed (CEPA 2013a, USGS 2000).

The Sacramento-San Joaquin River Delta watershed is part of the San Francisco Bay Delta (SFBD) watershed. The SFBD watershed covers over 75,000 square miles and includes the largest estuary on the west coast and the only inland delta in the world. The SFBD watershed extends nearly 500 miles starting in the Cascade Range to the north and ending in the Tehachapi Mountains to the south, and bounded by the Sierra Mountain Range to the east and the Coast Range to the west. Nearly half of the surface water in California starts as rain or snow that falls within the watershed and flows downstream to the Pacific Ocean through the Golden Gate Strait (EPA 2013).

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The Sacramento- San Joaquin River Delta (Delta) watershed is one of five major areas of the SFBD watershed. The Delta is the area where the Sacramento River and the San Joaquin River converge and is located just east of Suisun Bay where the fresh waters flow to the Pacific Ocean. The Delta used to be a vast plain with seasonal flooding, creating 1,000 square miles of brackish (mixing of fresh salt water) tidal marsh, narrow, branching tidal channels, and freshwater marshes. Due to 19th century European settlement and 20th century water supply, agricultural uses, and urban development, the original habitat of the Delta has been replaced by sub-sea level, levee-protected islands and deep, wide, and armored waterways. The Delta now includes approximately 1,100 miles of levees to protect agricultural areas and residents in small, rural communities and urban areas. The brackish water in the Delta provides essential estuarine habitat for migratory fish like salmon and resident fishes like delta smelt and striped bass (EPA 2013).

Site Hydrology and On-Site Drainage

The Project is located within the East and West Antioch Creek watersheds. Hydrology on-site can be influenced by many factors, such as precipitation, run-off, geologic stratigraphy, topography, soil permeability, and plant cover. The single hydrologic feature on site is the approximately 0.75 mile stretch of West Antioch Creek. West Antioch Creek is characterized as an intermittent “blue-line” stream on the Antioch North and Antioch South USGS 7.5-minute quadrangles. However, it receives local runoff from adjacent development which may contribute to surface water flow all year.

During four separate site visits performed by Nomad Ecology on July 8, 2009; February 24, 2010; and March 12 and August 27, 2013; West Antioch Creek contained flowing water (Nomad 2013c).

West Antioch Creek originates in the Mount Diablo foothills, more specifically in Black Diamond Mines Regional Park, to the south and drains north into the Sacramento-San Joaquin Delta by flowing north into Antioch Municipal Reservoir, where it continues north and is joined by several tributaries near State Route 4. Markley Creek flows into West Antioch Creek approximately 0.5 mile south of the Project site. West Antioch Creek flows through the Project area and empties into the San Joaquin River/Sacramento-San Joaquin Delta, immediately north of the Project area (Nomad 2013c).

The reach of West Antioch Creek within the Project area is highly urbanized. Historically, the creek was discontinuous, but has since been made into a continuous channel with engineered banks, surrounded by mostly impervious surfaces. Moving from the upstream end of the Project to the downstream end, the drainage transitions from an earthen trapezoidal channel near the Contra Costa County Fairgrounds, to a culvert under West Tenth Street, to a concrete-lined drainage covered by wooden planking under the vacant car dealership’s parking lot, to an open concrete-lined ditch, to the improved open earthen/vegetated channel, back to concrete culverts at Fourth Street and open concrete-lined ditch adjacent to the Antioch Historical Society Museum, to an improved open earthen/vegetated channel that continues all the way to the northern end of the Project site just beyond the railroad trestle. In the Project area, West Antioch Creek runs primarily in a north-south alignment; however, the channel has four bends that are almost 90 degree angles. Within the Project area, West Antioch Creek is tidally influenced (Nomad 2013c).

According to the RWQCB approved 2008-2010 Clean Water Act, Section 303(d) list, West Antioch Creek is not listed as an impaired water body (CEPA 2013b). The 303(d) list identifies water bodies that do not meet, or are not expected to meet water quality standards. The 2012 list is currently being evaluated by the State and Regional Water Quality Control Boards (CEPA 2013c).

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4.9.2 Hydrology and Water Quality (IX.) Environmental Checklist and Discussion

a) Would the project violate any water quality standards or waste discharge requirements?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Project consists of the construction, operation, and maintenance of channel improvements to the West Antioch Creek Channel. The Project would involve grading and grubbing of vegetation in West Antioch Creek that could potentially cause erosion impacts. During construction, the City's contractor would implement a SWPPP, listing the BMPs to prevent construction pollutants and products from violating any water quality standards or any waste discharge requirements. These on-site BMPs would reduce stormwater before it discharges into drainages and ultimately into the San Joaquin River/Sacramento-San Joaquin Delta. During operation, the Project would collect, convey, and discharge stormwater runoff emanating from developed areas that may already produce pollutants.

The District and the City of Antioch are required to comply with the National Pollutant Discharge Elimination System (NPDES) East Contra Costa Municipal Storm Water Permit (NPDES No. CA83313), which includes the City of Antioch Municipal Separate Storm Sewer System permit (MS4) (RWQCB 2010). In addition, the District and the City of Antioch are required to obtain and comply with the following permits to ensure that the Project would not result in substantial discharges of typical stormwater pollutants; therefore, resulting in a less than significant impact.

- NPDES Stormwater Construction General Permit and preparation of a Stormwater Pollution Prevention Plan (SWPPP) - issued by the State Water Resources Control Board (SWRCB);
- Clean Water Act, Section 401 Water Quality Certification – issued by the Central Valley Regional Water Quality Control Board (CVRWQCB);
- Clean Water Act, Section 404 Individual Permit – issued by U.S. Army Corps of Engineers-Sacramento District; and
- California Fish and Game Code, Section 1602 Streambed Alteration Agreement – issued by the California Department of Fish and Wildlife (CDFW)

Alternatives Analysis

Impacts from the four alternatives for Reach A on water quality standards or waste discharge requirements would be similar to the impacts discussed above for the Project. Alternative 2, would include the installation of maximum culverts (approximately 700 feet). This alternative would minimize the amount of exposed earth and, therefore, would reduce potential water quality and erosion impacts.

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b)	Would the project 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)?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project does not involve the withdrawal of groundwater. The Project would not affect groundwater recharge because it would not increase impervious surfaces in the Project area. The Project would decrease the amount of impervious surfaces by removing a timber ditch covered concrete channel and would replace it with a new earthen channel (Sub-Reach A-2). No impact would occur.

Alternatives Analysis

The alternatives proposed would not involve the withdrawal of groundwater; therefore, they would not deplete groundwater supplies. Each of the alternatives would include different amounts of impervious surfaces because they each propose different culvert lengths for Reach A. For example Alternative 2 is the maximum culvert option for Reach A and would result in the greatest increase of impervious surfaces when compared to the existing conditions. However, it is expected that groundwater recharge impacts would be minimal because no substantial increase in impervious surfaces would occur from all of the Alternatives compared with the existing conditions. Furthermore, the proposed impervious surfaces (concrete box culverts) would be located adjacent to unpaved areas (earthen channel) where runoff would flow to and ground percolation would continue to occur. No impact would occur.

c)	Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion or siltation on- or off-site?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Project is designed to increase the conveyance capacity of the channel for Reach A and would restore the channel's design capacity for Reach B. The Project would require grading and earthmoving activities; however, proposed grading would not substantially alter the existing drainage patterns of West Antioch Creek. Urban runoff from the surrounding areas and creek flows originating upstream would continue to drain towards the San Joaquin River/Sacramento-San Joaquin Delta through West Antioch Creek. A SWPPP would be prepared and would include BMPs to minimize potential erosion or siltation from the Project site during and after construction. Impacts from the Project would be less than significant.

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Alternatives Analysis

All Project alternatives are designed to increase the channel's conveyance capacity for Reach A. All alternatives would require site grading; however, the proposed grading would not substantially alter the existing drainage patterns of the Project site. Urban runoff from surrounding areas and creek flows originating upstream would continue to flow through the channel. A SWPPP, including BMPs to control erosion and siltation, would be implemented for all alternatives. Impacts would be less than significant.

d) Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Please see the response to IX c) above. The Project would not substantially alter the existing drainage pattern of the site nor would the drainage patterns in the area be altered in a manner which would result in substantial flooding on-site or off-site as the Project would reduce flood risk to the Project area by increasing the conveyance capacity of the West Antioch Creek channel. A beneficial impact would occur.

Alternatives Analysis

All Project alternatives are designed to increase the channel's conveyance capacity for Reach A; thereby reducing the flood risk to the Project area. A beneficial impact would occur from all alternatives.

e) Would the project 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?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Project would reduce the amount of existing impervious surfaces in the Project site by removing the existing wooden planking segment and concrete channel and paved parking area in Sub-Reach A-2 and replacing it with an earthen channel. No additional runoff would be generated by the Project. The improved West Antioch Creek channel would continue to collect and convey the same or a similar amount of runoff as the existing channel. The conveyance capacity of the existing channel would be increased reducing the risk of flooding in the area. Existing sources of polluted runoff in the Project area include surrounding urban development. No new sources would be created by the Project. A SWPPP, that includes BMPs, would be implemented during construction to prevent pollutants used during construction from entering the stream. A less than significant impact would occur.

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Alternatives Analysis

Impacts from Alternatives 4 and 5 for Reach A associated with creating or contributing to runoff water would be the same as the impacts discussed above for the Project.

Impacts from Alternative 1 for Reach A would be similar to the impacts discussed above for the Project; however, the box culverts would extend an additional 200 feet, and the new earthen channel would be shorter in length. The installation of additional box culverts would not result in a substantial increase in an impervious surface because they would be partially located in an area with an existing timber covered ditch and concrete channel and a parking area. The capacity of the existing channel would still be increased and would reduce the risk of flooding in the area. The Project would not create or contribute runoff water which would exceed the capacity of the channel. Impacts would be less than significant.

Impacts from Alternative 2 for Reach A would be similar to the impacts discussed above for the Project; however, the box culverts would extend an additional 600 feet and no earthen channel would be added to Reach A. This increase in an impervious surface in the Project area would not substantially increase runoff volume. Furthermore, the conveyance capacity for Reach A would be increased thereby allowing the channel to safely convey additional runoff that may be created as a result of the increase of impervious surfaces in the Project area. The Project would not create or contribute runoff water which would exceed the capacity of the channel; therefore, impacts would be less than significant.

f) Would the project otherwise substantially degrade water quality?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Please see response to IX. a) above. Incorporation of BMPs identified in a SWPPP, and compliance with conditions set forth in the NPDES MS4 and Construction General permits and Section 401 Water Quality Certification would reduce impacts to less than significant.

Alternatives Analysis

Water quality impacts from the four alternatives for Reach A would be the same as the impacts discussed above for the Project. Impacts would be less than significant.

g) Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project does not include housing. The Project would remove and relocate an existing apartment's carport further away from the West Antioch Creek channel. The West Antioch Creek channel is located within a special flood hazard area subject to inundation by a 100-year flood;

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however, the Project would increase the channel capacity to reduce flooding in the area resulting in a beneficial impact (FEMA 2009). No impact would occur.

Alternatives Analysis

Housing is not included in any of the alternatives. Alternatives 2 and 4 would not remove and relocate the parking carport; however, the impact analysis above for the Project would be applicable to all alternatives. No impacts would occur.

h)	Would the project place within a 100-year flood hazard area structures that would impede or redirect flood flows?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The structures being proposed are channel improvement structures, such as culverts and retaining walls, which would increase the capacity of the channel to reduce flooding in the area. All structures built by the Project would be built in conformance with the California Building Code and would be designed to withstand storm event flows. The improved channel would safely convey 25-year flood event flows through the Project area. A beneficial impact would occur.

Alternatives Analysis

The impact analysis above for the Project would be applicable to all alternatives. All alternatives are designed to safely convey flood event flows through the Project area. No impacts would occur.

i)	Would the project 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?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The nearest dam to the Project site is the Contra Loma Reservoir, located approximately 2 miles to the south, and the Antioch Municipal Reservoir, located approximately 2.5 miles to the southeast. The City of Antioch is located below both of these dams. The Bureau of Reclamation Division of Dam Safety conducted a safety analysis of the Contra Loma Reservoir in 1983 and determined that "safe" performance of the dam can be expected under all anticipated dam conditions, including the maximum credible earthquake and probable maximum flood events (City of Antioch 2003). To mitigate the potential flooding hazard related to dam failure the City of Antioch General Plan provides Policy 11.8.2-f which requires the regular review and clarification of emergency evacuation plans in the event of dam failure (City of Antioch 2003). The Project would not increase the risk of loss, injury, or death involving flooding as a result of levee or dam failure because the Project would continue an existing land use. A less than significant impact would occur.

Alternatives Analysis

The impact analysis above for the Project would be applicable to all alternatives. Impacts would be less than significant.

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j) Would the project be subject to inundation by seiche, tsunami, or mudflow?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is located just south of the Sacramento-San Joaquin River Delta, part of the greater SFBD watershed. Although the Project site is located adjacent to a large body of water, according to tsunami inundation maps for Contra Costa County, the Project site is located outside of the tsunami hazard zone; therefore, the Project site would not be subject to seiche or tsunami (DOC 2013). The Project is not located near a mountainside or hillside; therefore, the Project area would not be subject to mudflows. No impact would occur.

Alternatives Analysis

Impacts from inundation by seiche, tsunami, or mudflow on the four alternatives for Reach A would be the same as the impacts discussed above for the Project.

4.10 Land Use and Planning

4.10.1 Environmental Setting

The Project is located along a 0.79 mile segment of the West Antioch Creek channel, extending from approximately the northern end of the Contra Costa County Fairgrounds property (southwest and southeast corners of West Tenth Street and O Street) downstream to approximately 200 feet north of the BNSF railroad trestle. This segment of West Antioch Creek Channel traverses several City of Antioch General Plan land use and zoning designations (Table 8).

Table 8. General Plan Land Use and Zoning Designations

Reach	General Plan Land Use Designation	Zoning Designation
A-1	Public/Institutional (Contra Costa County Fairgrounds)	Unincorporated Area Not Zoned
A-2	Somersville Road Corridor Focus Area: Commercial	Neighborhood/Community Commercial District (C-2)
B-1	Somersville Road Corridor Focus Area: Commercial	Neighborhood/Community Commercial District (C-2) and High Density Residential District (R-20)
B-2	Rivertown/Urban Waterfront Focus Area: Business Park	Planned Business Center (PBC)
B-3	Rivertown/Urban Waterfront Focus Area: Business Park	Planned Business Center (PBC)
B-4	Rivertown/Urban Waterfront Focus Area: Dow Wetlands Preserve	OS – Open Space/Public Use District

Source: City of Antioch 2003, 2013a, 2013b

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The Somersville Road Corridor Focus Area is located in the western portion of the City (Figure 10. *Somersville Rd. Corridor Focus Area*). This Focus Area encompasses commercial land uses along Somersville Road from SR-4 north to Fourth Street and commercial land uses south from SR-4.

The Somersville Road Corridor Focus Area includes automobile dealerships, the Somersville Towne Center Mall, and other retail businesses (City of Antioch 2003a). Reaches A-2 and B-1 are located in the northern portion of this focus area.

The Rivertown/Urban Waterfront Focus Area is located in the northwestern portion of the City (Figure 11. *Rivertown/Urban Waterfront Focus Area*). Antioch's downtown, known as Rivertown, is located at the center of this Focus Area. South of Rivertown are older residential areas with a mix of commercial uses. To the west of Rivertown are older heavy industrial uses, a business park, and a large open land area between the San Joaquin River/Sacramento-San Joaquin Delta and the Pittsburg-Antioch Highway encompassing the Dow Wetlands and other vacant lands. Along the eastern edge of the Rivertown/Urban Waterfront Focus Area are heavy industrial uses along the San Joaquin River (City of Antioch 2013a). Reaches B-2, B-3, and B-4 are located north of West Fourth Street within the Business Park land use designation and the Dow Wetlands Preserve in the Rivertown/Urban Waterfront Focus Area.

4.10.2 Land Use and Planning (X.) Environmental Checklist and Discussion

a) Would the project physically divide an established community?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is the construction of improvements, operation, and maintenance of a segment of the West Antioch Creek channel, from approximately West Tenth Street north to 200 feet beyond the BNSF railroad trestle. This segment of West Antioch Creek Channel is located within the Somersville Road Corridor Focus Area and the Rivertown/Urban Waterfront Focus Area in the northwestern portion of the City of Antioch. The majority of the proposed improvements and maintenance would be located along the existing footprint of the West Antioch Creek channel. However, improvements within Reach A would require a permanent easement on privately-owned parcels located at 1400 West Tenth Street and 804 O Street. Temporary easements would also be required for the construction of the Project for staging and stockpiling of material, as described in Section 2.0 Project Description. The permanent easement would not physically divide an established community because the West Antioch Creek is an existing channel and the Project would be located generally along the existing alignment of the channel. No impact would occur.

Alternatives Analysis

All alternatives would generally be located in the same area and would not create a barrier in an existing community; therefore, the impact analysis above for the Project would be applicable to all alternatives.

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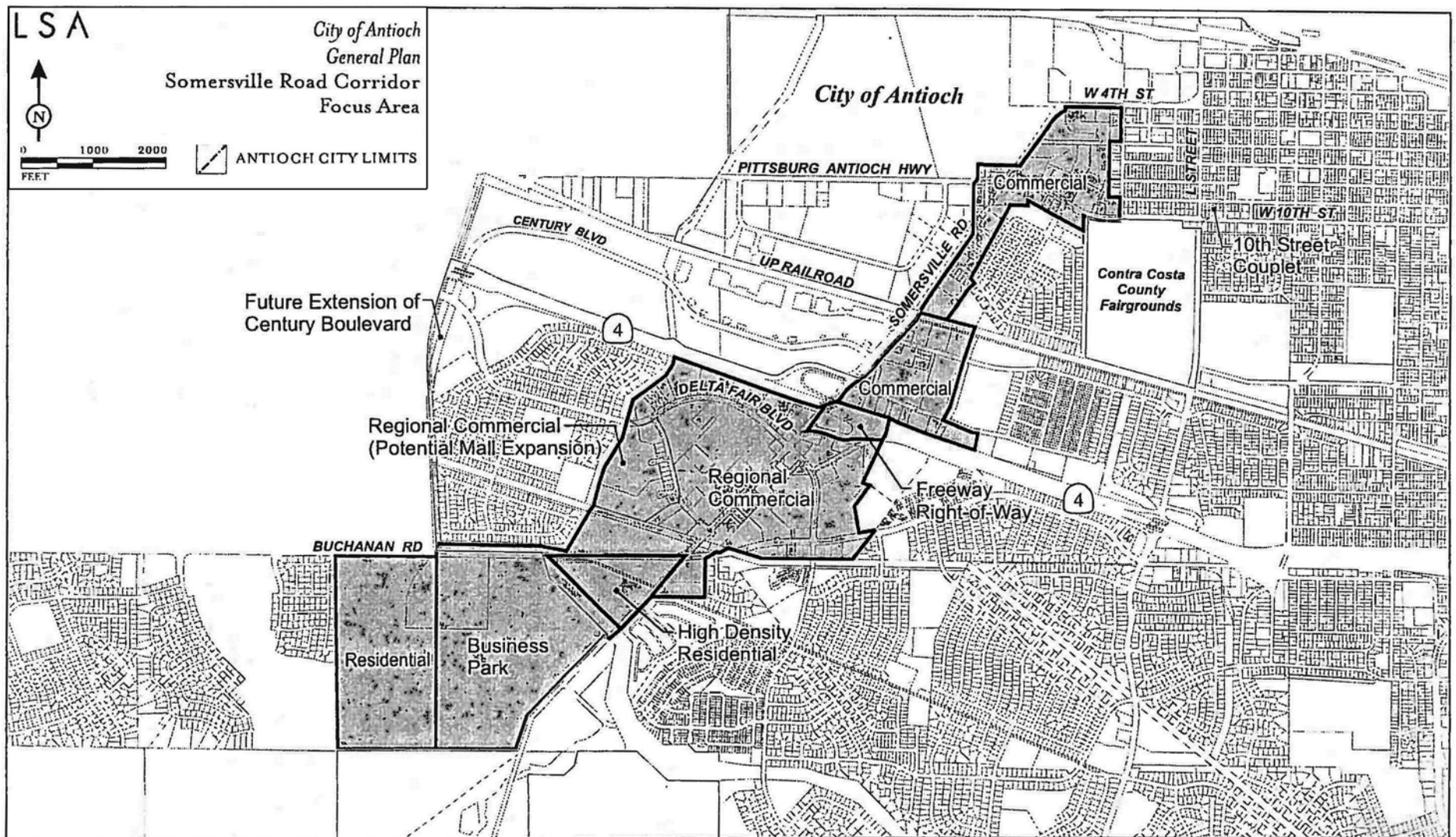


Figure 10. Somersville Rd Corridor Focus Area

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b) Would the project 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?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The City of Antioch's General Plan includes a Public Services and Facilities Element that lists the City's storm drainage and flood control objective and policies. The City's objective regarding storm drainage and flood control is to convey all storm water via adequately sized storm drains and channels (City of Antioch 2003). The Project would increase the conveyance capacity of the West Antioch Creek channel, within the Project's limits, to be able to convey up to the 25-year storm event flows. With West Antioch Creek channel's improved conveyance capacity the Project area would be less susceptible to flooding when compared to the existing conditions. The proposed improvements would be consistent with the City's objective regarding drainage and flood control. A beneficial impact would occur.

The Project would require permanent easements on privately-owned parcels located at 1400 West Tenth Street and 804 O Street. Approximately 0.8 acre of paved area currently used for parking and access to service bays at 1400 West Tenth Street would be part of the earthen channel proposed for Reach A-2. Approximately 0.02 acre of 804 O Street would be acquired for the earthen channel proposed for Reach A-2 and would require the relocation of a carport. The City of Antioch would acquire the easements needed for the Project in compliance with local and state regulations. No impact would occur.

Alternatives Analysis

All alternatives are designed to alleviate flooding in the Project area and would be in conformance with the City's Public Services and Facilities Element; however, they each propose different conveyance designs for Reach A. The different configuration of Reach A requires different permanent easement requirements. Table 2 in Section 2 Project Description of this Initial Study details the property acquisition requirements for each alternative. All alternatives would acquire the necessary easements in compliance with local and state regulations; therefore, the impact analysis above for the Project would be applicable to all alternatives.

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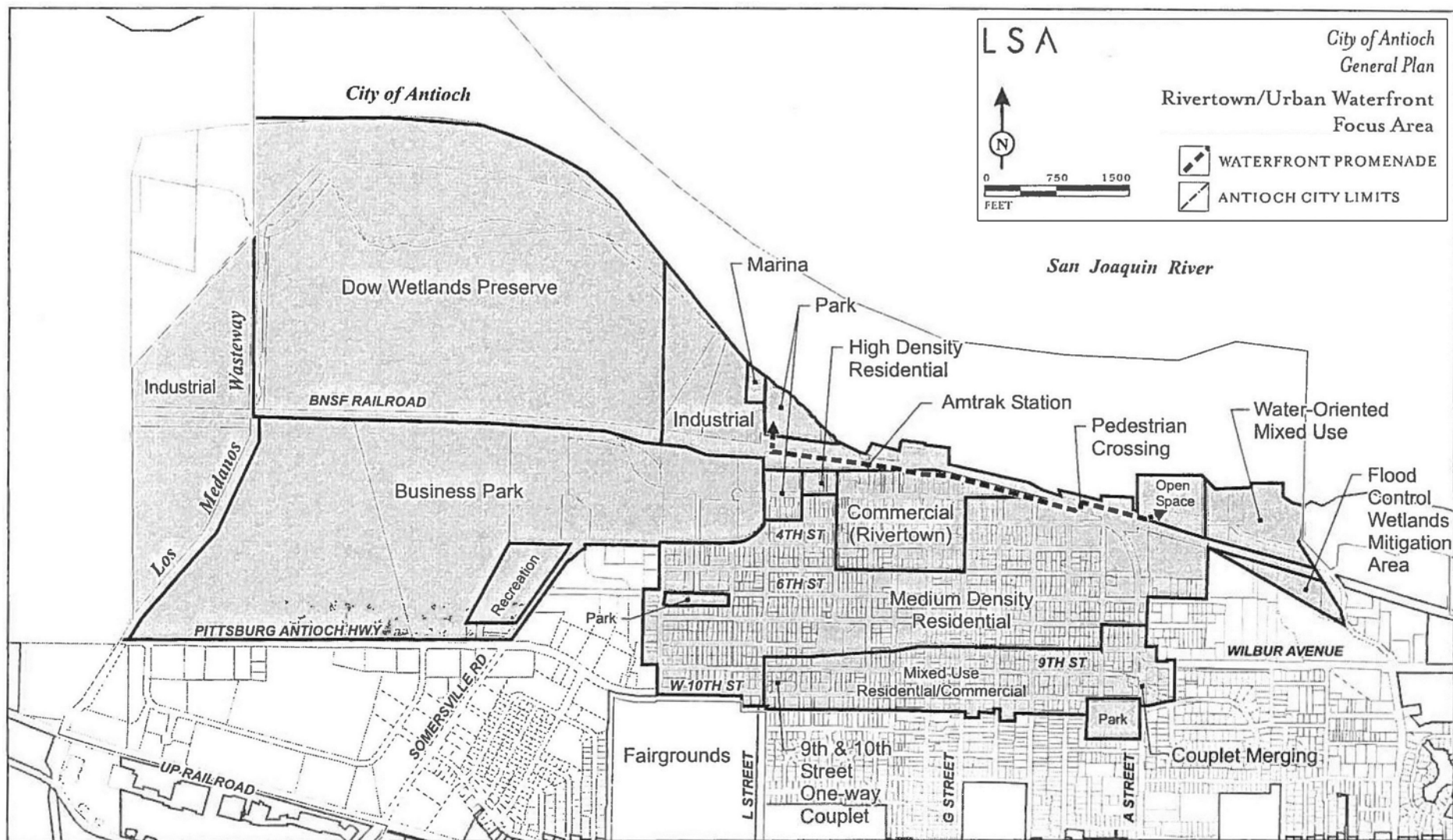


Figure 11. Rivertown/Urban Waterfront Focus Area

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c) Would the project conflict with any applicable habitat conservation plan or natural community conservation plan?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Reach A of the Project site is identified as a covered inventory area in the East Contra Costa County HCP/NCCP, the remainder of the Project site (Reach B) is not within the HCP/NCCP (Nomad 2013a). The City would consult with regulatory agencies and obtain the required permits for the remainder of the Project site. Further discussion on HCP/NCCP coverage can be found in Section 4.4 Biological Resources question f) of this Initial Study. No impact would occur.

Alternatives Analysis

All alternatives would be located generally in the same area; therefore, HCP/NCCP coverage would only apply to Reach A. The impact analysis above for the Project would be applicable to all alternatives.

4.11 Mineral Resources

4.11.1 Environmental Setting

Historically, coal and oil were the mineral products produced within and near the City of Antioch. The coal mines were abandoned in the late 1800's and had been a risk until the ventilation shafts were closed in 1981 and 1982. The Brentwood oil field is southeast of the City of Antioch and within the general plan area; however, 49 of the 52 wells have been plugged and capped (City of Antioch 2003). The nearest oil well is over 3 miles from the project area and this well is plugged (DOC 2014). Currently within Contra Costa County, crushed rock is the most important mineral resource, along with shale, sand and sandstone; the mineral industry is a significant source of employment in the county (CCC 2005).

4.11.2 Mineral Resources (XI.)Environmental Checklist and Discussion

a) Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

According to the City of Antioch General Plan, there are no known mineral resources present at the Project site and it is not zoned for this activity. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same location as the Project. No impact would occur.

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b) Would the project result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project area is not located within a current or historic locally-important mineral resource recovery site. No Impact would occur.

Alternatives Analysis

The four alternatives for Reach A are located in the same location as the Project. No impact would occur.

4.12 Noise

4.12.1 Environmental Setting

Existing Ambient Noise Environment

An environmental noise assessment was completed for the Project by Bollard Acoustical Consultants, Inc. (BAC 2013). The existing ambient noise environment in the immediate Project vicinity is defined primarily by local traffic on West Fourth Street, West Tenth Street, and O Street, as well as from the BNSF railroad tracks and light industrial uses to the north. To generally quantify the existing ambient noise environment in the Project vicinity, short-term ambient noise surveys were conducted at four locations on the Project site on October 4, 2013. All noise measurement sites were located along the West Antioch Creek channel. Site 1 was located near Fourth Street, Site 2 was located near Sixth Street, Site 3 was located near Seventh Street, and Site 4 was located near Ninth Street (BAC 2013).

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the ambient noise level measurement surveys. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4). A summary of the noise level measurement results are provided in Table 9. The Table 9 data indicates that the measured ambient noise conditions in the Project vicinity are typical for residential areas affected primarily by local traffic noise sources (BAC 2013).

Table 9. Ambient Short-Term Noise Level Measurement Survey

Site #	Interval #	Time	Duration	L _{eq} , dB	L _{max} , dB
1	2	1:15 p.m.	15 min	54	68
2	3	1:37 p.m.	15 min	48	58
3	4	1:58 p.m.	15 min	55	66
4	5	2:20 p.m.	15 min	52	68

Notes: dB= decibel, L_{eq} = equivalent sound level, L_{max} = maximum sound level
Source: BAC 2013

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City of Antioch General Plan Environmental Hazards Element

Section 11.6 of the City of Antioch General Plan Environmental Hazards Element contains the City's noise policies. The following specific policies which pertain to temporary construction are included within the General Plan in Section 11.6.2:

- i. Ensure that construction activities are regulated as to hours of operation in order to avoid or mitigate noise impacts on adjacent noise-sensitive land uses.
- j. Require proposed development adjacent to occupied noise sensitive land uses to implement a construction-related noise mitigation plan. This plan would depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses.
- k. Require that all construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.
- m. Prior to the issuance of any grading plans, the City shall condition approval of subdivisions and non-residential development adjacent to any developed/occupied noise-sensitive land uses by requiring applicants to submit a construction-related noise mitigation plan to the City for review and approval. The plan should depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of the Project through the use of such methods as:
 - The construction contractor shall use temporary noise-attenuation fences, where feasible, to reduce construction noise impacts on adjacent noise sensitive land uses.
 - During all Project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site.
 - The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction.
 - The construction contractor shall limit all construction-related activities that would result in high noise levels to between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. No construction shall be allowed on Sundays and public holidays.
- n. The construction-related noise mitigation plan required shall also specify that haul truck deliveries be subject to the same hours specified for construction equipment. Additionally, the plan shall denote any construction traffic haul routes where heavy trucks would exceed 100 daily trips (counting those both to and from the construction site). To the extent feasible, the plan shall denote haul routes that do not pass sensitive

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land uses or residential dwellings. Lastly, the construction-related noise mitigation plan shall incorporate any other restrictions imposed by the City.

City of Antioch Municipal Code: Chapter 17 Disturbing the Peace

Section 5-17.04 Heavy Construction Noise

- a. For the purpose of this chapter, the following definitions shall apply unless the context clearly indicates or requires a different meaning.
 - **HEAVY CONSTRUCTION EQUIPMENT.** Equipment used in grading and earth moving, including diesel engine equipped machines used for that purpose, except pickup trucks of one ton or less.
 - **OPERATE.** Includes the starting, warming-up, and idling of heavy construction equipment engines or motors.
- b. It shall be unlawful for any person to operate heavy construction equipment during the hours specified below:
 - On weekdays prior to 7:00 a.m. and after 6:00 p.m.
 - On weekdays within 300 feet of occupied dwelling space, prior to 8:00 a.m. and after 5:00 p.m.
 - On weekends and holidays, prior to 9:00 a.m. and after 5:00 p.m., irrespective of the distance from the occupied dwelling.

Section 15-17.05 Construction Activities

- a. As used in this section, **CONSTRUCTION ACTIVITY** means the process or manner of constructing, building, refurbishing, remodeling or demolishing a structure, delivering supplies thereto and includes, but is not limited to, hammering, sawing, drilling, and other construction activities when the noise or sound therefrom can be heard beyond the perimeter of the parcel where such work is being performed. The term **CONSTRUCTION ACTIVITY** also includes the testing of any audible device such as a burglar or fire alarm or loudspeaker. **CONSTRUCTION ACTIVITY** does not include floor covering installation or painting when done with non-powered equipment.
- b. It shall be unlawful for any person to be involved in construction activity during the hours specified below:
 - On weekdays prior to 7:00 a.m. and after 6:00 p.m.
 - On weekdays within 300 feet of occupied dwellings, prior to 8:00 a.m. and after 5:00 p.m.
 - On weekends and holidays, prior to 9:00 a.m. and after 5:00 p.m., irrespective of the distance from the occupied dwellings.

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- c. In addition to the penalties provided by this code, authorized employees may issue "Stop Work Orders" when a violation of this section or § 5-17.04 has occurred. If such a Stop Work Order is issued, it shall not be released until the holder of the building permit provides assurance that future violations will not occur.

4.12.2 Noise (XII.) Environmental Checklist and Discussion

a) Would the project 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?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project would generate changes in ambient noise levels in the immediate Project vicinity from the following sources:

- On-site construction equipment used for Project demolition, culvert replacement, roadway reconstruction, and channel desilting;
- Off-site heavy truck traffic hauling silt away from the Project area; and
- Off-site changes in traffic patterns resulting from construction detours.

On-Site Equipment Noise Generation

During the construction phases of the Project, noise from construction activities would add to the noise environment in the immediate Project vicinity. Activities involved in typical construction would generate maximum noise levels ranging from 70 to 90 dBA at a distance of 50 feet (BAC 2013).

There are existing residences located on both the east and west sides of O Street, a Holiday Lodge Motel on the west side of 1400 West Tenth Street, and businesses at 1400 West Tenth Street which would be exposed to short-term periods of elevated noise exposure during Project construction. The carport at the existing apartment complex located at 804 O Street would be removed and reconstructed on a neighboring parcel to the south. Desilting activities would occur in Reach B-1, within approximately 75-175 feet of the existing apartments located along the west side of O Street. Capacity improvements would occur in Reach A-1 and A-2 approximately 200 feet from the motel located behind 1400 West Tenth Street and the residential area across O Street. During these operations, maximum exterior noise levels in the range of 70-90 dBA_{max} could occur at those residences.

Off-Site Haul Truck Noise Generation

The Project would result in the generation of approximately 20 heavy truck trips per day for the hauling of vegetation and soils to and from the Project site. BAC file data for both loaded and empty 20-ton haul trucks indicates that a typical haul truck passing by at 50 feet can be expected to generate an average Sound Exposure Level (SEL) of approximately 80 dBA. Given approximately 20 haul trips in a typical day, it is reasonable to conclude that there would likely be no more than four off-site heavy truck trips in a given hour. Based on four trips in an hour, and a SEL of 80 dBA at 50 feet, the hourly average noise level resulting from those four trips would be 50 dBA_{Leq} at a distance of 50 feet (BAC 2013).

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Noise Generated by Project Detours

During construction of Reach A-1 Project demolition, culvert replacement, and roadway reconstruction, West Tenth Street would be subject to temporary access restrictions and/or closure and local traffic would be delayed or detoured around the construction. As part of the Project, a Traffic Management Plan (TMP) (Mitigation Measure T-1) would be prepared which would evaluate detour plans for street/lane closures. It is anticipated that the TMP would develop detour plans which maximize the use of the larger West Fourth Street and L Street corridors, while minimizing cut through traffic on the smaller residential roadways (BAC 2013).

The City of Antioch General Plan does not apply specific noise standards to construction activities. However, the City's noise policies identify practical measures which should be implemented to the extent possible to reduce the potential for adverse public reaction to noise generated during short-term construction projects. The implementation of Mitigation Measure N-1 would reduce this impact to a less than significant level.

Mitigation Measure

N-1 Noise Best Management Practices

- A. The construction contractor will develop and implement a construction-related noise mitigation plan. This plan will depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses; in particular the apartment complexes on the west side of O Street in Reach B-1 and the motel to the west of Reach A-2.
- B. The construction contractor will place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the Project site. During all Project site excavation and grading on-site, the construction contractors will equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.
- C. The construction contractor will locate equipment staging areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the Project site during all Project construction.
- D. The construction contractor will limit all construction-related activities that would result in high noise levels to comply with the city code between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and 8:00 a.m. to 5:00 p.m. on Saturdays. Construction-related activities within 300 feet of an occupied dwelling will be limited to the hours of 8:00 a.m. to 5:00 p.m. No construction will be allowed on Sundays and public holidays.
- E. Haul truck activity will be subject to the same hours specified for construction equipment.
- F. Project haul routes will be developed in the TMP which will minimize the usage of routes through residential neighborhoods or other sensitive land uses.

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Alternatives Analysis

The potential noise impact associated with all of the alternatives would be similar for the proposed hours of construction and heavy equipment required for construction. However, Alternative 4 and 5 would require building demolition on the west side of the channel nearest the motel at 1400 West Tenth Street. With the implementation of Mitigation Measure N-1, impacts would be less than significant.

b)	Would the project result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities (inches/second). Vibration levels for heavy earth-moving equipment range from 0.02 inches/second for a passing bulldozer at 35 feet to 0.005 inches/second for a front-loader at distance of 100 feet. Unless the receiver is very close to the equipment, ground-borne vibration generated by heavy earth-moving equipment is negligible (BAC 2013).

The facades of the nearest existing residences/sensitive receptors (apartments along the east side of Reach B-1 and the motel on the west side of Reach A-2) would be more than 50 feet from the proposed construction and desilting activities. As a result, Project-generated vibration levels at those nearest residences are predicted to be below 0.1 inches/second peak particle velocity. Peak particle velocities of 0.1 inches/second or less would be barely to distinctly perceptible (BAC 2013). Because vibrations would be barely perceptible and because construction activities would be temporary and limited to daytime hours this impact is considered less than significant.

Alternatives Analysis

The potential noise impact associated with each alternative is considered to be similar because proposed hours of construction and heavy equipment required for construction are similar for all alternatives. The analysis for the Project is considered representative of potential impacts for all Reach A alternatives.

c)	Would the project result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Construction of the Project would be temporary; therefore, no permanent increase in ambient noise levels would result. No impact would occur.

Alternatives Analysis

The potential noise impact associated with each alternative is considered to be similar because Construction of the Project would be temporary; therefore, no permanent increase in ambient noise

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levels would result. The analysis for the Project is considered representative of potential impacts for all Reach A alternatives.

d)	Would the project result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Project construction would result in temporary increases in ambient noise levels in the Project vicinity. However, construction would be temporary, limited to daytime hours, and would require implementation of Mitigation Measure N-1 in conformance with the City of Antioch General Plan noise policies. Implementation of Mitigation Measure N-1 would result in a less than significant impact.

Alternatives Analysis

The potential noise impact associated with each alternative is considered to be similar because proposed hours of construction and heavy equipment required for construction are similar for all alternatives. The analysis for the Project is considered representative of potential impacts for all Reach A alternatives.

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 expose people residing or working in the project area to excessive noise levels?	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is not located within an airport land use plan or within two miles of a public use airport (BAC 2013). No impact would occur.

Alternatives Analysis

The analysis for the Project is considered representative of potential impacts for all Reach A alternatives.

f)	For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project is not located in the vicinity of a private use airstrip (BAC 2013). No impact would occur.

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Alternatives Analysis

The analysis for the Project is considered representative of potential impacts for all Reach A alternatives.

4.13 Population and Housing

4.13.1 Environmental Setting

The Project is located in the City of Antioch, California. As of 2010, the City of Antioch had a population of 102,372 (Bay Area Census 2013). The Project site is located in two Focus Areas, with a small portion south of West Tenth Street designated as Open Space land use under the City of Antioch's General Plan (City of Antioch 2013a). The first focus area is the Somersville Road Corridor Focus Area which encompasses commercial land uses. The second focus area is the Rivertown/Urban Waterfront Focus Area which encompasses residential areas with a mix of commercial uses. The closest residence to the Project is an apartment complex approximately 60 feet to the east on the corner of West Tenth Street and O Street.

4.13.2 Population and Housing (XIII.) Environmental Checklist and Discussion

a)	Would the project 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)?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not add additional housing or create permanent jobs that would induce population growth. Any development that may occur would be subject to further review and to the policies of the City of Antioch. No impact would occur.

Alternatives Analysis

Direct or indirect impacts on population growth in the area from the four alternatives for Reach A would be the same as the impacts discussed above for the preferred alternative.

b)	Would the project displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not displace existing housing; it would improve the West Antioch Creek channel and reduce flooding impacts on nearby residences. No impact would occur.

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Alternatives Analysis

Impacts for the four alternatives for Reach A would be the same as discussed above for the preferred alternative.

c)	Would the project displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not displace people and, thus, would not necessitate the construction of replacement housing elsewhere (see response to XIII. B.) above. No Impact would occur.

Alternatives Analysis

Impacts for the four alternatives for Reach A would be the same as discussed above for the preferred alternative.

4.14 Public Services

4.14.1 Environmental Setting

Police Services

The City of Antioch Police Department provides police services to the City of Antioch. The closest police station to the Project site is less than 0.25 miles to the east.

Fire Services

The Contra Costa County Fire Protection District serves the City of Antioch, along with eight other cities. There are four fire stations located in the City of Antioch, Stations 81, 82, 83, and 88. Station 81 is the closest fire station and is located less than 0.75 miles away from the Project site.

Schools

School services are provided by the Antioch Unified School District. There are 11 schools within approximately one mile of the Project site; Bridges School, Prospects High Alternative High School, Antioch Charter Academy School, Antioch High School, Fremont Elementary School, Live Oak High School, Antioch Middle School, Marsh Elementary School, Kimball Elementary School, R.A.A.M.P. Charter Academy School, and Mission Elementary School.

Parks

The City of Antioch provides services to the public parks in the area. The parks within two miles of the Project site are discussed further in Section XV. Recreation below.

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4.14.2 Public Services (XIV.) Environmental Checklist and Discussion

a)	Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services: <ul style="list-style-type: none">• Fire Protection?• Police Protection?• Schools?• Parks?• Other Public Facilities?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The Project site does not contain fire or police protection facilities that would need to be altered as a result of the Project. The Project would not increase the demand for fire or police protection and, therefore, no new facilities would need to be developed in order to maintain acceptable service ratios. Fire protection and police protection response times could potentially be affected during construction. Mitigation Measure T-1 would mitigate this impact to a less than significant level.

The Project site does not contain school facilities, park facilities, or other public facilities that would need to be altered as a result of the Project. The Project would not affect local school enrollment. The Project would have no impacts to schools, parks, and other public facilities.

Alternatives Analysis

Impacts on public services and facilities from the four alternatives for Reach A would be the same as the impacts discussed above for the preferred alternative.

4.15 Recreation

4.15.1 Environmental Setting

The City of Antioch is located in proximity to a variety of local parks, recreational facilities, regional parks, and open space areas. The City owns and manages 28 local parks and recreational facilities varying in size and amenities, while the East Bay Regional Park District (EBRPD) is responsible for management of regional facilities. Approximately 400 acres of parks and open space areas are located within the City. 200 acres have been developed into recreational facilities and the remaining 200 is pending development or is designated exclusively as open space (City of Antioch 2003).

Several recreational facilities exist within a 2-mile radius of the Project area, including the Dow Wetlands Preserve located directly adjacent to the Project site on the north and Contra Costa County Fairgrounds located at the southern terminus of the Project. (City of Antioch 2013b; Contra Costa County Fairgrounds 2010). A list of recreational facilities in the project vicinity is provided below:

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- Prosserville Park
- City Park
- The Contra Costa County Fairgrounds - including an agricultural museum, a flea market, a speedway, an RC track, a skate rink, and a paintball park.
- Mountaire Park
- Mira Vista Park
- Contra Loma Park
- Canal Park
- Gentrytown Park
- Village East Park
- Gino Marchetti Park
- Fairview Park
- The Dow Wetlands Preserve

4.15.2 Recreation (XV.)Environmental Checklist and Discussion

a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not alter existing neighborhood and regional parks or other recreational facilities or increase population. No impact would occur.

Alternatives Analysis

Impacts on regional parks or other recreational facilities from the four alternatives for Reach A would be the same as the impacts discussed above for the preferred alternative.

b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project does not include recreational facilities nor would it require the construction or expansion of such facilities. No impact would occur.

Alternatives Analysis

Impacts from the construction or expansion of regional parks or other recreational facilities from the four alternatives for Reach A would be the same as the impacts discussed above for the preferred alternative.

4.16 Transportation/Traffic

4.16.1 Environmental Setting

The Project is located in the City of Antioch along a segment of West Antioch Creek Channel from approximately the southwest corner of the intersection of West Tenth Street and O Street, downstream to approximately 200 feet north of the BNSF railroad trestle. West Tenth Street provides east-west access in downtown Antioch between Somersville Road and A Street. West of Auto Center Drive (Somersville Road), West Tenth Street becomes the Pittsburg/Antioch Highway, which serves industrial uses and provides a regional roadway connection to west Antioch. West Fourth Street is the main arterial between Somersville Road and G Street. O Street is a local road that extends from the Contra Costa County Fairgrounds, just south of West Tenth Street, north to West Fourth Street. Somersville Road runs north-south in western Antioch on both sides of SR-4 providing access to the Pittsburg-Antioch Highway and Buchanan Road. North of SR-4 Somersville Road is signed as Auto Center Drive. The Project site is located approximately 0.75 miles north of SR-4. SR-4 runs east-west, connecting Antioch with Oakley, Brentwood, Pittsburg, Interstate 680 (I-680), Martinez, Pinole, and Interstate 80 (I-80) (City of Antioch 2003). See Figure 12 for information on Project area circulation.

4.16.2 Transportation/Traffic (XVI.) Environmental Checklist and Discussion

a) Would the project conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways, and freeways, pedestrian and bicycle paths, and mass transit?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

The City of Antioch's General Plan Circulation Element provides goals and policies to meet the need for safe and convenient movement of people and goods between land uses at the development intensity anticipated in the Land Use Element (City of Antioch 2003). Improvements to the West Antioch Creek channel would not conflict with the City's Circulation Element because no modifications to the City's circulation system would occur. However, temporary impacts to the City's circulation system may occur during construction from the potential temporary closure or reduced access of West Tenth Street and from traffic generated by construction activities.

The closure or access restrictions on West Tenth Street, for up to 11 weeks, from approximately 200 feet west of the West Antioch Creek channel to O Street, would be required to construct the culvert across West Tenth Street. Impacts may occur from the re-routing of traffic through other streets in the Project area or delays during certain construction activities. With the implementation of Mitigation Measure T-1, impacts would be less than significant.

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Figure 12. Project Area Circulation

West Antioch Creek Channel Improvement Project

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The Project would generate daily construction-related trips from workers driving to and from the Project site; trucks delivering equipment and materials to and from the Project site; and trucks hauling soil and vegetation from the Project site. Local roads that would be used to access the Project site would include West Fourth Street, West Sixth Street, West Tenth Street, Auto Center Drive (Somersville Road), and O Street (Figure 2b. *Staging/Stockpiling Areas and Access Points*). Trucks delivering equipment and materials and trucks hauling soil and vegetation from the Project site would use Auto Center Drive (Somersville Road), West Fourth Street, and L Street, which are designated truck routes, to access SR-4 and Pittsburg-Antioch Highway. The largest source of construction traffic is expected to be from hauling soil and vegetation from the Project site. Estimated overall truck trips for this activity are shown in Table 10.

Table 10. Estimated Truck Trips from Hauling Soil and Vegetation from the Project Site

	Roundtrip Distance (miles)	Total Volume of Soils (CY)	Volume of Truck (CY)	Number of trips	Mileage
Reach A (Conveyance Improvements)					
Keller Canyon (Vegetation) ¹	14.6	0	20	0	0
Jersey Island (Common Soils) ²	31.6	12,500	20	630	19,908
Altamont (Contaminated Soils) ³	65.2	1,375 ⁴	20	70	4,564
Reach B (Desilting)					
Keller Canyon (Vegetation)	14.6	7,580	20	380	5,548
Jersey Island (Common Soils)	31.6	28,533	20	1,430	45,188
Altamont (Contaminated Soils)	65.2	3,170 ⁴	20	160	10,432
	TOTAL MILEAGE				85,640

Notes: CY = Cubic Yards

1. Vegetation could be disposed of at Keller Canyon, Jersey Island, or a nearby composting facility
2. Common soils could be disposed of at Jersey Island, or Keller Canyon Landfill.
3. Contaminated soils to be disposed of at a suitably licensed facility, such as Altamont landfill.
4. Quantity of contaminated soils is to be determined. Preliminary estimate is 10 percent of common soil excavation and is subject to change.

It is estimated that approximately ten double transfer dump trucks would be required to conduct approximately 20 trips per day to dispose of soil and decomposed marsh vegetation. Given approximately 20 haul trips in a typical day, there would likely be four off-site heavy truck trips in a given hour. Dump trucks would access SR-4 and Pittsburg-Antioch Highway from Auto Center Drive (Somersville Road), West Fourth Street, and L Street, which are designated truck routes. Construction generated trips would temporarily increase traffic along these designated truck routes. However, given the minimal amount of daily trips generated per hour, impacts to the circulation system in the Project area would be less than significant with the implementation of Mitigation Measure T-1.

The operation and maintenance of the Project would include infrequent vehicular trips by maintenance staff. It is not expected that these infrequent operation and maintenance trips would result in a significant increase in traffic in the Project area. Operation and maintenance of the Project would not conflict with the City's Circulation Element because no substantial traffic would be generated by the Project and no modifications to the City's circulation system would occur. A less than significant impact would occur.

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Mitigation Measure

T-1 Traffic Management Plan

The City of Antioch (or its contractor) will prepare a Traffic Management Plan (TMP) to manage site access, temporary access restrictions and/or closure of West Tenth Street, material and equipment delivery, and the hauling of soil and vegetation from the site. The TMP will address, but not be limited to, the following:

- A. Access to the Project site (for workers, material and equipment delivery, and dump trucks);
- B. Detour plan for street closures which maximizes the use of the larger streets, such as West Fourth Street and L Street, while minimizing cut-through traffic on the smaller residential streets;
- C. Traffic control measures at ingress/egress points;
- D. Number of dump haul trucks to be used;
- E. Days and hours of haul operation (restrictions during AM and PM peak operating periods);
- F. Haul operation restrictions during community/county events in the area (e.g. Contra Costa County Fair);
- G. Frequency of dump trucks entering and leaving the Project site;
- H. Primary and alternate haul routes to be used to and from the staging areas to the disposal sites; and
- I. Best Management Practices BMPs to prevent tracking dirt onto City streets, consistent with Mitigation Measure AQ-1.

Alternatives Analysis

All alternatives would result in temporary traffic impacts from construction, which would end at the completion of construction activities, as described above for the Project. No permanent traffic impacts are anticipated. The impact analysis above for the Project would be applicable for all alternatives.

b) Would the project conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

See the response to 4.16 a) above. With the implementation of Mitigation Measure T-1 impacts would be less than significant.

Alternatives Analysis

All alternatives would result in temporary traffic impacts from construction which would end at the completion of construction activities. No permanent traffic impacts are anticipated; therefore, the impact analysis above for the Project would be applicable for all alternatives.

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c) Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project site is not located within an airport land use plan and there are no airports located within two miles of the Project site. The closest airport is the Buchanan Field Airport located approximately 13 miles west of the Project site. The Project would not result in a change in air traffic patterns, including an increase in traffic levels or a change in location. No impacts would occur.

Alternatives Analysis

All alternatives would be located in the same area; therefore, the impact analysis above for the Project would be applicable for all alternatives.

d) Would the project substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not substantially increase hazards due to a design feature. The proposed improvements to the West Antioch Creek channel would alleviate flooding in the Project area. No impact would occur.

Alternatives Analysis

All alternatives would be located in the same area and all would be designed to alleviate flooding in the Project area. No alternative would include a design feature that would increase traffic hazards in the Project area. The impact analysis above for the Project would be applicable for all alternatives.

e) Would the project result in inadequate emergency access?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Construction of the Project would require temporary access restrictions and/or closure of West Tenth Street, for up to 11 weeks, from approximately 200 feet west of the West Antioch Creek to O Street. The Project area of West Tenth Street would be demolished and reconstructed in order to replace the four side by side pre-cast concrete box culverts. Temporary impacts to emergency access may occur during lane closures. Implementation of Mitigation Measure T-1, would reduce impacts to a less than significant level.

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Construction of the Project would increase the channels capacity to convey up to a 25-year storm event flows. The increase capacity of the channel would reduce the probability of the Project area to flood during storm events resulting in a beneficial impact to emergency access in the Project area during storm events.

Alternatives Analysis

Each Reach A alternative would require temporary access restrictions and/or closure of West Tenth Street, which could cause temporary impacts to emergency access near the Project area. All Reach A alternatives would include the implementation of Mitigation Measure T-1; therefore, the impact analysis above for the Project would be applicable for all alternatives.

f) Would the project conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities or otherwise decrease the performance or safety of such facilities?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Project would not conflict with public transportation programs, plans, or policies. Traffic could increase during construction but would be temporary. Impacts would be less than significant.

Alternatives Analysis

All alternatives would not conflict with public transportation programs, plans, or policies. The impact analysis above for the Project would be applicable to all alternatives.

4.17 Utilities and Service Systems

4.17.1 Environmental Setting

Water Service

The Antioch Water Treatment Plants provide water service for the city residents and facilities with 31,274 service connections (City of Antioch, 2013c). The raw water originates from the Sacramento/San Joaquin River Delta and is purchased from the Contra Costa Water District (City of Antioch 2011). The City stores the water in the Municipal Reservoir and then treats it at the Antioch Water Treatment Plants (Plant A or Plant B). According to the City of Antioch General Plan, the city owns and operates 11 storage reservoirs with a total of 21.5 million gallon capacity, six booster stations, and several backup wells. In 2009, Drought Management Regulations and Water Conservation Goals were adopted by the City (City of Antioch 2011). The resulting water conservation program has a conservation coordinator, monitors customer water use, and provides various education and rebate/incentive programs.

Wastewater

The City of Antioch is responsible for wastewater collection and system maintenance of approximately 300 miles of sewer lines with 28,252 connections (City of Antioch 2013c). The wastewater is conveyed through pump stations to the Delta Diablo Sanitation District. The wastewater treatment plant is located near the border of Antioch and Pittsburg, and also services Bay Point.

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Solid Waste

Curbside garbage, recycling and yard waste recycling service is contracted with Allied Waste. Hazardous waste can be disposed of at the Delta Household Hazardous Waste (HHW) Collection Facility. Curbside collection of motor oil is provided by Allied Waste. In addition, numerous drop off locations for motor oil and paint recycling services are listed on the City of Antioch's website at <http://ci.antioch.ca.us/Environment/SolidWaste.htm>.

4.17.2 Utilities and Service Systems (XVII.) Environmental Checklist and Discussion

a)	Would the project exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not produce wastewater. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A would not produce wastewater. No impact would occur.

b)	Would the project 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not require the construction of new water and wastewater connections. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A would not require the construction of new water and wastewater connections. No impact would occur.

c)	Would the project require or result in the construction of new stormwater drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

The Project does require construction and expansion for improving an existing stormwater drainage facility. The Project would increase permeable surfaces and would improve creek channel flow to decrease the frequency of flood events. The culverts under West Tenth Street would change from

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two to four culverts, the length of the covered creek channel would decrease from 300 feet to 100 feet, and the concrete lining the drainage would be removed from Reach A-2. As previously described in the Hydrology and Water Quality (IX.) Environmental Checklist Discussion item a), the District and the City of Antioch are required to comply with the NPDES East Contra Costa Municipal Storm Water Permit, and obtain a NPDES Stormwater Construction General Permit, and prepare a SWPPP to ensure that the Project would not result in substantial discharges of typical stormwater pollutants. A less than significant impact would occur.

Alternatives Analysis

The four alternatives for Reach A would be located in generally the same area. The Project for Reach A would have the same impacts as Alternatives 4 and 5, shortening the enclosed channel from 300 feet to 100 feet and removing the concrete lining from Reach A-2. Alternatives 4 and 5 would result in a less than significant impact. Alternative 1 would have the same length of culvert as the current enclosed condition, so no more or less creek channel would be enclosed. As previously described above, the District and the City of Antioch are required to comply with the NPDES East Contra Costa Municipal Storm Water Permit, obtain a NPDES Stormwater Construction General Permit, and prepare a SWPPP to ensure the Project would not result in substantial discharges of typical stormwater pollutants. Alternative 1 would have a less than significant impact. Alternative 2 would enclose more of the creek channel, extending it from its current 300 feet to 700 feet of culvert. Alternative 2 would result in a less than significant impact with implementation the requirements described above.

d)	Would the project have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not require or need a water supply. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A (conveyance) would not require or need a water supply. No impact would occur.

e)	Would the project result in a determination by the wastewater treatment provider, which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

The Project would not require wastewater service. No impact would occur.

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Alternatives Analysis

The four alternatives for Reach A would not require wastewater service. No impact would occur.

f)	Would the project be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

A temporary increase in waste would occur during construction related-activities and is not anticipated to affect the permitted capacity of such landfills. The Project would generate solid waste from the replacement and construction of the culverts and removal of the concrete-lined channel in Reach A. Construction waste would be disposed of at a local landfill permitted to accept construction waste. Reach B would also generate solid waste with the desilting/debris removal activity. Clean soil would be disposed of at Jersey Island for use in levee buttress construction, Ironhouse Sanitary District treatment plant site, Keller Canyon Landfill, or another suitable nearby facility. Contaminated soils would be hauled away for disposal at a licensed facility. In addition to sediment, the Project would remove approximately 7,580 cubic yards of decomposed marsh vegetation, which would be disposed of at Jersey Island, Keller Canyon Landfill, or a suitable nearby composting facility. A less than significant impact would occur.

Alternatives Analysis

Please see the analysis discussion above. The four alternatives for Reach A would not differ from the Project. The Alternatives would result in a less than significant impact.

g)	Would the project comply with federal, state, and local statutes and regulations related to solid waste?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Waste generated by the Project would comply with statutes and regulations related to solid waste. No impact would occur.

Alternatives Analysis

The four alternatives for Reach A would comply with statutes and regulations related to solid waste. No impact would occur.

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4.18 Mandatory Findings of Significance

4.18.1 Mandatory Findings of Significance (XVIII.) Environmental Checklist and Discussion

a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, 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?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

With mitigation described in this Initial Study, the Project would not have a significant impact on fish and wildlife species or their habitat or eliminate important examples of major periods of California history or prehistory.

b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

A list of current and proposed projects that are located in the City of Antioch and within Contra Costa County was compiled using the CEQAnet Database search (CEQAnet 2013) and City of Antioch Planning Division Project Pipeline list (City of Antioch 2013d). Current and proposed projects are summarized in Table 11.

Table 11. Current and Proposed Projects in the City of Antioch

Project Name	Type of Project	Project Size	Location
Highway 160 Levee Seepage Repair Project	Infrastructure	N/A	Highway 160, Sherman Island Levee stations from 870+00 to 940+00.
Recycled Water System Expansion Project	Infrastructure	N/A	Pittsburg-Antioch Hwy, Loveridge Road, Willow Pass Road, W Fourth Street
Northeast Antioch Area Reorganization	Public Services and Infrastructure	N/A	Northeast of the City of Antioch along San Joaquin River near Wilbur Avenue
Hillcrest Station Area Specific Plan Amendment	Residential, Office, Commercial, Transportation, Open Space	N/A	Hillcrest Ave, Hwy 4, Hwy 160, Oakley Rd

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Project Name	Type of Project	Project Size	Location
Line 191 Tributary to East Antioch Creek Crossing ECDA Project	Inspection and Repair of Infrastructure	112 Square Feet	Unnamed Tributary, City of Antioch
Almond Ridge East Tract 7906	Residential development	81 SFD 21 acres	Philips Lane
Black Diamond Ranch 7487, 8585, 8586	Residential development	Unit 1 58 SFD Unit 2 117 SFD Unit 3 105 SFD	Somersville Road & James Donlon
Bridle Ranch Master Development Plan	Residential development	Approx. 370 executive SFD	5599 Empire Mine Rd NW corner of Empire Mine Rd & Deer Valley Rd
Deer Valley Estates	Residential development	136 SFD 37.25 acres	Off Deer Valley Rd north of Kaiser
Golden Bow Estates 8538	Residential development	12 SFD	Off Lexington
Hidden Glen 6909, 7505, 8387, 8388	Residential development	Unit 1 89 SFD Unit 2 81 SFD Unit 3 111 SFD Unit 4 90 SFD	Off Hillcrest at Hidden Glen
Mira Vista Hills 6708, 6921	Residential development	Unit 13 95 SFD Unit 16 85 SFD	Off James Donlon at east of Somersville
Monterra (Nelson Ranch) 6893, 8850, 8851	Residential development	Unit 1 102 SFD Unit 2 128 SFD Unit 3 130 SFD 145 acres	Wild Horse Rd off of Hillcrest Ave.
Park Ridge	Residential development	525 SFD 171 Acres	Canada Valley Rd
Aviano	Residential development adult community	553 Del Webb 189 acres	At the end of Heidorn Ranch Rd
Quail Cove	Residential development	31 SFD 5.59 acres	Prewett Ranch Dr. & Summerfield Dr.
Ram Court	Residential development	Lot 4 0.2143 acres	Ram Court
Roddy Ranch	Residential development	574 SFD +/- 100 multi family Hotel	West of Deer Valley Rd, South of Empire Mine Rd
Sand Creek Ranch 8640, 8885, 8949	Residential development	8640 69 SFD 8885 42 SFD 8949 52 SFD	Off Canada Valley Rd & Lone Tree Way
Sand Creek Ranch Rivergate 8640, 8886, 8951	Residential development	8640 28 SFD 8886 30 SFD 8951 156 SFD	Off Canada Valley Rd & Lone Tree Way
Sierra Vista 7722	Residential development	50 SFD	
Tabora Gardens	Residential development Senior Apartments	85 units	Southeast corner of James Donlon & Tabora Dr.
2100 L Street	Construct 6,870 sf retail building on vacant land	0.774 acres	2100 L Street
AutoZone	Building 7,928 SF	0.56 acres	Northeast corner of Lone Tree Way and Fairside Way
Bank of Agriculture	Subdivision of parcel and development of car wash & bank.	2.4 acres	Lone Tree Way at Country Hills

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Project Name	Type of Project	Project Size	Location
Bluerock Business Center	122,856 sq ft office/retail		Blue Rock Dr at Lone Tree Way
Buchanan Crossings Shopping Center	102,370 SF shopping center	13.5 acres	Buchanan Rd at Somersville
Deer Valley Business Park Parcel 1+Bldg N, O, P	16 single user/multi-tenant bldgs. 1800-7000 SF	6 acres	SW Deer Valley at Country Hills
Hillcrest Summit	1500 sf retail 35,077 sf office	5 acres	Hillcrest Ave & E. Tregallas
Holy Cross Cemetery	Construct new 10,100 sf Funeral Center	20 acres	2200 E. 18 th Street
Kaiser Medical Center	500,000 sf hospital 450,000 sf medical offices		6200 Deer Valley Rd
Kamps Propane	Propane storage and distribution plant		4200 Wilbur Ave
Lone Tree Landing	81,690 sf retail center	413,790 sf	Lone Tree Way at Hillcrest
St Ignatius Church Expansion	12,995 sf expansion of existing church		3351 Contra Loma Blvd
WalMart Expansion	33,575 sf expansion with additional parking		4893 Lone Tree Way

Source:CEQAnet 2013, City of Antioch 2013d

As described in the impact analysis of this Initial Study, potentially significant impacts to air quality, biological resources, cultural resources, hazards and/or hazardous materials, noise, and transportation have been identified and mitigation measures have been proposed to offset any Project specific contribution to cumulative impacts. Current and proposed projects in the Project area would also implement mitigation as necessary. All other impacts from the Project are short-term in nature and associated with construction activities on the Project site and, therefore, would not be cumulatively considerable. No other cumulative impacts were identified.

c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Direct and indirect impacts to human beings would be less than significant with the implementation of mitigation measures listed in this Initial Study.

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

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Appendix B – Biological Resources Assessment by Nomad Ecology April 2013; Revised September 2013

Appendix C – Cultural Resources Assessment by ECORP Consulting Inc. October 14, 2013

Appendix D – Noise Assessment by Bollard Acoustical Consultants, Inc. October 17, 2013

Appendix E – Paleontological Assessment by ECORP Consulting Inc. October 28, 2013

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

APPENDIX A

Air Quality/Climate Change Technical Report

AIR QUALITY STUDY

**FOR THE WEST ANTIOCH CREEK
CHANNEL IMPROVEMENT PROJECT**

Prepared for:

ECORP Consulting, Inc.

Prepared by:

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3853 Taylor Road, Suite G
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Project #2610-06

October 21, 2013

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EXECUTIVE SUMMARY

This *Executive Summary* is a brief overview of the analysis presented in this *Air Quality Study*. It is not intended to be a comprehensive description of the analysis. For more details, the reader is referred to the full description presented in this study.

The proposed West Antioch Creek Channel Improvement Project would reduce flood risk in a portion of the City of Antioch, California. The project would involve improvements to West Antioch Creek.

This *Air Quality Study* presents an evaluation of the construction-related and operational impacts of the Proposed Project on the air quality environment.

The project would be located within the San Francisco Bay Area Air Basin (SFBAAB). The project site is designated a nonattainment area for both state and federal ozone standards. The project site is in a nonattainment area for federal and state standards for fine particulate matter smaller than 2.5 microns in diameter (PM_{2.5}). The area is designated attainment or unclassified for inhalable particulate matter smaller than 10 microns in diameter (PM₁₀), carbon monoxide (CO), nitrogen dioxide (NO₂), and sulfur dioxide (SO₂).

Implementation of the West Antioch Creek Channel Improvement Project would result in the generation of short-term construction-related air pollutant emissions. With implementation of mitigation measures, the project is considered to have a less than significant impact on construction-related emissions.

Air quality impacts due to long-term operation of the project were assessed by evaluating criteria pollutant emissions. Operation of the project is considered to have a less-than-significant impact on criteria pollutant air quality.

The project-related effect on CO concentrations was assessed. Because the project would not substantially increase traffic volumes or traffic congestion, the project would not result in a significant impact on CO concentrations.

Impacts associated with toxic air contaminants were assessed. These impacts were found to be less than significant.

An assessment of the effects of the West Antioch Creek Channel Improvement Project on global climate change was conducted. The project-related change in emissions of greenhouse gases was quantified. The project is determined to have a less-than-significant impact on global climate change.

SECTION 1

INTRODUCTION

This *Air Quality Study* has been prepared to assess the air quality impacts of the West Antioch Creek Channel Improvement Project. This study contains information that will be used in the preparation of a California Environmental Quality Act (CEQA) environmental compliance document for this project. The City of Antioch is the CEQA lead agency for the project environmental review.

The purpose of this *Air Quality Study* is to provide documentation of the air quality resources in the project area, and an assessment of the impacts of the project on the air quality environment.

This *Air Quality Study* presents an assessment of the localized air quality impacts of the Proposed Project, the impacts of the project on regional air quality, construction-related impacts of the project, and the impacts on global climate change.

Following this *Introduction* section, this *Air Quality Study* presents a description of:

- the Proposed Project,
- air quality standards and existing air quality conditions,
- short-term construction-related impacts,
- long-term operational impacts,
- local CO impacts,
- impacts associated with toxic air contaminant emissions, and
- impacts on global climate change and greenhouse gases.

SECTION 2

PROJECT DESCRIPTION

The West Antioch Creek Channel Improvement Project (Proposed Project) is located in the City of Antioch, Contra Costa County (**Figure 1**). The Proposed Project would reduce flood risk in the project area by increasing the capacity of the West Antioch Creek channel between West Tenth Street and West Eighth Street and re-establishing the 25 year flood protection capacity of the channel downstream of West Eighth Street to the Burlington Northern Santa Fe (BNSF) railroad trestle.

2.1 PROJECT BACKGROUND

In 1993, the Contra Costa County Flood Control District completed channel improvements for West Antioch Creek (1993 Project). The 1993 Project improved the conveyance capacity of the West Antioch Creek channel, from approximately 200 feet north of the BNSF railroad crossing upstream to approximately West Eighth Street in the City of Antioch, to convey up to the 25-year storm event flows. The 25-year level of protection was the design conveyance criterion for the 1993 Project. The available funding at the time did not allow channel improvements to extend upstream of West Eighth Street. As a result, a 650-foot segment of undersized channel exists between the southern limits of the 1993 Project upstream (approximately West Eighth Street) to the earthen trapezoidal channel on the Antioch fairgrounds property south of West Tenth Street.

This 650-foot segment of West Antioch Creek channel transitions from an earthen trapezoidal channel near the Antioch fairgrounds, to structural plate steel arch culverts under West Tenth Street, then to a 20- to 25-foot wide concrete ditch in the reach of the creek between West Tenth Street and West Eighth Street. This segment of the West Antioch Creek channel has the capacity to convey runoff from an approximately one- to two-year return period storm event. Furthermore, the previously improved channel segment of West Antioch Creek (1993 Project) has significantly diminished capacity due to sediment deposition. As a result, flooding can occur several times a year adjacent to West Antioch Creek near the intersection of West Tenth Street and O Street.

Flooding in this area is a public safety concern and results in property and economic damages. Frequent flooding results in numerous road closures several times a year along the creek. Road closures result in the loss of commercial business which has led major businesses to relocate out of the area. The flooding also impacts the City of Antioch's Public Works maintenance yard. Furthermore, the effort by the City to enforce road closures, fight floodwaters, and to clean up debris after flooding recedes is a drain on the City's resources and budget. The Proposed Project

was developed to increase the capacity of the West Antioch Creek channel to reduce flooding in the area and the impacts that result from it.

2.2 PROJECT INFORMATION

The Proposed Project is intended to reduce flooding in the project area. Currently within the project area the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport for an apartment building, to an earthen channel that continues north to the BNSF railroad trestle.

The Proposed Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and approximately West Eighth Street. Project work in Reach B (desilting) would desilt the channel from approximately West Eighth Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity (**Figure 2**). Either reach can be improved independently from the other or concurrently, but work in both reaches must be conducted to realize improved levels of flood protection.

2.2.1 Reach A – Conveyance Improvements

Five alternatives were proposed for Reach A (conveyance). All alternatives would use pre-cast concrete box culverts under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to approximately West Eighth Street. The City of Antioch evaluated all Reach A alternatives based on the following criteria: hydraulics, property acquisition feasibility and cost, permanent property impacts, mitigation potential, permitting feasibility, and construction cost.

Of the five alternative evaluated, the City's preferred alternative is referred to as Alternative 3. Alternative 3 would increase the capacity of the channel to convey the 25-year storm event flows thus reducing flooding in the area, provide a feasible regulatory permitting process, and is the most cost-effective alternative. Therefore, Reach A would implement Alternative 3. This *Air Quality Study* will evaluate the environmental impacts of implementing Alternative 3. **Figure 3** shows features of Alternative 3 in Reach A.

2.2.2 Reach B – Desilting

Project work in Reach B (desilting) would include the removal of accumulated sediment from the earthen channel from West Eighth Street downstream to approximately 200 feet north of the BNSF railroad trestle to restore design capacity (**Figure 4**). Approximately 3,000 linear feet of channel would be desilted. Approximately 30,000 cubic yards of sediment accumulated since the completion of the 1993 Project would be removed from the channel to re-establish the 1993 Project design contours, restoring the design capacity of the channel to convey the 25-year storm event flows. Depending on the characterization of the material that is removed, it would be disposed at Jersey Island for use in levee buttress construction, Ironhouse Sanitary District's

Wastewater Treatment Plant, Keller Canyon Landfill or another suitable facility. In addition to sediment, the Proposed Project would remove approximately 7,580 cubic yards of decomposed marsh vegetation, which would be disposed of at Jersey Island, Keller Canyon Landfill, or a suitable nearby composting facility.

2.2.3 Project Implementation

The Proposed Project is the implementation of conveyance improvements in Reach A and the desilting of Reach B. These channel reaches have been further divided into sub-reaches based on anticipated construction techniques (**Figure 2**). Implementation of the Proposed Project is anticipated to include the following steps at each sub-reach.

Reach A – Alternative 3. The following is a description of the sub-reaches in Reach A.

Sub-Reach A-1 (culvert construction across West Tenth Street). Access to the channel during construction of Sub-Reach A-1 would be from 1400 West Tenth Street (west of the channel) and through the Antioch Fairgrounds (south of West Tenth Street). To construct the culvert across West Tenth Street a cofferdam, sump, and bypass pipe would be installed upstream of the Proposed Project. During culvert construction, summer flows from the channel would be piped downstream to West Eighth Street. Traffic access across West Tenth Street, from approximately 200 feet west of West Antioch Creek to O Street, would be temporarily restricted to through traffic.

The existing roadway would then be demolished and the existing steel arch culverts would be removed and replaced with four side by side pre-cast concrete box culverts. Once the culverts are constructed the creek bypass pipe would be relocated through the new pre-cast concrete box culverts. An eight-inch sewer pipe and water connection to the Antioch Fairgrounds would be relocated as a result of construction. A cast-in-place culvert inlet structure would be constructed just south of West Tenth Street. The pre-cast concrete box culverts would then be back-filled and West Tenth Street would be reconstructed, repaved, and reopened for traffic.

Sub-Reach A-2 (culvert and/or earthen channel construction from north side of West Tenth Street to West Eighth Street). The bypass piping of summer creek flows from the construction of Sub-Reach A-1 would continue through the construction of Sub-Reach A-2. Access to the channel during construction of Sub-Reach A-2 would be from 1400 West Tenth Street (west of the channel), from West Sixth Street (east of channel), and from the south from within the channel.

The existing timber ditch cover, concrete channel, and paved parking at 1400 West Tenth Street would be demolished and removed. Soils would be excavated and a cast-in-place concrete culvert discharge structure would be constructed at the end of the pre-cast concrete box culverts on the north side of West Tenth

Street. Excavation and shaping of the earthen channel would then occur from the discharge concrete structure downstream to West Eighth Street. Wet or contaminated soils would be stockpiled and aerated adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Rip rap erosion barriers would be installed and the top of bank areas, slopes, and channel bottom would be revegetated. Construction would occur over two to three months.

Reach B – Implementation of Desilting. Sub-Reaches B-1, B-2, B-3, and B-4 could be excavated in any order, or concurrently. Excavation could occur concurrent with or in sequence with construction of Reach A. Creek water bypass pumping would be implemented from the cofferdam at the upstream end of Reach A, and pumped to the existing storm drain outfall at the southwest corner of the Antioch Marina, approximately 1,000 feet east of the BNSF railroad trestle. Other bypass methods may be considered. Bypass pumping or gravity conveyance would also be implemented at any drainage inlets to the creek.

The following is a description of the sub-reaches in Reach B.

Sub-Reach B-1 (West Eighth Street to West Fourth Street). Access to the channel during the desilting of Sub-Reach B-1 would be from West Sixth Street, West Fourth Street, and O Street. Mudcats and excavators would be used to remove accumulated silt from the channel to re-establish the 1993 Project design contours. Wet or contaminated soils would be stockpiled and aerated adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Front end loaders would be used to handle and load the silt into double transfer tractor-trailer rigs for hauling off to a disposal site. Top of bank areas, slopes, and channel bottom would be revegetated. Construction would occur over four months.

Sub-Reach B-2 (West Fourth Street to end of concrete channel). Access to the channel during the desilting of Sub-Reach B-2 would be through 1500 West Fourth Street (Antioch Historical Society), 1400 West Fourth Street (north of West Fourth Street), and 1700 West Fourth Street (east side of channel). A cofferdam would be constructed at the BNSF railroad trestle to isolate the work area from the marsh to the north. The work area would then be dewatered by digging a sump and installing dewatering pumps and a conveyance pipeline to the Antioch Marina storm drain outfall or other appropriate outfall location. Mudcats and excavators would then be used to remove accumulated silt and decaying vegetative material from the channel to re-establish the 1993 Project design contours. Wet or contaminated soils would be stockpiled and aerated adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Front end loaders would be used to handle and load the silt into double transfer tractor-trailer rigs for hauling off to a disposal site. Construction would occur over two months.

Sub-Reach B-3 (End of concrete channel to BNSF Railroad Trestle). Access to the channel during the desilting of Sub-Reach B-3 would be through 1500 West Fourth Street (Antioch Historical Society), 1400 West Fourth Street (north of West Fourth Street), and 1700 West Fourth Street (east side of channel). Mudcats and excavators would then be used to remove accumulated silt and decaying vegetative material from the channel to re-establish the 1993 Project design contours. Wet or contaminated soils would be stockpiled and aerated adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Front end loaders would be used to handle and load the silt into double transfer tractor-trailer rigs for hauling off to a disposal site. Construction would occur over four months.

Sub-Reach B-4 (BNSF Railroad Trestle to 200 feet north). Access to the channel during the desilting of Sub-Reach B-4 would be from the north of the BNSF railroad tracks, using the BNSF right-of-way between Sub-Reach B-4 and L Street. A silt/sediment barrier and cofferdam would be installed between the work area and the marsh to north. The work area would then be dewatered by digging a sump and installing dewatering pumps and a conveyance pipeline to the Antioch Marina storm drain outfall or other appropriate outfall. Mudcats and excavators would then be used to remove accumulated silt and decaying vegetative material from the channel to re-establish the 1993 Project design contours. Wet or contaminated soils would be stockpiled and aerated adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Front end loaders would be used to handle and load the silt into double transfer tractor-trailer rigs for hauling off to a disposal site. Construction would occur over three months.

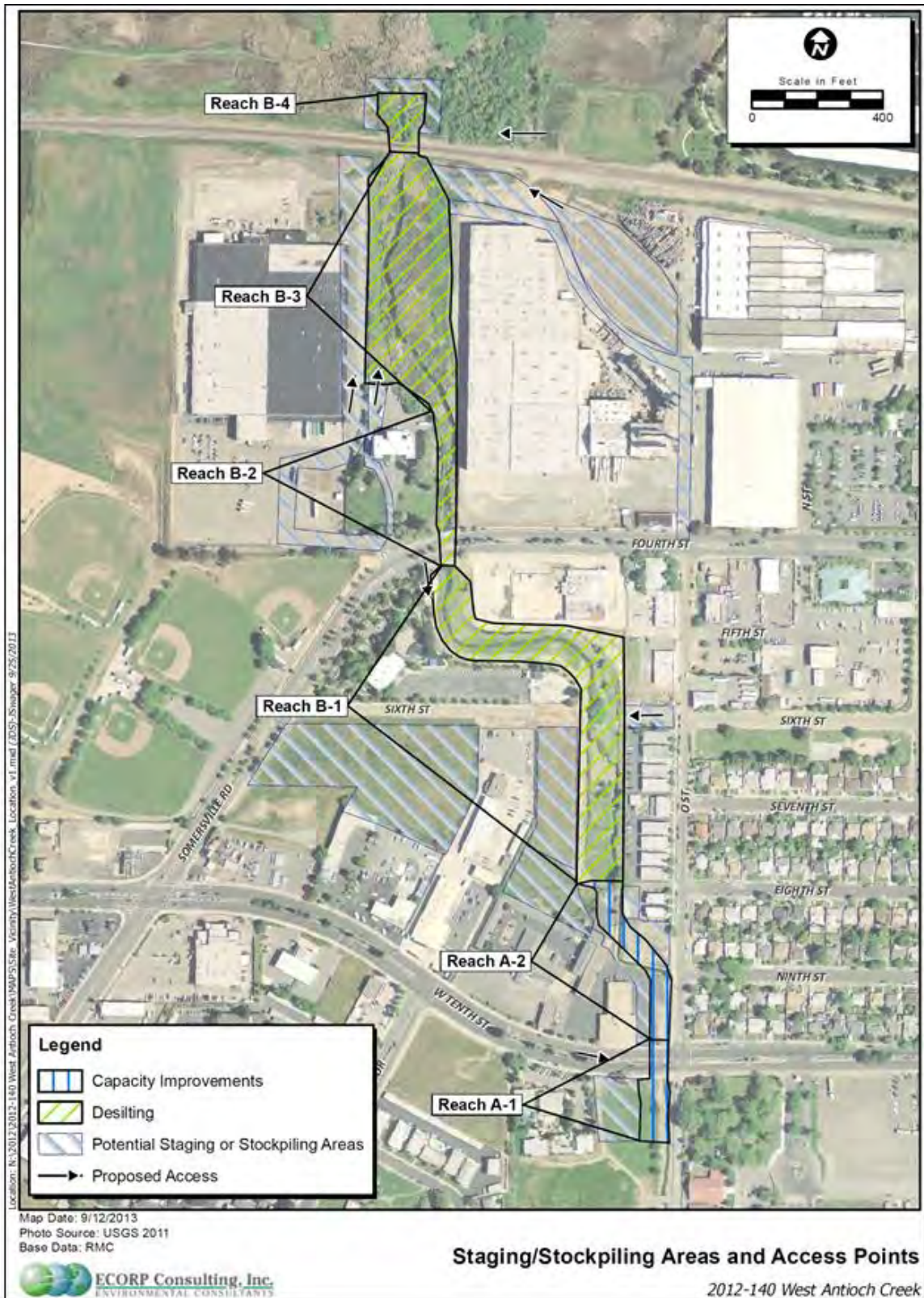
2.2.4 Soil Hauling and Disposal

Clean soils would be disposed of at Jersey Island, Ironhouse Sanitary District treatment plant site, Keller Canyon Landfill, or suitable nearby facility. Wet or contaminated soils would be stockpiled and aerated (bulldozers would turn over and aerate soil) adjacent to the project site to remove moisture to a point suitable for hauling off to a disposal site. Soils would be tested and if contaminated would be hauled away for disposal at a suitably licensed facility. Decaying vegetative material would be disposed of at Keller Canyon landfill, Jersey Island, or a suitable nearby facility.

2.2.5 Construction Schedule

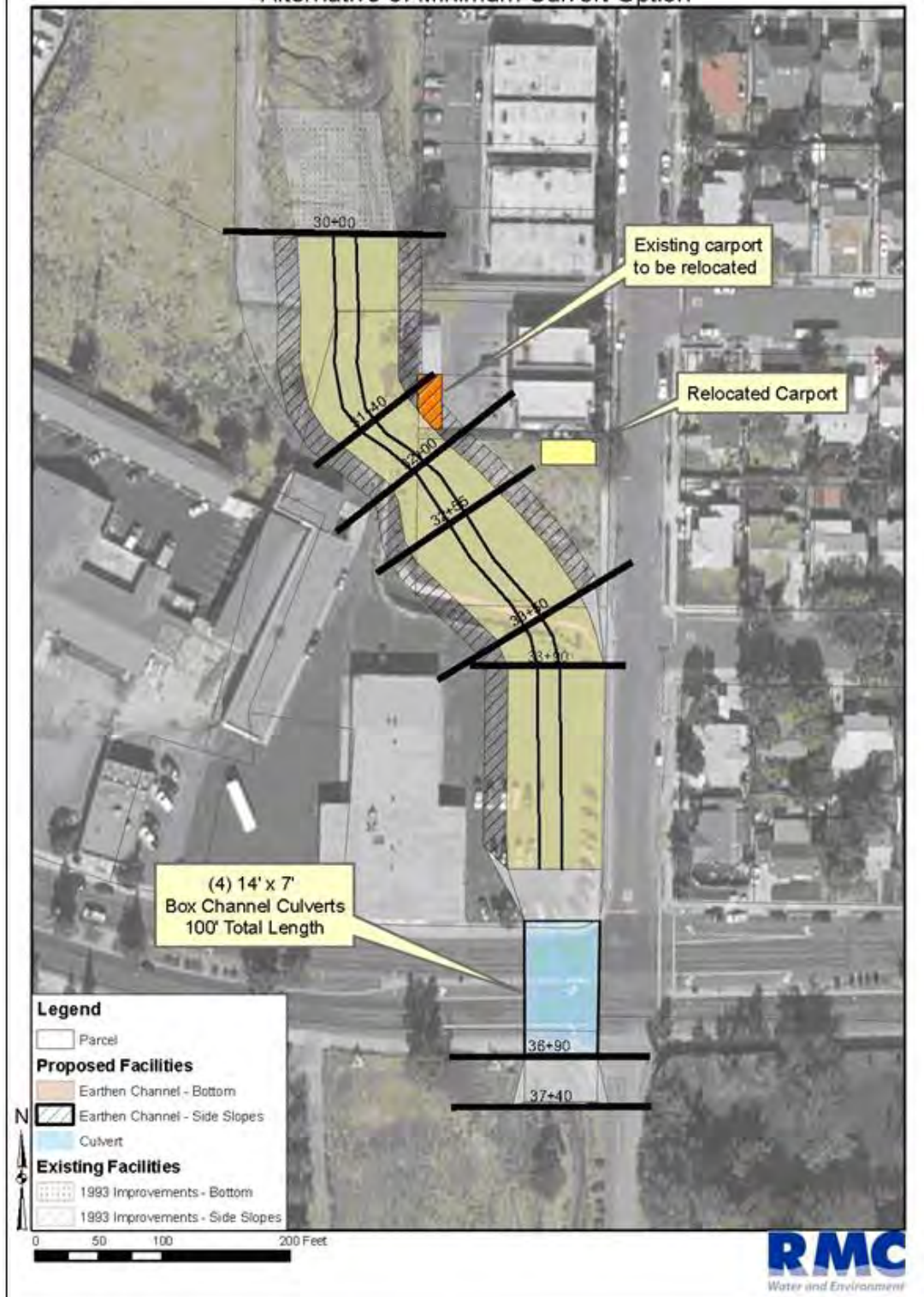
Construction would occur from 7:30 a.m. to 4:30 p.m. during weekdays with the potential for weekend work. Construction crew size would be 25 people for Reach A and 30 people for Reach B.

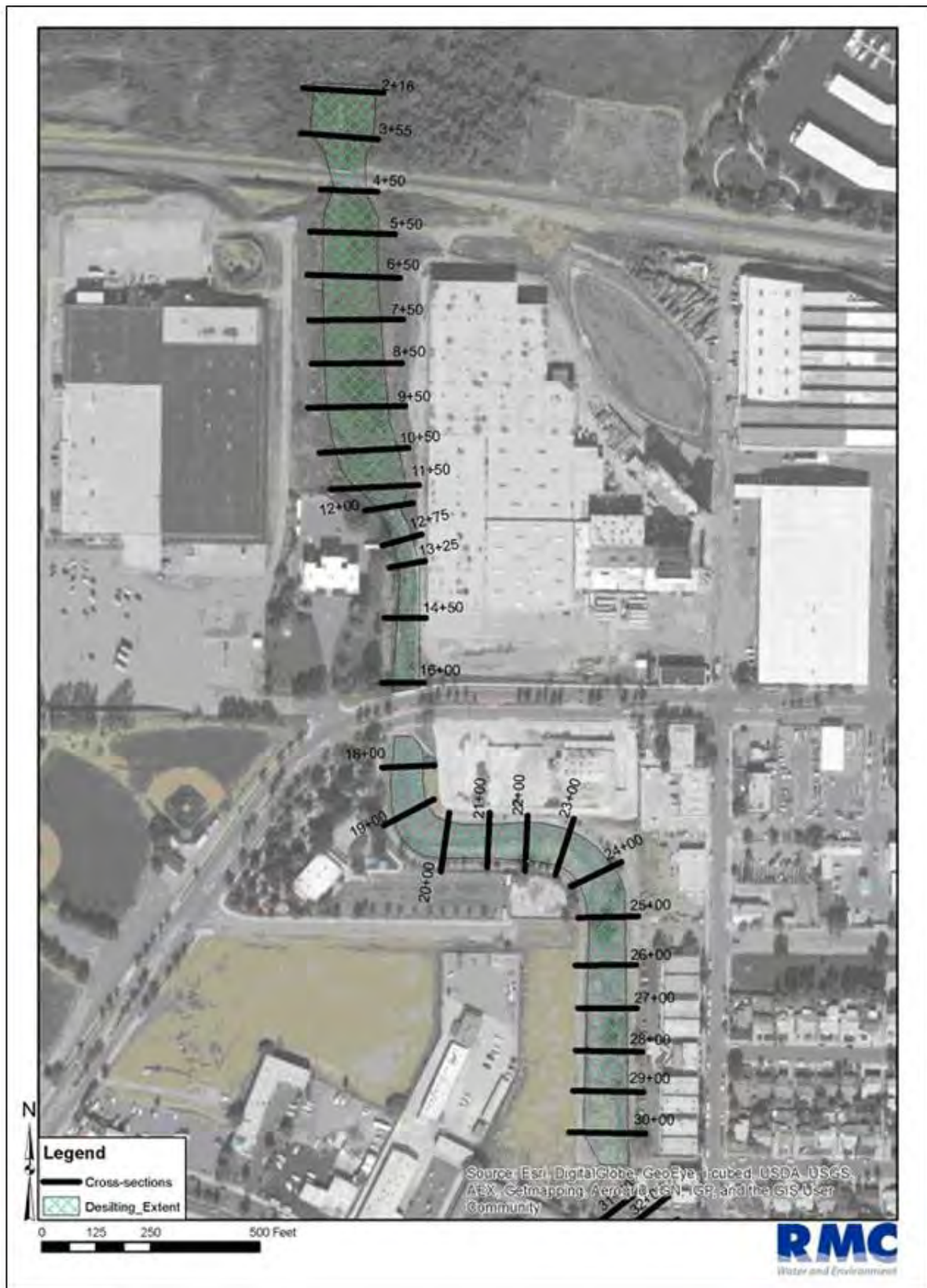




PROJECT STAGING/STOCKPILING AREAS AND ACCESS POINTS

West Antioch Creek
Alternative 3: Minimum Culvert Option





REACH B DESILTING EXTENT

SECTION 3

AIR QUALITY STANDARDS AND EXISTING CONDITIONS

The following is a description of ambient air quality standards and existing air quality conditions in the West Antioch Creek Channel Improvement Project study area.

3.1 AIR POLLUTANTS AND AMBIENT STANDARDS

Both the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board (ARB) have established ambient air quality standards for common pollutants. These ambient air quality standards indicate levels of contaminants that represent safe levels, to avoid specific adverse health effects associated with each pollutant. The ambient air quality standards cover what are called “criteria” pollutants because the health and other effects of each pollutant are described in criteria documents. The federal and state ambient air quality standards are presented in **Table 1**. The federal and state ambient standards were developed independently with differing purposes and methods, although both processes attempted to avoid health-related effects. As a result, the federal and state standards differ in some cases. In general, the California state standards are more stringent, as is the case for ozone, PM₁₀, and PM_{2.5}.

There are three basic designation categories: nonattainment, attainment, and unclassified. A “nonattainment” designation indicates that the air quality violates an ambient air quality standard. Although a number of areas may be designated as nonattainment for a particular pollutant, the severity of the problem can vary greatly. To identify the severity of the problem and the extent of planning required, nonattainment areas are assigned a classification that is commensurate with the severity of their air quality problem (e.g., moderate, serious, severe). In contrast to nonattainment, an “attainment” designation indicates that the air quality does not violate the established standard. Finally, an “unclassified” designation indicates that there are insufficient data for determining attainment or nonattainment. EPA combines unclassified and attainment into one designation for ozone, CO, PM₁₀ and PM_{2.5}.

3.2 POLLUTANTS OF CONCERN

For projects similar to the West Antioch Creek Channel Improvement Project, criteria pollutants that are of greatest concern are ozone, particulate matter, and CO. In addition, this *Air Quality Study* presents an analysis of the project-related effects on global climate change.

Table 1. Ambient Air Quality Standards

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards ¹		National Standards ²		
		Concentration ³	Method ⁴	Primary ^{3,5}	Secondary ^{3,6}	Method ⁷
Ozone (O ₃)	1 Hour	0.09 ppm (180 µg/m ³)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m ³)		0.075 ppm (147 µg/m ³)		
Respirable Particulate Matter (PM10) ⁸	24 Hour	50 µg/m ³	Gravimetric or Beta Attenuation	150 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m ³		—		
Fine Particulate Matter (PM2.5) ⁸	24 Hour	—	—	35 µg/m ³	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m ³	Gravimetric or Beta Attenuation	12.0 µg/m ³	15 µg/m ³	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m ³)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m ³)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m ³)		9 ppm (10 mg/m ³)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m ³)		—	—	
Nitrogen Dioxide (NO ₂) ⁹	1 Hour	0.18 ppm (339 µg/m ³)	Gas Phase Chemiluminescence	100 ppb (188 µg/m ³)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m ³)		0.053 ppm (100 µg/m ³)	Same as Primary Standard	
Sulfur Dioxide (SO ₂) ¹⁰	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	—	Ultraviolet Fluorescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m ³)	
	24 Hour	0.04 ppm (105 µg/m ³)		0.14 ppm (for certain areas) ¹⁰	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas) ¹⁰	—	
Lead ^{11,12}	30 Day Average	1.5 µg/m ³	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m ³ (for certain areas) ¹²	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m ³		
Visibility Reducing Particles ¹³	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m ³	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m ³)	Ultraviolet Fluorescence			
Vinyl Chloride ¹¹	24 Hour	0.01 ppm (26 µg/m ³)	Gas Chromatography			

See footnotes on next page ...

See footnotes on next page ...

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (6/4/13)

Table 1. Ambient Air Quality Standards (Continued)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above $150 \mu\text{g}/\text{m}^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr: ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On December 14, 2012, the national annual PM2.5 primary standard was lowered from $15 \mu\text{g}/\text{m}^3$ to $12.0 \mu\text{g}/\text{m}^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at $35 \mu\text{g}/\text{m}^3$, as was the annual secondary standard of $15 \mu\text{g}/\text{m}^3$. The existing 24-hour PM10 standards (primary and secondary) of $150 \mu\text{g}/\text{m}^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
9. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
10. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
11. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
12. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard ($1.5 \mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
13. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB-PIO at (916) 322-2990

California Air Resources Board (6/4/13)

3.2.1 Ozone

Prior to 2005, both state and federal standards for ozone were set for a one-hour averaging time. The state ozone standard is 0.09 parts per million (ppm), not to be exceeded. The federal one-hour standard was 0.12 ppm and was not to be exceeded more than three times in any three-year period. A federal eight-hour standard for ozone was issued in July 1997 by Executive Order of the President. The eight-hour ozone standard has been set at a concentration of 0.075 ppm ozone measured over eight hours.

As of June 15, 2005, the federal one-hour ozone standard was revoked. In setting the eight-hour ozone standard, EPA concluded that replacing the existing one-hour standard with an eight-hour standard was appropriate to provide adequate and more uniform protection of public health from both short-term (one to three hours) and prolonged (six to eight hours) exposures to ozone.

Ozone is not emitted directly into the air, but is formed by a photochemical reaction in the atmosphere. Ozone precursors, which include reactive organic compounds (ROG) and nitrogen oxides (NO_x), react in the atmosphere in the presence of sunlight to form ozone. Because photochemical reaction rates depend on the intensity of ultraviolet light and air temperature, ozone is primarily a summer air pollution problem. Ozone is a respiratory irritant and an oxidant that increases susceptibility to respiratory infections and can cause substantial damage to vegetation and other materials. Once formed, ozone remains in the atmosphere for one or two days. It is then eliminated through chemical reaction with plants and by rainout and washout.

3.2.2 Particulate Matter

State and federal standards for particulate matter are based on micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) for a 24-hour average and as an annual geometric mean.

PM_{10} is sometimes referred to as “inhalable particulate matter” or “respirable particulate matter”. The state standards for PM_{10} are $50 \mu\text{g}/\text{m}^3$ 24-hour average, and $20 \mu\text{g}/\text{m}^3$ annual geometric mean. The federal PM_{10} standard is a 24-hour average of $150 \mu\text{g}/\text{m}^3$.

A federal standard for particulate matter less than 2.5 microns in diameter ($\text{PM}_{2.5}$) was issued in July 1997 by Executive Order of the President. $\text{PM}_{2.5}$ is sometimes referred to as “fine particulate matter”. The $\text{PM}_{2.5}$ standard has been set at a concentration of $15 \mu\text{g}/\text{m}^3$ annually and $35 \mu\text{g}/\text{m}^3$ daily. The federal standards for PM_{10} are being maintained so that relatively larger, courser particulate matter continues to be regulated. The state $\text{PM}_{2.5}$ standard is an annual average of $12 \mu\text{g}/\text{m}^3$.

PM_{10} and $\text{PM}_{2.5}$ can reach the lungs when inhaled, resulting in health concerns related to respiratory disease. Suspended particulate matter can also affect vision or contribute to eye irritation. PM_{10} can remain in the atmosphere for up to seven days before removal by gravitational settling, rainout and washout.

3.2.3 Carbon Monoxide

State and federal CO standards have been set for both one-hour and eight-hour averaging times. The state one-hour standard is 20 ppm by volume, while the federal one-hour standard is 35 ppm. Both state and federal standards are 9 ppm for the eight-hour averaging period. CO is a public health concern because it combines readily with hemoglobin and thus reduces the amount of oxygen transported in the bloodstream.

Motor vehicles are the dominant source of CO emissions in most areas. High CO levels develop primarily during winter when periods of light winds combine with the formation of ground level temperature inversions (typically from the evening through early morning). These conditions result in reduced dispersion of vehicle emissions. Motor vehicles also exhibit increased CO emission rates at low air temperatures.

3.2.4 Greenhouse Gases

The average surface temperature of the Earth has risen by about one degree Fahrenheit in the past century, with most of that occurring during the past two decades (World Meteorological Organization, 2005). There is evidence that most of the warming over the last 50 years is due to human activities. Human activities, such as energy production and internal combustion vehicles, have increased the amount of climate-changing gases in the atmosphere, which in turn is causing the Earth's average temperature to rise. Rises in average temperature are leading to changes in climate patterns, shrinking polar ice caps and a rise in sea level, with a host of corresponding impacts to humans and ecosystems.

Gases which affect global climate are referred to as greenhouse gases (GHG). Greenhouse gases are atmospheric gases that act as global insulators by reflecting visible light and infrared radiation back to Earth. Some GHG, such as water vapor, carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), occur naturally and are emitted to the atmosphere through natural processes. Although CO₂, CH₄, and N₂O occur naturally in the atmosphere, human activities have changed their atmospheric concentrations. From 1750 to 2004, concentrations of CO₂, CH₄, and N₂O have increased globally by 35, 143, and 18 percent, respectively. Other greenhouse gases, such as fluorinated gases, are created and emitted solely through human activities. (U.S. Environmental Protection Agency 2006)

The principal GHG that enter the atmosphere because of human activities are CO₂, CH₄, N₂O, and fluorinated gases. Carbon dioxide is the gas that is most commonly referenced when discussing climate change because it is the most commonly emitted gas. While some of the less common gases do make up less of the total GHG emitted to the atmosphere, some have more effect per molecule than CO₂.

Carbon Dioxide. The natural production and absorption of CO₂ is achieved through the terrestrial biosphere and the ocean. However, humankind has altered the natural carbon cycle by burning coal, oil, natural gas, and wood. Since the industrial revolution began in the mid-1700s, each of these activities has increased in scale and distribution. Carbon dioxide was the first GHG demonstrated to be increasing in atmospheric concentration, with the first conclusive

measurements being made in the last half of the 20th Century. Prior to the industrial revolution, concentrations were fairly stable at 280 ppm. Today, they are around 370 ppm, an increase of well over 30 percent (U.S. Environmental Protection Agency 2006). Left unchecked, the concentration of CO₂ in the atmosphere is projected to increase to a minimum of 535 ppm by 2100 as a direct result of anthropogenic (manmade) sources. This could result in an average global temperature rise of at least two degrees Celsius (Intergovernmental Panel on Climate Change 2007). The California Energy Commission (CEC) estimates that CO₂ emissions account for 84 percent of California's anthropogenic GHG emissions, nearly all of which is associated with fossil fuel combustion (California Energy Commission 2005).

Methane. Methane is an extremely effective absorber of radiation, though its atmospheric concentration is less than CO₂ and its lifetime in the atmosphere is brief (10 – 12 years), compared to some other GHG (such as CO₂, N₂O, and chlorofluorocarbons). Methane has both natural and anthropogenic sources. Landfills, natural gas distribution systems, agricultural activities, fireplaces and wood stoves, stationary and mobile fuel combustion, and gas and oil production fields categories are the major sources of these emissions (U.S. Environmental Protection Agency 2006). The CEC estimates that CH₄ emissions from various sources represent 6.2 percent of California's total GHG emissions (California Energy Commission 2005).

Nitrous Oxide. Concentrations of N₂O also began to rise at the beginning of the industrial revolution. Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizers that contain nitrogen. Use of these fertilizers has increased over the last century. Global concentration for N₂O in 1998 was 314 parts per billion (ppb), and in addition to agricultural sources for the gas, some industrial processes (fossil fuel fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load (U.S. Environmental Protection Agency 2006). The CEC estimates that N₂O emissions from various sources represent 6.6 percent of California's total GHG emissions (California Energy Commission 2005).

Fluorinated Gases. Fluorinated gases, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆), are powerful GHG emissions that are emitted from a variety of industrial processes. Fluorinated gases are occasionally used as substitutes for ozone-depleting substances such as chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), and halons, which have been regulated since the mid-1980s because of their ozone destroying potential. Fluorinated gases are typically emitted in smaller quantities than CO₂, CH₄, and N₂O, but each molecule can have a much greater global warming effect. Therefore, fluorinated gases are sometimes referred to as High Global Warming Potential (GWP) gases (U.S. Environmental Protection Agency 2006). The primary sources of fluorinated gas emissions in the United States include the production of HCFC-22 electrical transmission and distribution systems, semiconductor manufacturing, aluminum production, magnesium production and processing, and substitution for ozone-depleting substances. The CEC estimates that fluorinated gas emissions from various sources represent 3.4 percent of California's total GHG emissions (California Energy Commission 2005).

3.3 AIR QUALITY MONITORING

Table 2 presents air quality monitoring data for ozone and CO. **Table 3** presents monitoring data for PM₁₀, and PM_{2.5}. Data for the latest available three-year period (2010 through 2012) are presented for the monitoring stations closest to the project site.

Table 2 shows recent exceedances of the state and federal ozone air quality standards, and shows no recent exceedances of the state or federal CO standards. **Table 3** shows recent exceedances of the state PM₁₀ standard and the federal PM_{2.5} standard.

3.4 ATTAINMENT DESIGNATIONS

The current air quality attainment designations for the SFBAAB are summarized in **Table 4**.

As shown in **Table 4**, the SFBAAB is designated nonattainment for the state and federal ozone standards.

The SFBAAB is designated nonattainment for the state PM₁₀ standard, and unclassifiable for the federal PM₁₀ standard. The air basin is designated nonattainment for both the state and federal PM_{2.5} standards.

The SFBAAB is designated either attainment or unclassified for the remaining federal and state air quality standards.

3.5 EMISSIONS INVENTORY

Table 5 presents estimates of emissions currently generated in Contra Costa County. The information presented in **Table 5** is divided into emission source categories. **Table 6** presents a forecast of emissions expected to be generated in Contra Costa County in the year 2020. Like **Table 6**, the information presented in **Table 6** is divided into emission source categories.

For current emissions, shown in **Table 5**, the major source category that generates the largest amount of ROG, CO, and NO_x emissions in Contra Costa County is On-Road Motor Vehicles. For current emissions, the major source category that generates the largest amount of PM₁₀ and PM_{2.5} emissions in Contra Costa County is Miscellaneous Processes. The largest subcategory within this category is Paved Road Dust.

Table 2. Ozone and Carbon Monoxide Air Quality Monitoring Results

Pollutant Type, Station and Measurement	Pollutant Concentration by Year			
	Air Quality Standard	2010	2011	2012
Ozone at Bethel Island Road Monitoring Station				
Highest 1-Hour Average (parts per million)	0.09	0.106	0.091	0.098
Second Highest 1-Hour Average (parts per million)	(State)	0.102	0.091	0.090
Highest 8-Hour Average (parts per million)	0.070	0.086	0.078	0.087
Second Highest 8-Hour Average (parts per million)	(State)	0.083	0.077	0.079
Carbon Monoxide at Bethel Island Road Monitoring Station				
Highest 8-Hour Average (parts per million)	9.0	0.83	0.95	0.89
Second Highest 8-Hour Average (parts per million)	(State)	0.79	0.89	0.78
<hr/> Source: California Air Resources Board website: http://www.arb.ca.gov/ Note: Data are for the monitoring station closest to the project site.				

Table 3. Particulate Matter Air Quality Monitoring Results

Pollutant Type, Station and Measurement	Pollutant Concentration by Year			
	Air Quality Standard	2010	2011	2012
Inhalable Particulate Matter (PM₁₀) at Bethel Island Road Monitoring Station				
Highest 24-Hour Average (micrograms/cubic meter)	50	69.6	49.5	52.3
Second Highest 24-Hour Average (micrograms/cubic meter)	(State)	46.2	45.8	31.4
Annual Average (micrograms/cubic meter)	20 (State)	18.7	17.9	14.1
Fine Particulate Matter (PM_{2.5}) at Concord 2975 Treat Boulevard Monitoring Station				
Highest 24-Hour Average (micrograms/cubic meter)	35	36.4	47.5	32.2
Second Highest 24-Hour Average (micrograms/cubic meter)	(Federal)	35.0	39.7	30.0
Annual Average (micrograms/cubic meter)	12 (State)	7.1	7.9	6.6
<hr/> Source: California Air Resources Board website: http://www.arb.ca.gov/ Note: Data are for monitoring station closest to the project site.				

Table 4. Air Quality Attainment Status Designations for San Francisco Bay Area Air Basin

Pollutant	State Standards¹	National Standards²
Ozone	Nonattainment (Serious)	Nonattainment
Carbon Monoxide	Attainment	Unclassifiable/Attainment
Nitrogen Dioxide	Attainment	Unclassifiable/Attainment
Sulfur Dioxide	Attainment	Attainment
Inhalable Particulate Matter (PM ₁₀)	Nonattainment	Unclassifiable
Fine Particulate Matter (PM _{2.5})	Nonattainment	Nonattainment
Sulfates	Attainment	N/A
Lead	Attainment	N/A
Hydrogen Sulfide	Unclassified	N/A
Visibility Reducing Particles	Unclassified	N/A
<p>Notes: N/A – not applicable, standard does not exist for the pollutant.</p> <p>¹ Unclassified: a pollutant is designated unclassified if the data are incomplete and do not support a designation of attainment or nonattainment. Attainment: a pollutant is designated attainment if the state standard for that pollutant was not violated at any site in the area during a 3-year period. Nonattainment: a pollutant is designated nonattainment if there was a least one violation of a state standard for that pollutant in the area.</p> <p>² Nonattainment: any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard for the pollutant. Attainment: any area that meets the national primary or secondary ambient air quality standard for the pollutant. Unclassifiable: any area that cannot be classified on the basis of available information as meeting or not meeting the national primary or secondary ambient air quality standard or the pollutant.</p> <p>Source: Bay Area Air Quality Management District 2012 and Bay Area Air Quality Management District 2013</p>		

Table 5. Contra Costa County Emissions Inventory for 2008

Emission Category	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Inhalable Particulate Matter (PM₁₀)	Fine Particulate Matter (PM_{2.5})
<u>Fuel Combustion</u>					
Electric Utilities	0.07	1.11	1.05	0.10	0.09
Cogeneration	0.11	1.08	2.02	0.48	0.47
Oil and Gas Production (Combustion)	0.00	0.01	0.04	0.00	0.00
Petroleum Refining (Combustion)	0.91	5.64	9.97	1.36	1.34
Manufacturing and Industrial	0.01	0.14	0.37	0.01	0.01
Food and Agricultural Processing	0.01	0.04	0.11	0.00	0.00
Service and Commercial	0.60	5.19	4.37	0.98	0.98
Other (Fuel Combustion)	0.04	0.15	0.38	0.03	0.03
Subtotal	1.75	13.36	18.31	2.96	2.92
<u>Waste Disposal</u>					
Sewage Treatment	0.05	0.01	0.12	0.00	0.00
Landfills	0.34	--	--	--	--
Incinerators	0.11	0.14	0.03	0.01	0.01
Soil Remediation	0.01	--	--	0.00	0.00
Other (Waste Disposal)	0.66	--	--	--	--
Subtotal	1.17	0.15	0.15	0.01	0.01
<u>Cleaning and Surface Coatings</u>					
Laundering	0.00	--	--	--	--
Degreasing	0.30	--	--	--	--
Coatings and Related Process Solvents	1.65	--	--	--	--
Printing	0.33	--	--	--	--
Adhesives and Sealants	0.91	--	--	--	--
Other (Cleaning and Surface Coating)	0.05	--	--	--	--
Subtotal	3.24	--	--	--	--
<u>Petroleum Production and Marketing</u>					
Oil and Gas Production	0.09	--	0.00	--	--
Petroleum Refining	5.77	0.21	0.60	0.68	0.62
Petroleum Marketing	5.04	--	--	--	--
Other (Petroleum Production and Marketing)	0.02	--	--	--	--
Subtotal	10.92	0.21	0.60	0.68	0.62
<u>Industrial Processes</u>					
Chemical	1.11	0.13	0.20	0.34	0.33
Food and Agriculture	0.20	0.24	0.02	0.09	0.05
Mineral Processes	0.37	0.25	1.89	1.00	0.44
Metal Processes	0.04	0.05	0.15	0.04	0.03
Wood and Paper	--	--	--	0.00	0.00
Electronics	0.01	--	--	0.00	--
Other (Industrial Processes)	1.19	0.60	0.07	0.24	0.20
Subtotal	2.92	1.27	2.33	1.71	1.05

Table 5. Contra Costa County Emissions Inventory for 2008 (Continued)

Emission Category	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Inhalable Particulate Matter (PM ₁₀)	Fine Particulate Matter (PM _{2.5})
<u>Solvent Evaporation</u>					
Consumer Products	6.43	--	--	--	--
Architectural Coatings & Related Process Solvents	3.39	--	--	--	--
Pesticides/Fertilizers	0.13	--	--	--	--
Asphalt Paving / Roofing	0.24	--	--	--	--
Subtotal	10.19	--	--	--	--
<u>Miscellaneous Processes</u>					
Residential Fuel Combustion	2.39	40.69	2.63	5.76	5.55
Farming Operations	0.79	--	--	1.70	0.90
Construction and Demolition	--	--	--	5.02	0.50
Paved Road Dust	--	--	--	11.83	1.77
Unpaved Road Dust	--	--	--	0.98	0.10
Fugitive Windblown Dust	--	--	--	0.68	0.12
Fires	0.03	0.45	0.01	0.03	0.03
Managed Burning and Disposal	0.08	1.70	0.07	0.23	0.22
Cooking	0.10	--	--	0.49	0.30
Other (Miscellaneous Processes)	0.01	0.16	0.01	0.13	0.08
Subtotal	3.40	43.00	2.72	26.85	9.57
<u>On-Road Motor Vehicles</u>					
Light Duty Vehicles	12.74	126.08	12.32	0.90	0.55
Medium Duty Trucks	0.83	10.60	1.58	0.11	0.07
Heavy Duty Trucks	1.74	12.84	13.44	0.44	0.39
Motorcycles	1.39	13.27	0.36	0.01	0.01
Buses	0.12	1.15	2.12	0.05	0.04
Motor Homes	0.05	1.36	0.21	0.00	0.00
Subtotal	16.87	165.30	30.03	1.51	1.06
<u>Other Mobile Sources</u>					
Aircraft	0.05	1.16	0.01	0.00	0.00
Trains	0.21	0.57	2.73	0.07	0.06
Ocean Going Vessels	0.15	0.31	3.74	0.50	0.49
Commercial Harbor Craft	0.08	0.32	1.11	0.05	0.04
Recreational Boats	3.50	21.07	1.03	0.17	0.13
Off-Road Recreational Vehicles	0.18	0.88	0.01	0.00	0.00
Off-Road Equipment	5.66	41.28	17.72	1.02	0.92
Farm Equipment	0.14	0.77	0.68	0.04	0.04
Fuel Storage and Handling	0.68	--	--	--	--
Subtotal	10.65	66.36	27.03	1.85	1.68
COUNTY TOTAL	61.09	289.57	81.16	35.60	16.90
Notes: 2008 is the latest inventory available from the California Air Resources Board (CARB). All values are in tons per day. Dashes ("--") indicate no data are available. The sum of values may not equal total shown due to rounding. Source: CARB website: http://arb.ca.gov					

Table 6. Contra Costa County Emissions Forecast for 2020

Emission Category	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Inhalable Particulate Matter (PM₁₀)	Fine Particulate Matter (PM_{2.5})
<u>Fuel Combustion</u>					
Electric Utilities	0.07	1.27	1.18	0.11	0.11
Cogeneration	0.13	1.21	2.28	0.54	0.54
Oil and Gas Production (Combustion)	0.00	0.01	0.04	0.00	0.00
Petroleum Refining (Combustion)	1.02	6.43	11.25	1.54	1.51
Manufacturing and Industrial	0.01	0.16	0.41	0.01	0.01
Food and Agricultural Processing	0.00	0.03	0.05	0.00	0.00
Service and Commercial	0.71	6.17	5.17	1.17	1.17
Other (Fuel Combustion)	0.02	0.12	0.27	0.03	0.03
Subtotal	1.96	15.40	20.65	3.40	3.37
<u>Waste Disposal</u>					
Sewage Treatment	0.05	0.01	0.14	0.00	0.00
Landfills	0.23	--	--	--	--
Incinerators	0.11	0.14	0.03	0.01	0.01
Soil Remediation	0.01	--	--	0.00	0.00
Other (Waste Disposal)	0.66	--	--	--	--
Subtotal	1.06	0.15	0.17	0.01	0.01
<u>Cleaning and Surface Coatings</u>					
Laundering	0.00	--	--	--	--
Degreasing	0.33	--	--	--	--
Coatings and Related Process Solvents	1.87	0.00	0.00	--	--
Printing	0.36	0.00	0.01	--	--
Adhesives and Sealants	0.93	--	--	--	--
Other (Cleaning and Surface Coating)	0.06	--	--	--	--
Subtotal	3.55	0.00	0.01	--	--
<u>Petroleum Production and Marketing</u>					
Oil and Gas Production	0.10	--	0.01	--	--
Petroleum Refining	6.88	0.25	0.71	0.81	0.73
Petroleum Marketing	5.62	--	--	--	--
Other (Petroleum Production and Marketing)	0.02	--	--	--	--
Subtotal	12.62	0.25	0.72	0.81	0.73
<u>Industrial Processes</u>					
Chemical	1.30	0.15	0.24	0.38	0.37
Food and Agriculture	0.22	0.24	0.02	0.09	0.05
Mineral Processes	0.37	0.26	2.20	1.13	0.51
Metal Processes	0.04	0.06	0.18	0.04	0.04
Wood and Paper	--	--	--	0.00	0.00
Electronics	0.02	--	--	0.00	--
Other (Industrial Processes)	1.37	0.68	0.08	0.26	0.21
Subtotal	3.32	1.39	2.72	1.90	1.18

Table 6. Contra Costa County Emissions Forecast for 2020 (Continued)

Emission Category	Reactive Organic Gases	Carbon Monoxide	Nitrogen Oxides	Inhalable Particulate Matter (PM₁₀)	Fine Particulate Matter (PM_{2.5})
<u>Solvent Evaporation</u>					
Consumer Products	6.88	--	--	--	--
Architectural Coatings & Related Process Solvents	3.66	--	--	--	--
Pesticides/Fertilizers	0.11	--	--	--	--
Asphalt Paving / Roofing	0.28	--	--	--	--
Subtotal	10.93	--	--	--	--
<u>Miscellaneous Processes</u>					
Residential Fuel Combustion	2.58	44.10	2.82	6.19	5.97
Farming Operations	0.86	--	--	1.97	1.08
Construction and Demolition	--	--	--	5.79	0.58
Paved Road Dust	--	--	--	14.04	2.11
Unpaved Road Dust	--	--	--	1.07	0.11
Fugitive Windblown Dust	--	--	--	0.59	0.10
Fires	0.03	0.48	0.01	0.03	0.03
Managed Burning and Disposal	0.08	1.68	0.07	0.23	0.21
Cooking	0.11	--	--	0.57	0.34
Other (Miscellaneous Processes)	0.01	0.20	0.01	0.16	0.10
Subtotal	3.67	46.46	2.91	30.64	10.63
<u>On-Road Motor Vehicles</u>					
Light Duty Vehicles	5.82	49.50	4.54	1.10	0.69
Medium Duty Trucks	0.69	6.76	0.76	0.14	0.10
Heavy Duty Trucks	0.79	5.31	5.04	0.20	0.14
Motorcycles	1.20	8.70	0.37	0.01	0.01
Buses	0.12	0.93	1.94	0.06	0.05
Motor Homes	0.01	0.20	0.10	0.00	0.00
Subtotal	8.63	71.40	12.75	1.51	0.99
<u>Other Mobile Sources</u>					
Aircraft	0.05	1.32	0.01	0.00	0.00
Trains	0.21	0.69	2.83	0.07	0.06
Ocean Going Vessels	0.15	0.30	3.67	0.48	0.46
Commercial Harbor Craft	0.07	0.50	0.60	0.02	0.02
Recreational Boats	3.35	22.90	1.03	0.32	0.24
Off-Road Recreational Vehicles	0.22	1.14	0.01	0.00	0.00
Off-Road Equipment	3.68	43.89	9.15	0.45	0.40
Farm Equipment	0.05	0.69	0.28	0.01	0.01
Fuel Storage and Handling	0.38	--	--	--	--
Subtotal	8.16	71.43	17.58	1.35	1.19
COUNTY TOTAL	53.90	206.50	57.51	39.65	18.11
<p>Notes: 2020 is the furthest horizon year available from the California Air Resources Board (CARB). All values are in tons per day. Dashes ("--") indicate no data are available. The sum of values may not equal total shown due to rounding.</p> <p>Source: CARB website: http://arb.ca.gov</p>					

For 2020 forecasted emissions, shown in **Table 6**, the major source category expected to generate the largest amount of ROG emissions in Contra Costa County is Petroleum Production and Marketing. The largest subcategory within this category is Petroleum Refining. The major source category expected to generate the largest amount of CO emissions is On-Road Motor Vehicles. The major source category expected to generate the largest amount of NO_x emissions in Contra Costa County is Fuel Combustion. The largest subcategory within this category is Petroleum Refining (Combustion). The major source category expected to generate the largest amount of PM₁₀ and PM_{2.5} emissions is Miscellaneous Processes. The largest subcategory within this category is Paved Road Dust.

Table 7 presents estimates of GHG emissions generated in California during the years 2000 through 2010. The data are expressed as “million tonnes of CO₂ equivalent” per year. One tonne is sometimes referred to as a “metric ton” and is equal to 2,204.6 pounds.

While CO₂ is the most common component of GHG, several different compounds are components of overall GHG. The different compounds contribute to climate change with varying intensities. The term “CO₂ equivalent” (CO₂e) refers to a weighted composite of these several compounds, expressed as the equivalent amount of CO₂.

Table 7 presents estimates of GHG emissions disaggregated into the following four major source categories:

- Transportation,
- Electric Power,
- Commercial and Residential, and
- Industrial.

Each major source category is further disaggregated into minor source categories.


As shown in **Table 7**, Transportation and Electric Power are the two larger major source categories of GHG emissions in California. Industrial, and Commercial and Residential activities are relatively smaller sources of GHG emissions.

Table 8 presents forecasts of GHG emissions expected to be generated in California during the years 2008 through 2020.

Table 9 presents estimates of GHG emissions generated in Contra Costa County in 2005. Energy Use – Commercial/Industrial/Direct Access is the category that generates the largest amount of GHG emissions in Contra Costa County.

Table 7. California Greenhouse Gas Inventory for 2000 - 2010

California Environmental Protection Agency

 **Air Resources Board**

California Greenhouse Gas Inventory for 2000-2010
— by Category as Defined in the Scoping Plan

million tonnes of CO₂ equivalent - (based upon IPCC Second Assessment Report's Global Warming Potentials)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Transportation	171.87	175.01	181.51	179.47	183.46	186.34	186.95	187.38	178.18	173.34	173.18
On Road	159.51	162.34	168.79	166.61	169.85	171.35	171.63	172.66	164.39	160.25	159.70
Passenger Vehicles	126.85	129.29	135.63	133.07	134.66	134.83	134.71	134.93	129.37	127.69	126.99
Heavy Duty Trucks	32.66	33.05	33.16	33.53	35.19	36.52	36.93	37.74	35.02	32.56	32.70
Ships & Commercial Boats	3.21	2.99	3.28	3.42	3.42	3.69	3.74	3.71	3.62	3.42	3.39
Aviation (Intrastate)	3.86	3.70	4.00	3.84	4.37	4.84	5.04	5.26	5.22	5.33	4.76
Rail	1.88	1.89	2.50	2.70	2.91	3.34	3.53	3.17	2.58	1.95	2.35
Unspecified	3.42	4.10	2.95	2.89	2.91	3.12	3.01	2.57	2.36	2.38	2.99
Electric Power	105.76	122.91	109.70	113.65	116.25	108.89	105.55	114.97	121.16	103.58	93.30
In-State Generation	59.85	63.88	50.73	49.09	50.20	46.08	50.87	55.15	55.34	55.53	49.70
Natural Gas	50.92	55.46	42.16	40.91	42.40	38.11	43.07	47.12	48.02	48.90	43.10
Other Fuels	6.85	6.36	6.37	5.99	5.59	5.77	5.64	5.85	5.15	5.28	5.49
Fugitive and Process Emissions	2.08	2.06	2.20	2.19	2.21	2.19	2.16	2.19	2.16	1.36	1.11
Imported Electricity	45.91	59.03	58.97	64.57	66.05	62.81	54.69	59.81	65.83	48.05	43.59
Unspecified Imports	14.27	25.43	26.92	32.05	32.92	30.02	27.96	32.73	37.93	14.99	13.45
Specified Imports	31.64	33.60	32.05	32.51	33.13	32.80	26.73	27.08	27.90	33.05	30.14
Commercial and Residential	42.27	41.13	43.10	41.47	42.83	41.18	41.85	42.07	42.39	42.61	43.89
Residential Fuel Use	29.65	28.72	28.88	28.41	29.45	28.18	28.55	28.70	29.03	28.65	29.38
Natural Gas	28.02	27.42	27.53	26.66	27.37	25.97	26.59	26.72	26.66	26.30	27.03
Other Fuels	1.64	1.30	1.34	1.75	2.07	2.21	1.95	1.98	2.37	2.35	2.36
Commercial Fuel Use	11.53	11.36	13.17	12.80	12.76	12.60	12.88	12.87	12.99	13.04	13.47
Natural Gas	10.06	10.10	11.90	11.38	11.16	10.93	11.61	11.48	11.16	11.02	11.19
Other Fuels	1.46	1.26	1.27	1.43	1.60	1.67	1.27	1.39	1.83	2.02	2.29
Commercial Cogeneration Heat Output	1.09	1.05	1.06	0.26	0.62	0.40	0.42	0.49	0.37	0.92	1.03
Industrial	98.43	96.34	97.12	95.29	96.97	96.04	94.29	91.88	94.32	83.60	85.96
Refineries	32.13	32.82	33.00	33.69	32.74	33.95	35.04	34.74	34.08	28.13	30.80
General Fuel Use	22.30	21.04	22.45	18.60	19.05	18.15	18.05	17.01	18.15	17.60	20.26
Natural Gas	16.82	14.62	15.18	11.97	12.80	12.72	12.38	11.56	12.37	11.46	13.46
Other Fuels	5.48	6.41	7.27	6.63	6.25	5.43	5.67	5.45	5.77	6.14	6.80
Oil & Gas Extraction [1]	17.75	17.77	16.52	18.21	17.93	16.71	14.01	14.63	17.81	16.71	15.78
Fuel Use	17.07	16.94	15.79	17.47	17.56	16.37	13.24	13.83	17.02	15.92	15.00
Fugitive Emissions	0.69	0.83	0.73	0.74	0.37	0.35	0.77	0.80	0.79	0.79	0.78
Cement Plants	9.39	9.50	9.60	9.70	9.80	9.90	9.73	9.13	8.62	5.72	5.55
Clinker Production	5.43	5.52	5.60	5.68	5.77	5.85	5.80	5.55	5.28	3.60	3.46
Fuel Use	3.96	3.98	4.00	4.01	4.03	4.05	3.93	3.58	3.33	2.12	2.09
Cogeneration Heat Output	11.69	10.47	10.65	10.59	12.91	12.40	12.15	11.14	10.39	10.26	7.72
Other Fugitive and Process Emissions	5.17	4.73	4.90	4.51	4.56	4.93	5.30	5.23	5.27	5.18	5.84

Last Updated: Tuesday, February 19, 2013

Table 8. California Greenhouse Gas Emissions Forecast (2008 – 2020)

Last Updated: 10/28/2010 Million tonnes of CO2 equivalent

Category	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Grand Total	474.64	457.65	462.04	463.23	470.37	480.40	487.35	492.01	494.66	497.88	500.76	503.76	506.78
Total (Capped)	403.15	387.60	389.18	387.94	392.58	400.14	404.56	406.71	406.89	407.61	407.99	408.41	408.84
Total Narrow Scope (Capped)	174.54	168.54	166.26	165.84	165.85	167.26	168.07	168.84	169.63	170.40	171.10	171.82	172.57
Electricity Generation (Capped)	43.82	40.85	39.47	38.89	38.65	39.70	40.44	41.18	41.93	42.67	43.37	44.08	44.82
Electricity Generation (In-State)	43.82	40.85	39.47	38.89	38.65	39.70	40.44	41.18	41.93	42.67	43.37	44.08	44.82
Imported Electricity (Capped)	55.03	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53	53.53
AZ	6.62	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90	5.90
CO	3.20	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85	2.85
NM	4.70	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67	4.67
NV	3.18	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03	3.03
UT	13.57	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52	13.52
ID	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
MT	1.29	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24	1.24
OR	3.19	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01	3.01
WA	4.74	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58	4.58
Tribal	8.80	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07	9.07
MEX	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55	2.55
CAN	2.69	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61	2.61
Industrial (Capped)	75.69	74.15	73.26	73.42	73.66	74.03	74.10	74.12	74.17	74.20	74.20	74.21	74.21
Cement Plants	8.64	8.64	8.64	8.64	8.64	8.64	8.64	8.63	8.63	8.63	8.63	8.63	8.63
Cogeneration Facilities	11.13	10.37	10.02	9.87	9.81	10.08	10.27	10.46	10.65	10.83	11.01	11.19	11.38
Hydrogen Plants	2.22	2.20	2.18	2.18	2.18	2.18	2.17	2.17	2.17	2.17	2.17	2.17	2.17
Petroleum Refining	34.58	34.24	33.89	33.89	33.87	33.85	33.82	33.80	33.77	33.75	33.72	33.69	33.66
Other	0.21	0.20	0.20	0.21	0.22	0.23	0.23	0.23	0.24	0.24	0.24	0.25	0.25
General Stationary Combustion	18.91	18.50	18.32	18.63	18.94	19.06	18.97	18.83	18.70	18.57	18.43	18.28	18.13
Added Broad Scope Fuels (Capped)	228.61	219.07	222.92	222.10	226.73	232.87	236.49	237.87	237.26	237.21	236.88	236.59	236.28
Gasoline	130.62	128.83	131.88	130.56	133.43	137.41	139.50	138.98	137.51	135.64	133.47	131.48	129.33
Distillate	38.59	36.57	37.95	37.89	38.88	40.07	40.99	42.28	42.48	43.63	44.88	45.99	47.06
Propane	4.29	3.44	3.45	3.46	3.45	3.45	3.45	3.45	3.45	3.45	3.44	3.44	3.44
Natural Gas	55.11	50.23	49.65	50.20	50.97	51.94	52.55	53.16	53.82	54.49	55.09	55.69	56.44
Ethanol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total (Uncapped)	71.49	70.05	72.86	75.29	77.80	80.26	82.79	85.30	87.77	90.28	92.78	95.35	97.94
Electricity Generation & Industrial	25.83	21.22	21.84	22.06	22.24	22.29	22.44	22.59	22.74	22.91	23.10	23.29	23.50
Transportation	5.58	5.27	5.54	5.85	6.02	6.18	6.37	6.61	6.83	7.07	7.28	7.54	7.73
Ag & Forestry	20.44	21.15	21.20	21.41	21.71	22.06	22.43	22.82	23.23	23.67	24.11	24.57	25.11
Commercial	0.04	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Residential	0.25	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
High GWP Gases	13.89	16.95	18.69	20.44	22.18	23.92	25.66	27.40	29.15	30.89	32.63	34.37	36.11
Ethanol	5.46	5.15	5.27	5.22	5.34	5.50	5.58	5.56	5.50	5.42	5.34	5.26	5.17

Notes:

The emission factor used for unspecified imported electricity in this forecast is WCI's preliminary factor of 959.7 lbs/MWh. This factor was recently updated and may be obtained from the Western Climate Initiative (WCI) website: <http://www.westernclimateinitiative.org/component/remository/Electricity-Team-Documents/Default-Emission-Factor-Calculators/>
 Because of the difference in emission factors for unspecified imported electricity, the emissions total for 2008 in this forecast differs from the 2008 emissions total in the statewide GHG inventory: <http://www.arb.ca.gov/cc/inventory/data/data.htm>

Source: California Air Resources Board website <http://www.arb.ca.gov>

Table 9. 2005 Greenhouse Gas Emissions for Contra Costa County

Emissions Source	Carbon Dioxide Equivalent (CO ₂ e)	
	Metric Tons	Percent of Total
<u>Contra Costa County</u>		
Energy Use - Residential	1,587,655	13%
Energy Use - Commercial/Industrial/Direct Access	6,030,798	49%
Transportation	4,542,073	37%
Landfilled Waste	175,378	1%
County Total	12,335,904	100%
<u>Unincorporated County Area</u>		
Energy Use - Residential	279,439	6%
Energy Use - Commercial/Industrial/Direct Access	3,500,768	73%
Transportation	972,754	20%
Landfilled Waste	22,335	0%
Unincorporated Total	4,775,296	100%
<u>Incorporated and Unincorporated Distribution</u>		
Incorporated Area	7,560,608	61%
Unincorporated Area	4,775,296	39%
County Total	12,335,904	100%
<hr/> Source: County of Contra Costa 2008. Note: Totals may not equal sum of components due to rounding.		

3.6 REGULATORY SETTING

The following description of regulatory setting is based on material presented in the Bay Area Air Quality Management District (BAAQMD) document *California Environmental Quality Act Air Quality Guidelines* (Bay Area Air Quality Management District 2012).

Air quality within the SFBAAB is regulated by such agencies as the BAAQMD, ARB, and EPA. Each of these agencies develops rules, regulations, policies, and/or goals to attain the goals or directives imposed through legislation. Although the EPA regulations may not be superseded, both state and local regulations may be more stringent.

3.6.1 Federal Air Quality Regulations

At the federal level, EPA has been charged with implementing national air quality programs. EPA's air quality mandates are drawn primarily from the Federal Clean Air Act (FCAA), which was enacted in 1963. The FCAA was amended in 1970, 1977, and 1990.

The FCAA required EPA to establish primary and secondary NAAQS, which are shown in **Table 1**. The FCAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The Federal Clean Air Act Amendments of 1990 (FCAAA) added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by their jurisdictional agencies. EPA has responsibility to review all state SIPs to determine conformance to the mandates of the FCAAA and determine if implementation will achieve air quality goals. If the EPA determines a SIP to be inadequate, a Federal Implementation Plan (FIP) may be prepared for the nonattainment area that imposes additional control measures. Failure to submit an approvable SIP or to implement the plan within the mandated timeframe may result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

3.6.2 State Air Quality Regulations

ARB is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA), which was adopted in 1988. The CCAA requires that all air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that districts should focus particular attention on reducing the emissions from transportation and area-wide emission sources, and provides districts with the authority to regulate indirect sources.

ARB is primarily responsible for developing and implementing air pollution control plans to achieve and maintain the NAAQS. The ARB is primarily responsible for statewide pollution sources and produces a major part of the SIP. Local air districts are still relied upon to provide additional strategies for sources under their jurisdiction. The ARB combines these data and submits the completed SIP to EPA.

Other ARB duties include monitoring air quality (in conjunction with air monitoring networks maintained by air pollution control and air quality management districts), establishing CAAQS (which in many cases are more stringent than the NAAQS), determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, and off-road vehicles.

In 1992 and 1993, the ARB requested delegation of authority for the implementation and enforcement of specified New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAPS) to the following local agencies: the BAAQMD and the South Coast Air Quality Management Districts (SCAQMD). EPA's review of the State of California's laws, rules, and regulations showed them to be adequate for the implementation and enforcement of these federal standards, and EPA granted the delegations as requested.

The California Clean Air Act, Section 39610 (a), directs the ARB to “identify each district in which transported air pollutants from upwind areas outside the district cause or contribute to a violation of the ozone standard and to identify the district of origin of transported pollutants.” The information regarding the transport of air pollutants from one basin to another was to be quantified to assist interrelated basins in the preparation of plans for the attainment of State ambient air quality standards. Numerous studies conducted by the ARB have identified air basins that are impacted by pollutants transported from other air basins (as of 1993). Among the air basins affected by air pollution transport from the SFBAAB are the North Central Coast Air Basin, the Mountain Counties Air Basin, the San Joaquin Valley Air Basin, and the Sacramento Valley Air Basin. The SFBAAB was also identified as an area impacted by the transport of air pollutants from the Sacramento region.

3.6.3 Local Air Quality Regulations

The BAAQMD attains and maintains air quality conditions in the SFBAAB through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. The clean air strategy of the BAAQMD includes the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. The BAAQMD also inspects stationary sources of air pollution and responds to citizen complaints, monitors ambient air quality and meteorological conditions, and implements programs and regulations required by the FCAA, FCAAA, and the CCAA.

California Environmental Quality Act Air Quality Guidelines. In 2009, 2011, and 2012, the BAAQMD released the update to its *California Environmental Quality Act Air Quality Guidelines* (Bay Area Air Quality Management District 2012). This is an advisory document that provides the lead agency, consultants, and project applicants with uniform procedures for addressing air quality in environmental documents. The handbook contains the following applicable components:

1. criteria and thresholds for determining whether a project may have a significant adverse air quality impact;
2. specific procedures and modeling protocols for quantifying and analyzing air quality impacts;
3. methods available to mitigate air quality impacts; and
4. information for use in air quality assessments and environmental documents that will be updated more frequently such as air quality data, regulatory setting, climate, topography.

Air Quality Plans. As stated above, the BAAQMD prepares plans to attain ambient air quality standards in the SFBAAB. The BAAQMD prepares ozone attainment plans (OAP) for the national ozone standard and clean air plans (CAP) for the California standard both in coordination with the Metropolitan Transportation Commission and the Association of Bay Area Governments (ABAG).

With respect to applicable air quality plans, the BAAQMD prepared the *Bay Area 2010 Clean Air Plan* (Bay Area Air Quality Management District 2010a) to address nonattainment of the national 1-hour ozone standard in the SFBAAB. The purpose of the 2010 Clean Air Plan is to:

1. update the *Bay Area 2005 Ozone Strategy* (Bay Area Air Quality Management District 2006) in accordance with the requirements of the California Clean Air Act to implement “all feasible measures” to reduce ozone;
2. consider the impacts of ozone control measures on particulate matter (PM), air toxics, and greenhouse gases in a single, integrated plan;
3. review progress in improving air quality in recent years; and
4. establish emission control measures to be adopted or implemented in the 2009-2012 timeframe.

Similarly, the BAAQMD prepared the 2010 Clean Air Plan to address nonattainment of the CAAQS.

3.6.4 Global Climate Change and Greenhouse Gas Emissions

Federal Regulations. The following describes Federal regulations related to global climate change and GHG emissions.

Supreme Court Ruling. The EPA is the Federal agency responsible for implementing the FCAA. The U.S. Supreme Court ruled in its decision in *Massachusetts et al. v. Environmental Protection Agency et al.* ([2007] 549 U.S.

05-1120), issued on April 2, 2007, that CO₂ is an air pollutant as defined under the FCAA, and that EPA has the authority to regulate emissions of GHGs.

In response to the mounting issue of climate change, EPA has taken actions to regulate, monitor, and potentially reduce GHG emissions.

Mandatory Greenhouse Gas Reporting Rule. On September 22, 2009, EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the United States. In general, this national reporting requirement will provide EPA with accurate and timely GHG emissions data from facilities that emit 25,000 metric tons or more of CO₂ per year. This publicly available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85% of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.

Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act. On April 23, 2009, EPA published their Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the FCCA (Endangerment Finding) in the Federal Register. The Endangerment Finding is based on Section 202(a) of the FCAA, which states that the Administrator (of EPA) should regulate and develop standards for “emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” The proposed rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., CO₂, CH₄, N₂O, HFCs, PFCs, and SF₆) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and to the threat of climate change.

The Administrator proposed the finding that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the FCCA. The evidence supporting this finding consists of human activity resulting in “high atmospheric levels” of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wild fires, droughts, sea level rise, higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations.

The Administrator also proposed the finding that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. The proposed finding cites that in 2006, motor vehicles were the second largest contributor to domestic GHG emissions (24 percent of total) behind electricity generation. Furthermore, in 2005, the U.S. was responsible for 18 percent of global GHG emissions. Therefore, GHG emissions from motor vehicles and motor vehicle engines were found to contribute to air pollution that endangers public health and welfare.

State Greenhouse Gas Regulations. The following describes State regulations related to global climate change and GHG emissions.

Assembly Bill 1493 (2002). In 2002, then-Governor Gray Davis signed Assembly Bill (AB) 1493. AB 1493 requires that ARB develop and adopt, by January 1, 2005, regulations that achieve “the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the state.”

To meet the requirements of AB 1493, in 2004 ARB approved amendments to the California Code of Regulations (CCR) adding GHG emissions standards to California’s existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR 1900, 1961), and adoption of Section 1961.1 (13 CCR 1961.1) require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes (i.e., any medium-duty vehicle with a gross vehicle weight rating less than 10,000 pounds that is designed primarily for the transportation of persons), beginning with the 2009 model year. For passenger cars and light-duty trucks with a loaded vehicle weight (LVW) of 3,750 pounds or less, the GHG emission limits for the 2016 model year are approximately 37percent lower than the limits for the first year of the regulations, the 2009 model year. For light-duty trucks with LVW of 3,751 pounds to gross vehicle weight (GVW) of 8,500 pounds, as well as medium-duty passenger vehicles, GHG emissions would be reduced approximately 24 percent between 2009 and 2016.

In December 2004, a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of 13 CCR Sections 1900 and 1961 as amended by AB 1493 and 13 CCR 1961.1 (Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in Her Official Capacity as Executive Director of the California Air Resources Board, et al.). The auto-makers’ suit in the U.S. District Court for the Eastern District of California, contended California’s implementation of regulations that, in effect, regulate vehicle fuel economy violates various federal laws, regulations, and policies.

On December 12, 2007, the Court found that if California receives appropriate authorization from EPA (the last remaining factor in enforcing the standard), these regulations would be consistent with and have the force of federal law, thus, rejecting the automakers' claim. This authorization to implement more stringent standards in California was requested in the form of a FCAA Section 209, subsection (b) waiver in 2005. Since that time, EPA failed to act on granting California authorization to implement the standards. Governor Schwarzenegger and Attorney General Edmund G. Brown filed suit against EPA for the delay. In December 2007, EPA Administrator Stephen Johnson denied California's request for the waiver to implement AB 1493. Johnson cited the need for a national approach to reducing GHG emissions, the lack of a "need to meet compelling and extraordinary conditions", and the emissions reductions that would be achieved through the Energy Independence and Security Act of 2007 as the reasoning for the denial.

The state of California filed suit against EPA for its decision to deny the FCAA waiver. A change in presidential administration directed EPA to reexamine its position for denial of California's CAA waiver and for its past opposition to GHG emissions regulation. California received the waiver, notwithstanding the previous denial by EPA, on June 30, 2009.

Assembly Bill 32 (2006), California Global Warming Solutions Act. In September 2006, the governor of California signed AB 32 (Chapter 488, Statutes of 2006), the California Global Warming Solutions Act of 2006, which enacted Sections 38500–38599 of the California Health and Safety Code. AB 32 requires the reduction of statewide GHG emissions to 1990 levels by 2020. This equates to an approximate 15 percent reduction compared to existing statewide GHG emission levels or a 30 percent reduction from projected 2020 "business as usual" emission levels. The required reduction will be accomplished through an enforceable statewide cap on GHG emissions beginning in 2012.

To effectively implement the statewide cap on GHG emissions, AB 32 directs ARB to develop and implement regulations that reduce statewide GHG emissions generated by stationary sources. Specific actions required of ARB under AB 32 include adoption of a quantified cap on GHG emissions that represent 1990 emissions levels along with disclosing how the cap was quantified, institution of a schedule to meet the emissions cap, and development of tracking, reporting, and enforcement mechanisms to ensure that the state achieves the reductions in GHG emissions needed to meet the cap.

In addition, AB 32 states that if any regulations established under AB 1493 (2002) cannot be implemented then ARB is required to develop additional, new regulations to control GHG emissions from vehicles as part of AB 32.

AB 32 Climate Change Scoping Plan. In December 2008, ARB adopted its *Climate Change Scoping Plan* (California Air Resources Board 2008b), which

contains the main strategies California will implement to achieve reduction of approximately 169 million metric tons (MMT) of CO₂e, or approximately 30 percent from the state's projected 2020 emission level of 596 MMT of CO₂e under a business-as-usual scenario (this is a reduction of 42 MMT CO₂e, or almost 10 percent from 2002-2004 average emissions). The Scoping Plan also includes ARB-recommended GHG reductions for each emissions sector of the state's GHG inventory. The Scoping Plan calls for the largest reductions in GHG emissions to be achieved by implementing the following measures and standards:

- improved emissions standards for light-duty vehicles (estimated reductions of 31.7 MMT CO₂e);
- the Low-Carbon Fuel Standard (15.0 MMT CO₂e);
- energy efficiency measures in buildings and appliances and the widespread development of combined heat and power systems (26.3 MMT CO₂e); and
- a renewable portfolio standard for electricity production (21.3 MMT CO₂e).

ARB has not yet determined what amount of GHG reductions it recommends from local government operations; however, the Scoping Plan does state that land use planning and urban growth decisions will play an important role in the state's GHG reductions because local governments have primary authority to plan, zone, approve, and permit how land is developed to accommodate population growth and the changing needs of their jurisdictions(meanwhile, ARB is also developing an additional protocol for community emissions). ARB further acknowledges that decisions on how land is used will have large impacts on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. The Scoping Plan states that the ultimate GHG reduction assignment to local government operations is to be determined. With regard to land use planning, the Scoping Plan expects approximately 5.0 MMT CO₂e will be achieved associated with implementation of SB 375, which is discussed further below.

Senate Bills 1078 and 107 and Executive Order S-14-08. SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33 percent renewable power by 2020.

Senate Bill 1368 (2006). SB 1368 is the companion bill of AB 32 and was signed by Governor Schwarzenegger in September 2006. SB 1368 requires the

California Public Utilities Commission (PUC) to establish a greenhouse gas emission performance standard for baseload generation from investor owned utilities by February 1, 2007. The California Energy Commission (CEC) must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the greenhouse gas emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the PUC and CEC.

Senate Bill 97 (2007). SB 97, signed by the Governor in August 2007 (Chapter 185, Statutes of 2007; Public Resources Code, Sections 21083.05 and 21097), acknowledges climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the Governor's Office of Planning and Research (OPR) to prepare, develop, and transmit to the California Resources Agency by July 1, 2009 guidelines for mitigating GHG emissions or the effects of GHG emissions, as required by CEQA. The California Resources Agency is required to certify and adopt these guidelines by January 1, 2010.

This bill also removes, both retroactively and prospectively, as legitimate causes of action in litigation any claim of inadequate CEQA analysis of effects of GHG emissions associated with environmental review for projects funded by the Highway Safety, Traffic Reduction, Air Quality and Port Security Bond Act of 2006 (Proposition 1B) or the Disaster Preparedness and Flood Protection Bond Act of 2006 (Proposition 1E). This provision will be repealed by provision of law on January 1, 2010 at that time such projects, if any remain unapproved, will no longer enjoy protection against litigation claims based on failure to adequately address issues related to GHG emissions.

Senate Bill 375 (2008). SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. As part of the alignment, SB 375 requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) which prescribes land use allocation in that MPO's Regional Transportation Plan (RTP). The ARB, in consultation with MPOs, is required to provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. The ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned GHG emission reduction targets. If MPOs do not meet the GHG reduction targets, transportation projects located in the MPO boundaries would not be eligible for funding programmed after January 1, 2012.

This bill also extends the minimum time period for the Regional Housing Needs Allocation (RNHA) cycle from five years to eight years for local governments

located in an MPO that meets certain requirements. City or County land use policies (e.g., General Plans) are not required to be consistent with the RTP including associated SCSs or APSs. Projects consistent with an approved SCS or APS and categorized as “transit priority projects” would receive incentives under new provisions of CEQA.

Executive Order S-3-05 (2005). Governor Schwarzenegger signed Executive Order S-3-05 on June 1, 2005 which proclaimed California is vulnerable to the impacts of climate change. The executive order declared increased temperatures could reduce snowpack in the Sierra Nevada Mountains, further exacerbate California’s air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the executive order established targets for total GHG emissions which include reducing GHG emissions to the 2000 level by 2010, to the 1990 level by 2020, and to 80 percent below the 1990 level by 2050.

The executive order also directed the secretary of the California Environmental Protection Agency to coordinate a multiagency effort to reduce GHG emissions to the target levels. The secretary will submit biannual reports to the governor and legislature describing progress made toward reaching the emission targets; impacts of global warming on California’s resources; and mitigation and adaptation plans to combat impacts of global warming.

To comply with the executive order, the Secretary of the California Environmental Protection Agency created the California Climate Action Team which is made up of members from various state agencies and commissions. The California Climate Action Team released its first report in March 2006 of which proposed achieving the GHG emissions targets by building on voluntary actions of California businesses and actions by local governments and communities along with continued implementation of state incentive and regulatory programs.

Executive Order S-13-08. Governor Schwarzenegger signed Executive Order S-13-08 on November 14, 2008 which directs California to develop methods for adapting to climate change through preparation of a statewide plan. The executive order directs OPR, in cooperation with the California Resources Agency (CRA), to provide land use planning guidance related to sea level rise and other climate change impacts by May 30, 2009. The order also directs the CRA to develop a state Climate Adaptation Strategy by June 30, 2009 and to convene an independent panel to complete the first California Sea Level Rise Assessment Report. The assessment report is required to be completed by December 1, 2010 and required to include the following four items:

1. project the relative sea level rise specific to California by taking into account issues such as coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates;
2. identify the range of uncertainty in selected sea level rise projections;

3. synthesize existing information on projected sea level rise impacts to state infrastructure (e.g., roads, public facilities, beaches), natural areas, and coastal and marine ecosystems; and
4. discuss future research needs relating to sea level rise in California.

Executive Order S-1-07. Governor Schwarzenegger signed Executive Order S-1-07 in 2007 which proclaimed the transportation sector as the main source of GHG emissions in California. The executive order proclaims the transportation sector accounts for over 40 percent of statewide GHG emissions. The executive order also establishes a goal to reduce the carbon intensity of transportation fuels sold in California by a minimum of 10 percent by 2020.

In particular, the executive order established a Low-Carbon Fuel Standard (LCFS) and directed the Secretary for Environmental Protection to coordinate the actions of the CEC, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the “life-cycle carbon intensity” of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by CEC on December 24, 2007) and was submitted to ARB for consideration as an “early action” item under AB 32. The ARB adopted the LCFS on April 23, 2009.

Local Greenhouse Gas Regulations. The following describes local regulations related to global climate change and GHG emissions.

Bay Area Air Quality Management District Climate Protection Program. The BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB. The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy all of which assist in reducing emissions of GHG and in reducing air pollutants that affect the health of residents. BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders.

3.7 CLIMATE, TOPOGRAPHY, AIR POLLUTION POTENTIAL

The following description of climate, topography and air pollution potential is based on material presented in the BAAQMD document *California Environmental Quality Act Air Quality Guidelines* (Bay Area Air Quality Management District 2012).

The SFBAAB comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara counties, the southern portion of Sonoma, and the southwestern portion of Solano County. Air quality in this area is determined by such natural factors as topography, meteorology, and climate, in addition to the presence of existing air pollution sources and ambient conditions.

3.7.1 Climate

The climate is dominated by the strength and location of a semi-permanent, subtropical high-pressure cell. During the summer, the Pacific high pressure cell is centered over the northeastern Pacific Ocean resulting in stable meteorological conditions and a steady northwesterly wind flow. Upwelling of cold ocean water from below to the surface because of the northwesterly flow produces a band of cold water off the California coast. The cool and moisture-laden air approaching the coast from the Pacific Ocean is further cooled by the presence of the cold water band resulting in condensation and the presence of fog and stratus clouds along the Northern California coast.

In the winter, the Pacific high-pressure cell weakens and shifts southward resulting in wind flow offshore, the absence of upwelling, and the occurrence of storms. Weak inversions coupled with moderate winds result in a low air pollution potential.

High Pressure Cell. During the summer, the large-scale meteorological condition that dominates the West Coast is a semi-permanent high pressure cell centered over the northeastern Pacific Ocean. This high pressure cell keeps storms from affecting the California coast. Hence, the SFBAAB experiences little precipitation in the summer months. Winds tend to blow on shore out of the north/northwest.

The steady northwesterly flow induces upwelling of cold water from below. This upwelling produces a band of cold water off the California coast. When air approaches the California coast, already cool and moisture-laden from its long journey over the Pacific, it is further cooled as it crosses this bank of cold water. This cooling often produces condensation resulting in a high incidence of fog and stratus clouds along the Northern California coast in the summer.

Generally in the winter, the Pacific high weakens and shifts southward, winds tend to flow offshore, upwelling ceases and storms occur. During the winter rainy periods, inversions (layers of warmer air over colder air; see below) are weak or nonexistent, winds are usually moderate and air pollution potential is low. The Pacific high does periodically become dominant, bringing strong inversions, light winds and high pollution potential.

3.7.2 Topography

The SFBAAB is characterized by complex terrain, consisting of coastal mountain ranges, inland valleys, and bays, which distort normal wind flow patterns. The Coast Range splits resulting in a western coast gap, Golden Gate, and an eastern coast gap, Carquinez Strait, which allow air to flow in and out of the SFBAAB and the Central Valley.

This complex terrain, especially the higher elevations, distorts the normal wind flow patterns in the SFBAAB. The greatest distortion occur when low-level inversions are present and the air beneath the inversion flows independently of air above the inversion, a condition that is common in the summer time.

The only major break in California's Coast Range occurs in the SFBAAB. Here the Coast Range splits into western and eastern ranges. Between the two ranges lies San Francisco Bay. The gap in the western coast range is known as the Golden Gate, and the gap in the eastern coast range is the Carquinez Strait. These gaps allow air to pass into and out of the SFBAAB and the Central Valley.

3.7.3 Wind, Temperature, and Precipitation

Wind Patterns. During the summer, winds flowing from the northwest are drawn inland through the Golden Gate and over the lower portions of the San Francisco Peninsula. Immediately south of Mount Tamalpais, the northwesterly winds accelerate considerably and come more directly from the west as they stream through the Golden Gate. This channeling of wind through the Golden Gate produces a jet that sweeps eastward and splits off to the northwest toward Richmond and to the southwest toward San Jose when it meets the East Bay hills.

Wind speeds may be strong locally in areas where air is channeled through a narrow opening, such as the Carquinez Strait, the Golden Gate or the San Bruno gap. For example, the average wind speed at San Francisco International Airport in July is about 17 knots (from 3 p.m. to 4 p.m.), compared with only seven knots at San Jose and less than six knots at the Farallon Islands.

The air flowing in from the coast to the Central Valley, called the sea breeze, begins developing at or near ground level along the coast in late morning or early afternoon. As the day progresses, the sea breeze layer deepens and increases in velocity while spreading inland. The depth of the sea breeze depends in large part upon the height and strength of the inversion. If the inversion is low and strong, and hence stable, the flow of the sea breeze will be inhibited and stagnant conditions are likely to result.

In the winter, the SFBAAB frequently experiences stormy conditions with moderate to strong winds, as well as periods of stagnation with very light winds. Winter stagnation episodes are characterized by nighttime drainage flows in coastal valleys. Drainage is a reversal of the usual daytime air-flow patterns; air moves from the Central Valley toward the coast and back down toward the Bay from the smaller valleys within the SFBAAB.

Temperature. Summertime temperatures in the SFBAAB are determined in large part by the effect of differential heating between land and water surfaces. Because land tends to heat up and cool off more quickly than water, a large-scale gradient (differential) in temperature is often created between the coast and the Central Valley, and small-scale local gradients are often produced along the shorelines of the ocean and bays. The temperature gradient near the ocean is also exaggerated, especially in summer, because of the upwelling of cold ocean bottom water along the coast. On summer afternoons the temperatures at the coast can be 35 degrees Fahrenheit (°F) cooler than temperatures 15 to 20 miles inland. At night this contrast usually decreases to less than 10°F.

In the winter, the relationship of minimum and maximum temperatures is reversed. During the daytime the temperature contrast between the coast and inland areas is small, whereas at night the variation in temperature is large.

Precipitation. The SFBAAB is characterized by moderately wet winters and dry summers. Winter rains account for about 75 percent of the average annual rainfall. The amount of annual precipitation can vary greatly from one part of the SFBAAB to another even within short distances. In general, total annual rainfall can reach 40 inches in the mountains, but it is often less than 16 inches in sheltered valleys.

During rainy periods, ventilation (rapid horizontal movement of air and injection of cleaner air) and vertical mixing are usually high, and thus pollution levels tend to be low. However, frequent dry periods do occur during the winter where mixing and ventilation are low and pollutant levels build up.

3.7.4 Air Pollution Potential

The potential for high pollutant concentrations developing at a given location depends upon the quantity of pollutants emitted into the atmosphere in the surrounding area or upwind, and the ability of the atmosphere to disperse the contaminated air. The topographic and climatological factors discussed above influence the atmospheric pollution potential of an area. Atmospheric pollution potential, as the term is used here, is independent of the location of emission sources and is instead a function of factors described below.

Wind Circulation. Low wind speed contributes to the buildup of air pollution because it allows more pollutants to be emitted into the air mass per unit of time. Light winds occur most frequently during periods of low sun (fall and winter, and early morning) and at night. These are also periods when air pollutant emissions from some sources are at their peak, namely, commute traffic (early morning) and wood burning appliances (nighttime). The problem can be compounded in valleys, when weak flows carry the pollutants upvalley during the day, and cold air drainage flows move the air mass downvalley at night. Such restricted movement of trapped air provides little opportunity for ventilation and leads to buildup of pollutants to potentially unhealthful levels.

Inversions. An inversion is a layer of warmer air over a layer of cooler air. Inversions affect air quality conditions significantly because they influence the mixing depth (i.e., the vertical depth in the atmosphere available for diluting air contaminants near the ground). The highest air pollutant concentrations in the SFBAAB generally occur during inversions.

There are two types of inversions that occur regularly in the SFBAAB. One is more common in the summer and fall, while the other is most common during the winter. The frequent occurrence of elevated temperature inversions in summer and fall months acts to cap the mixing depth, limiting the depth of air available for dilution. Elevated inversions are caused by subsiding air from the subtropical high pressure zone, and from the cool marine air layer that is drawn into the SFBAAB by the heated low pressure region in the Central Valley.

The inversions typical of winter, called radiation inversions, are formed as heat quickly radiates from the earth's surface after sunset, causing the air in contact with it to rapidly cool. Radiation inversions are strongest on clear, low-wind, cold winter nights, allowing the build-up of such pollutants as CO and particulate matter. When wind speeds are low, there is little mechanical turbulence to mix the air, resulting in a layer of warm air over a layer of cooler air next to the ground. Mixing depths under these conditions can be as shallow as 50 to 100 meters, particularly in rural areas. Urban areas usually have deeper minimum mixing layers because of heat island effects and increased surface roughness. During radiation inversions downwind transport is slow, the mixing depths are shallow, and turbulence is minimal, all factors which contribute to ozone formation.

Although each type of inversion is most common during a specific season, either inversion mechanism can occur at any time of the year. Sometimes both occur simultaneously. Moreover, the characteristics of an inversion often change throughout the course of a day. The terrain of the SFBAAB also induces significant variations among subregions.

Solar Radiation. The frequency of hot, sunny days during the summer months in the SFBAAB is another important factor that affects air pollution potential. It is at the higher temperatures that ozone is formed. In the presence of ultraviolet sunlight and warm temperatures, ROG and NO_x react to form secondary photochemical pollutants, including ozone.

Because temperatures in many of the SFBAAB inland valleys are so much higher than near the coast, the inland areas are especially prone to photochemical air pollution.

In late fall and winter, solar angles are low, resulting in insufficient ultraviolet light and warming of the atmosphere to drive the photochemical reactions. Ozone concentrations do not reach significant levels in the SFBAAB during these seasons.

Sheltered Terrain. The hills and mountains in the SFBAAB contribute to the high pollution potential of some areas. During the day, or at night during windy conditions, areas in the lee sides of mountains are sheltered from the prevailing winds, thereby reducing turbulence and downwind transport. At night, when wind speeds are low, the upper atmospheric layers are often decoupled from the surface layers during radiation conditions. If elevated terrain is present, it

will tend to block pollutant transport in that direction. Elevated terrain also can create a recirculation pattern by inducing upvalley air flows during the day and reverse downvalley flows during the night, allowing little inflow of fresh air.

The areas having the highest air pollution potential tend to be those that experience the highest temperatures in the summer and the lowest temperatures in the winter. The coastal areas are exposed to the prevailing marine air, creating cooler temperatures in the summer, warmer temperatures in winter, and stratus clouds all year. The inland valleys are sheltered from the marine air and experience hotter summers and colder winters. Thus, the topography of the inland valleys creates conditions conducive to high air pollution potential.

Pollution Potential Related to Emissions. Although air pollution potential is strongly influenced by climate and topography, the air pollution that occurs in a location also depends upon the amount of air pollutant emissions in the surrounding area or transported from more distant places. Air pollutant emissions generally are highest in areas that have high population densities, high motor vehicle use and/or industrialization. These contaminants created by photochemical processes in the atmosphere, such as ozone, may result in high concentrations many miles downwind from the sources of their precursor chemicals.

3.7.5 Carquinez Strait Subregion

This section discusses the varying climatological and topographic conditions, and the resulting variations in air pollution potential, within the Carquinez Strait subregion.

The Carquinez Strait runs from Rodeo to Martinez. It is the only sea-level gap between the Bay and the Central Valley. The subregion includes the lowlands bordering the strait to the north and south, and includes the area adjoining Suisun Bay and the western part of the Sacramento-San Joaquin Delta as far east as Bethel Island. The subregion extends from Rodeo in the southwest and Vallejo in the northwest to Fairfield on the northeast and Brentwood on the southeast.

Prevailing winds are from the west in the Carquinez Strait. During the summer and fall months, high pressure offshore coupled with low pressure in the Central Valley causes marine air to flow eastward through the Carquinez Strait. The wind is strongest in the afternoon. Afternoon wind speeds of 15 to 20 miles per hour (mph) are common throughout the strait region. Annual average wind speeds are eight mph in Martinez, and nine to 10 mph further east. Sometimes atmospheric conditions cause air to flow from the east. East winds usually contain more pollutants than the cleaner marine air from the west. In the summer and fall months, this can cause elevated pollutant levels to move into the central SFBAAB through the strait. These high pressure periods are usually accompanied by low wind speeds, shallow mixing depths, higher temperatures and little or no rainfall.

Summer mean maximum temperatures reach about 90°F in the subregion. Mean minimum temperatures in the winter are in the high 30's. Temperature extremes are especially pronounced in sheltered areas farther from the moderating effects of the strait itself (e.g., at Fairfield).

Many industrial facilities with significant air pollutant emissions (e.g., chemical plants and refineries) are located within the Carquinez Strait subregion. The pollution potential of this area is often moderated by high wind speeds. However, upsets at industrial facilities can lead to short-term pollution episodes, and emissions of unpleasant odors may occur at anytime. Receptors downwind of these facilities could suffer more long-term exposure to air contaminants than individuals elsewhere. It is important that local governments and other agencies maintain buffers zones around sources of air pollution sufficient to avoid adverse health and nuisance impacts on nearby receptors. Areas of the subregion that are traversed by major roadways (e.g., Interstate 80) may also be subject to higher local concentrations of CO and particulate matter, as well as certain toxic air contaminants such as benzene.

SECTION 4

SHORT-TERM CONSTRUCTION IMPACTS

Implementation of the West Antioch Creek Channel Improvement Project would result in construction activity, which would generate air pollutant emissions. Construction activities such as grading, excavation and travel on unpaved surfaces would generate dust, and can lead to elevated concentrations of PM₁₀ and PM_{2.5}. The operation of construction equipment results in exhaust emissions, which include ROG and NO_x.

4.1 SIGNIFICANCE THRESHOLDS

The following describes significance thresholds applied in this *Air Quality Study*. In addition to describing significance thresholds applied in the analysis of short-term construction-related emissions, the following also describes significance thresholds applied in the analysis of long-term operational emissions. As a result, the descriptions of significance thresholds presented in Section 5, *Long-Term Operational Impacts* of this *Air Quality Study* refer back to the following description.

4.1.1 Litigation

On June 2, 2010, the BAAQMD Board of Directors adopted a set of CEQA thresholds of significance (Bay Area Air Quality Management District 2010b). The thresholds of significance were included in a May 2011 update of the district CEQA guidelines, *California Environmental Quality Act Air Quality Guidelines – Updated May 2011* (Bay Area Air Quality Management District 2011).

On March 5, 2012 the Alameda Superior Court issued a judgment finding the BAAQMD had failed to comply with CEQA when it adopted the June 2010 thresholds. The court did not determine whether the thresholds were valid on the merits, but found that the adoption of the thresholds was a project under CEQA. The court issued a writ of mandate ordering the District to set aside the thresholds and cease dissemination of them until the District had complied with CEQA. The BAAQMD appealed the Alameda County Superior Court's decision in the California First District Court of Appeal.

On August 13, 2013, the California First District Court of Appeal overturned the March 5, 2012 decision by the Alameda Superior Court. While the August 13, 2013 decision by the Court of Appeal did not result in immediate reinstatement of the June 2010 BAAQMD thresholds, the decision lays the groundwork for reinstatement of the thresholds.

The March 5, 2012 order by the Alameda Superior Court to set aside the June 2010 thresholds was based on a procedural action and not on the scientific merits of the thresholds. Because of this, and the August 13, 2013 decision by the Court of Appeal to overturn the Alameda Superior Court decision, this *Air Quality Study* uses the June 2010 thresholds.

4.1.2 Thresholds

The SFBAAB is currently designated as a nonattainment area for ozone and particulate matter air quality standards. The BAAQMD June 2010 significance thresholds include values for ozone precursors and particulate matter. These thresholds are presented in **Table 10**. The Proposed Project would be considered to result in a significant air quality impact if it would result in emissions greater than the values shown in **Table 10**.

As shown in **Table 10**, implementation of “Best Management Practices” is considered to reduce the impact of construction-related particulate matter emissions to a less than significant level. The following Best Management Practices measures are from Table 8-1 of the *California Environmental Quality Act Air Quality Guidelines – Updated May 2011*:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer’s specifications. All equipment shall be checked by a certified visible emissions evaluator.

8. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Implementation of these Best Management Practices measures is considered to reduce construction-related particulate matter air quality impacts to a less than significant level.

4.2 METHODOLOGY

As specified in Appendix B of the BAAQMD document *California Environmental Quality Act Air Quality Guidelines* (Bay Area Air Quality Management District 2012),

“For proposed projects that are linear in nature (e.g., road or levee construction, pipeline installation, transmission lines), use the most current version of Sacramento Metropolitan Air Quality Management District's (SMAQMD) Road Construction Emissions Model (RoadMod) to quantify construction-related criteria air pollutants and precursors. . . Use RoadMod in accordance with the user instructions and default assumptions unless project-specific information is available. The default assumptions are applicable to projects located within the SFBAAB.”

The amount of project-related criteria pollutant emissions due to construction activities was calculated using Version 7.1.4 of the *Road Construction Emissions Model*.

The amount and timing of construction activity assumed in the calculation of construction-related emissions is presented in the *Project Description* section of this *Air Quality Study*. Output report tables from the *Road Construction Emissions Model* are presented in the *Technical Appendix* of this *Air Quality Study*.

Table 10. Bay Area Air Quality Management District Significance Thresholds

Type and Source of Emissions	Construction- Related Average Daily Emissions (in lbs/day)	Operational-Related	
		Average Daily Emissions (in lbs/day)	Maximum Annual Emissions (in tpy)
Reactive Organic Gas (ROG)	54	54	10
Nitrogen Oxides (NO _x)	54	54	10
Inhalable Particulate Matter (PM ₁₀)	82 (Exhaust Only)	82	15
Fine Particulate Matter (PM _{2.5})	54 (Exhaust Only)	54	10
PM ₁₀ / PM _{2.5} (Fugitive Dust)	Best Management Practices	None	None
Greenhouse Gases (GHG) (Projects other than stationary sources)	None	Compliance with Qualified Greenhouse Gas Reduction Strategy, or 1,100 MT of CO2e/yr, or 4.6 MT CO2e/SP/yr (residents + employees)	
<div>Notes: lbs/day = pounds per day. tpy = tons per year. MT = metric tons. CO2e/yr = carbon dioxide equivalent per year. CO2e/SP/yr = carbon dioxide equivalent per service population per year. Source: Bay Area Air Quality Management District 2010b.</div>			

4.3 IMPACTS

The following is a description of construction-related impacts of the West Antioch Creek Channel Improvement Project on criteria pollutant emissions.

Implementation of the Proposed Project would result in construction activity, which would generate air pollutant emissions. Construction activities such as demolition, grading, excavation and travel on unpaved surfaces would generate dust, and can lead to elevated concentrations of particulate matter emissions PM_{10} and $PM_{2.5}$. The operation of construction equipment results in exhaust emissions, which include ozone precursors ROG and NO_x .

As noted in the *Project Description* section of this *Air Quality Study*, activities in the sub-reaches of the Proposed Project may be combined in various ways. While the construction activities in each of the sub-reaches are relatively well-defined, the combination of sub-reaches that may be constructed concurrently is not known. **Table 11** presents estimates of construction-related ROG, NO_x , PM_{10} , and $PM_{2.5}$ emissions. Because the combination of sub-reaches is not known, **Table 11** presents emissions for each sub-reach activity individually. By presenting emissions for each sub-reach individually, this approach allows future calculations of various combinations.

In addition to showing emissions for each sub-reach individually, **Table 11** also separately shows emissions associated with pumps for dewatering. Emissions for dewatering pumps is shown separately because there would be one set of pumps operating regardless of the number of sub-reaches that may be constructed concurrently. For example, if sub-reaches B-1 and B-2 were constructed concurrently, the emissions for sub-reach B-1 would be added to emissions for sub-reach B-2, and emissions for dewatering pumps would also be added; the single set of pumps would dewater both sub-reaches. In this example, NO_x emissions for the combination of sub-reaches B-1 and B-2 would be 41.7 ppd ($17.6 + 15.3 + 8.8 = 41.7$).

4.3.1 Reactive Organic Gas Emissions

The maximum hypothetical daily amount of ROG emissions associated with construction of the Proposed Project would be the sum of all the ROG emissions shown in **Table 11**. This hypothetical scenario is unrealistic because it would involve all sub-reaches and all activities occurring on the same day. Even under this unrealistic scenario, ROG emissions would be 20.2 ppd, which would be less than the 54 ppd significance threshold for construction-related ROG emissions shown in **Table 10**. Therefore, according to methods described in the *Significance Thresholds* section of the *Air Quality Study*, this impact is considered less-than-significant, and no mitigation measures are required.

Table 11. Construction-Period Emissions for Each Sub-Reach and Activity

				Criteria Pollutant Emissions			
Reach	Sub-Reach	Activity	Estimated Duration (Weeks)	ROG	NO _x	PM ₁₀ (Exhaust Only)	PM _{2.5} (Exhaust Only)
<u>Emissions From Construction Activities, Excluding Pumps for Dewatering</u>							
A	A-1	Demolition/Excavation	3	2.6	15.2	1.2	1.1
		Culvert Placement	4	2.2	16.9	1.0	0.8
		Road Reconstruction	4	1.5	9.3	0.6	0.5
A	A-2	Demolition	2	1.2	5.7	0.5	0.4
		Excavation	8	2.3	22.3	1.0	0.9
		Soil Removal/Hauling	8	1.1	8.3	0.4	0.3
B	B-1		16	1.7	17.6	0.7	0.6
B	B-2		8	1.6	15.3	0.7	0.5
B	B-3		16	1.8	19.6	0.8	0.6
B	B-4		12	1.7	15.5	0.7	0.6
<u>Emissions from Pumps for Dewatering</u>							
All	All	Pumps for Dewatering	Entire Construction Period	2.5	8.8	0.7	0.6
Notes: ROG = reactive organic gases. NO _x = nitrogen oxides. PM ₁₀ = inhalable particulate matter. PM _{2.5} = fine particulate matter. All values are in pounds per day.							

4.3.2 Inhalable Particulate Matter (PM₁₀) - Exhaust

The maximum hypothetical daily amount of PM₁₀ emissions associated with construction of the Proposed Project would be the sum of all the PM₁₀ emissions shown in **Table 11**. Even under this unrealistic scenario, PM₁₀ emissions would be 8.6 ppd, which would be less than the 82 ppd significance threshold for construction-related PM₁₀ emissions shown in **Table 10**. Therefore, according to methods described in the *Significance Thresholds* section of the *Air Quality Study*, this impact is considered less-than-significant, and no mitigation measures are required.

4.3.3 Inhalable Particulate Matter (PM_{2.5}) - Exhaust

The maximum hypothetical daily amount of PM_{2.5} emissions associated with construction of the Proposed Project would be the sum of all the PM_{2.5} emissions shown in **Table 11**. Even under this unrealistic scenario, PM_{2.5} emissions would be 6.9 ppd, which would be less than the 54 ppd significance threshold for construction-related PM_{2.5} emissions shown in **Table 10**. Therefore, according to methods described in the *Significance Thresholds* section of the *Air Quality Study*, this impact is considered less-than-significant, and no mitigation measures are required.

4.3.4 Particulate Matter – Fugitive Dust

As shown in **Table 10**, PM₁₀ and PM_{2.5} emissions would be reduced to less-than-significant levels with implementation of Best Management Practices. Therefore, according to methods described in the *Significance Thresholds* section of the *Air Quality Study*, application of the following mitigation measures would reduce construction-related PM₁₀ and PM_{2.5} emissions to a less-than-significant level:

Mitigation Measures. The following mitigation measures should be implemented:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 mph.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California

airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.

7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
8. Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

4.3.5 Nitrogen Oxides

Table 11 presents estimates of construction-related NO_x emissions for each sub-reach individually.

- The largest individual amount would be for Excavation during sub-reach A-1. NO_x emissions would be 22.3 ppd for all activities except pumping for dewatering, and 8.8 ppd for dewatering pumping, for a total of 31.1 ppd (22.3 + 8.8 = 31.1).
- The smallest individual amount would be for Demolition during sub-reach A-1. NO_x emissions would be 5.7 ppd for all activities except pumping for dewatering, and 8.8 ppd for dewatering pumping, for a total of 14.5 ppd (5.7 + 8.8 = 14.5).

As noted earlier in this *Air Quality Study*, activities in the sub-reaches of the Proposed Project may be combined in various ways. However, the combination of sub-reaches that may be constructed concurrently is not known. The significance threshold for construction-related NO_x emissions shown in **Table 10** is 54 ppd. **Table 11** shows that NO_x emissions for each individual sub-reach would be below 54 ppd. However, if larger groups of sub-reaches were constructed concurrently, the NO_x emissions could exceed 54 ppd.

For evaluation and disclosure purposes in this *Air Quality Study*, a realistic potential set of combinations was analyzed (Matson pers. comm.). The following describes the combinations.

- In sub-reach A-1, demolition/excavation, culvert placement, and road reconstruction would occur separately and sequentially. That is, none of these three activities in this sub-reach would occur concurrently.
- In sub-reach A-2, demolition would occur by itself. Then, excavation and soil removal/hauling would occur concurrently.
- Sub-reaches B-1 and B-2 would occur concurrently.

- Sub-reaches B-3 and B-4 would occur concurrently.

Table 12 presents emissions that would occur due to construction of the combinations described above. The values in **Table 12** were calculated by summing emissions associated with individual sub-reaches, and adding emissions associated with pumps for dewatering. Emissions for each individual sub-reach and for dewatering pumps are shown in **Table 11**. For example, **Table 12** shows 41.7 ppd of NO_x emissions associated with sub-reach “B-1 Plus B-2”. The 41.7 ppd is calculated by summing the NO_x values shown in **Table 11** for sub-reach B-1 (17.6 ppd), sub-reach B-2 (15.3 ppd), and dewatering pumping (8.8 ppd).

As shown in the **Table 11**, the largest amount of NO_x emissions would occur during the concurrent construction of sub-reach B-3 and sub-reach B-4. The “B-3 Plus B-4” scenario would result in 43.9 ppd of NO_x emissions, which would be less than the 54 ppd significance threshold for construction-related NO_x emissions shown in **Table 10**. Therefore, according to methods described in the *Significance Thresholds* section of the *Air Quality Study*, this impact is considered less-than-significant, and no mitigation measures are required.

The combination of sub-reaches shown in **Table 12** is not the only combination of sub-reaches that could be constructed simultaneously while the impact remains less than significant. Any combination of sub-reaches with a sum of NO_x emissions less than 54 ppd would result in a less than significant impact.

Table 12. Construction Emissions from Potential Combinations of Sub-Reaches and Activities

Sub-Reach	Activity	Criteria Pollutant Emissions			
		ROG	NO _x	PM ₁₀ (Exhaust Only)	PM _{2.5} (Exhaust Only)
A-1	Demolition/Excavation	5.1	24.0	1.9	1.7
	Culvert Placement	4.7	25.7	1.7	1.4
	Road Reconstruction	4.0	18.1	1.3	1.1
A-2	Demolition	3.7	14.5	1.2	1.0
	Excavation Plus Soil Removal/Hauling	5.9	39.4	2.1	1.8
B-1 Plus B-2		5.8	41.7	2.1	1.7
B-3 Plus B-4		6.0	43.9	2.2	1.8
<p>Notes: ROG = reactive organic gases. NO_x = nitrogen oxides. PM₁₀ = inhalable particulate matter. PM_{2.5} = fine particulate matter. All values are in pounds per day.</p> <p>Emissions shown above are calculated by summing emissions from individual sub-reaches from Table 11, and adding emissions from pumps for dewatering. For example, NO_x emissions for "B-1 Plus B-2" is calculated as 17.6 + 15.3 + 8.8 = 41.7 pounds per day.</p> <p>Source: CalEEMod emissions model.</p>					

SECTION 5

LONG-TERM OPERATIONAL IMPACTS

This section of this *Air Quality Study* assesses the long-term operational impact of project-related emissions on air quality.

5.1 SIGNIFICANCE THRESHOLDS

Section 4.1, *Significance Thresholds*, of this *Air Quality Study*, describes significance thresholds recommended by the BAAQMD and applied in this study to both construction-related and operational criteria pollutant emissions.

5.2 METHODOLOGY

The West Antioch Creek Channel Improvement Project would not generate long-term operational emissions. Therefore, the project-related change in operational criteria pollutant emissions has not been quantified for this *Air Quality Study*.

5.3 IMPACTS

The following is a description of operational impacts of the West Antioch Creek Channel Improvement Project on criteria pollutant emissions.

Long-term operation of the West Antioch Creek Channel Improvement Project would not generate new vehicle trips, would not geographically re-distribute vehicle travel, and would not result in a change in stationary source emissions. Therefore, the Proposed Project would not result in a change in long-term operational ROG, NO_x, PM₁₀ or PM_{2.5} emissions, and would have a less-than-significant impact on ozone and particulate matter concentrations. This impact is considered less than significant and no mitigation measures are required.

SECTION 6

LOCAL CARBON MONOXIDE IMPACTS

Carbon monoxide emissions are strongly associated with vehicle travel. Elevated concentrations of CO are found in close proximity to roadway with high traffic volumes. Also, because vehicle CO emission rates increase as vehicle speeds decrease, elevated CO concentrations are associated with high levels of traffic congestion.

During the short-term construction period, the West Antioch Creek Channel Improvement Project would generate some vehicle trips and, therefore, would generate some amount of CO emissions. The vehicle trips would be primarily associated with construction worker commute travel. As described in the *Construction Schedule* section of this *Air Quality Study*, the construction crew size would be 25 to 30 people. The number of construction-period vehicle trips is expected to be modest, and is not expected to increase traffic volumes enough to result in a substantial change in traffic congestion.

Long-term operation of the West Antioch Creek Channel Improvement Project would not generate new vehicle trips, would not geographically re-distribute vehicle travel, and would not result in a change in stationary source emissions. Therefore, the Proposed Project would not result in a change in long-term operational CO emissions.

The project site is located in an area designated attainment or unclassified for federal and state CO air quality standards. This is confirmed by low monitored levels of CO concentrations shown in **Table 2**. Because of the low background concentrations of CO and the low number of vehicle trips that would be generated, the West Antioch Creek Channel Improvement Project is considered to not have the potential for resulting in violations of federal or state CO air quality standards. Therefore, the project is considered to have a less than significant on CO, and no mitigation measures are required.

SECTION 7

TOXIC AIR CONTAMINANTS

This section of this *Air Quality Study* describes the impact of the West Antioch Creek Channel Improvement Project related to two types of toxic air contaminants (TAC) emissions:

- naturally-occurring asbestos (NOA), and
- construction-related diesel particulate matter.

7.1 SIGNIFICANCE THRESHOLDS

The following describes thresholds applied in this *Air Quality Study* to determine the significance of impacts associated with naturally-occurring asbestos and diesel particulate matter.

7.1.1 Naturally-Occurring Asbestos

Portions of Contra Costa County contain a type of rock referred to as “ultramafic”. As a result, these areas are considered to be more likely to contain NOA. Emissions of NOA have been attributed to soil-disturbing activities, including construction activities. Construction activities could entrain NOA into the air, exposing on-site sensitive uses and other land uses in areas surrounding a project site to NOA.

A screening evaluation of potential impacts associated with NOA was conducted for this *Air Quality Study* based on a review of the California Department of Conservation map *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos* (California Department of Conservation 2000).

If the screening evaluation indicates an elevated likelihood of NOA being on the project site, the impact associated with NOA will be considered significant. If the screening evaluation does not indicate an elevated likelihood of NOA being on the project site, the impact will be considered less-than-significant.

7.1.2 Construction-Related Diesel Particulate Matter

A component of diesel exhaust is particulate matter. Diesel particulate matter (DPM) has been identified as a TAC (<http://www.arb.ca.gov/research/diesel/diesel-health.htm>). While the BAAQMD does not present significance threshold specifically for construction-related DPM, the significance thresholds presented in **Table 10** do include thresholds for PM₁₀ and PM_{2.5} from

construction-related exhaust. Because a substantial portion of construction-related exhaust is emitted by diesel engines, the PM₁₀ and PM_{2.5} construction-related exhaust thresholds presented in **Table 10** are used in this *Air Quality Study* to determine the significance of DPM emissions.

The BAAMQD thresholds for construction-related exhaust includes 82 ppd for PM₁₀ and 54 ppd for PM_{2.5}.

7.2 METHODOLOGY

The following describes the sources of information used to evaluate impacts associated with TAC emissions.

7.2.1 Naturally-Occurring Asbestos

The screening evaluation for NOA was based on documents available from the California Department of Conservation website (ftp://ftp.consrv.ca.gov/pub/dmg/pubs/ofr/ofr_2000-019.pdf).

7.2.2 Construction-Related Diesel Particulate Matter

As described in Section 4.2, *Methodology*, of this *Air Quality Study*, Version 7.1.4 of the Road Construction Emissions Model has been used to estimate construction-related emissions.

7.3 IMPACTS

The following is a description of the TAC emission impacts of the West Antioch Creek Channel Improvement Project.

7.3.1 Naturally-Occurring Asbestos

Based on information presented in the California Department of Conservation map *A General Location Guide for Ultramafic Rocks in California – Areas More Likely to Contain Naturally Occurring Asbestos*, the areas more likely to contain NOA which are nearest to the West Antioch Creek Channel Improvement Project site are approximately eight miles south-southeast of the project site in the Mount Diablo State Park.

Because no portion of the West Antioch Creek Channel Improvement Project site is in an area considered more likely to contain NOA, the impact of the Proposed Project on NOA is considered less-than-significant and no mitigation measures are required.

7.3.2 Construction-Related Diesel Particulate Matter

Table 11 shows project-related construction exhaust emissions for PM₁₀ and PM_{2.5}. As shown in **Table 11**, PM₁₀ emissions would be below the 82 ppd threshold, and PM_{2.5} emissions would be

below the 54 ppd threshold. Because construction-related exhaust emissions of PM₁₀ and PM_{2.5} would be below the BAAQMD significance threshold, the impact of the Proposed Project on construction-related diesel particulate matter is considered less than significant and no mitigation measures are required.

SECTION 8

GLOBAL CLIMATE CHANGE AND GREENHOUSE GAS IMPACTS

This section of this *Air Quality Study* describes the effects of the West Antioch Creek Channel Improvement Project on global climate change and GHG emissions. Short-term construction of the Proposed Project would generate emissions which are associated with global climate change. As noted earlier in Section 5, *Long-Term Operational Impacts*, of this *Air Quality Study*, the West Antioch Creek Channel Improvement Project would not result in a change in long-term operational emissions.

8.1 SIGNIFICANCE THRESHOLDS

Section 15064.4(a) of the State CEQA Guidelines states,

“The determination of the significance of greenhouse gas emissions calls for a careful judgment by the lead agency consistent with the provisions in section 15064. A lead agency should make a good-faith effort, based to the extent possible on scientific and factual data, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project.”

Section 15064.4(b) of the State CEQA Guidelines states,

“A lead agency should consider the following factors, among others, when assessing the significance of impacts from greenhouse gas emissions on the environment:

“(1) The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;

“(2) Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.”

Neither Section 15064.4(a) nor Section 15064.4(b) of the State CEQA Guidelines make a distinction between construction-related and operational GHG emissions.

As shown in **Table 10**, the BAAQMD does not specify a significance threshold for construction-related GHG emissions. For operational GHG emissions, the BAAQMD provides three alternative thresholds.

As noted earlier in Section 4 of this *Air Quality Study, Short-Term Construction Impacts*, the West Antioch Creek Channel Improvement Project would generate construction-related emissions. The Proposed Project would generate both criteria pollutant and GHG construction-related emissions. As noted earlier in Section 5 of this *Air Quality Study, Long-Term Operational Impacts*, the Proposed Project would not result in a change in operational emissions; this applies to both criteria pollutant emissions and GHG emissions.

While the BAAQMD significance thresholds for GHG emissions apply to operational emissions, rather than construction-related emissions, the BAAQMD GHG thresholds are applied in this *Air Quality Study* to project-related construction emissions. This approach is applied to provide a quantitative basis for determining the significance of project-related GHG emissions. This approach is considered conservatively strict because the BAAQMD operational significance thresholds for GHG emissions are intended to apply to annual emissions which would repeatedly occur every year for the lifetime of a project. Conversely, the Proposed Project would only generate construction-related emissions, which would only occur once, during the finite construction period.

As shown in **Table 10**, the following three alternative significance thresholds are provided by the BAAQMD for operational GHG emissions:

- compliance with a qualified Greenhouse Gas Reduction Strategy,
- 1,100 metric tons (MT) of CO₂e per year, or
- 4.6 MT of CO₂e per service population per year.

The first and third alternative thresholds listed above can be applied to long-term operational GHG emissions generated by land use development projects. However, the first and third alternative thresholds have only limited applicability to short-term construction-related emissions generated by infrastructure projects, such as the West Antioch Creek Channel Improvement Project. As a result, the second alternative threshold listed above is applied in this *Air Quality Study*. If construction of the Proposed Project would generate more than 1,100 MT of CO₂ per year, the project is considered to have a significant impact on GHG emissions.

8.2 METHODOLOGY

As described earlier in Section 4.2, *Methodology*, of this *Air Quality Study*, emissions associated with construction of the West Antioch Creek Channel Improvement Project were quantified using Version 7.1.4 of the *Road Construction Emissions Model*.

8.3 IMPACTS

Estimates of construction-related GHG emissions associated with the West Antioch Creek Channel Improvement Project are shown in **Table 13**. As shown in **Table 13**, the Proposed Project would result in 800.0 construction-related metric tons of CO₂e emissions during the construction period.

Because the West Antioch Creek Channel Improvement Project would result in construction-related GHG emissions which are less than the significance threshold of 1,100 metric tons per year of CO₂ emissions, this impact is considered less-than-significant and no mitigation measures are required.

Table 13. Construction-Period Greenhouse Gases Emissions

Reach	Sub-Reach	Activity	Construction Period CO₂ Emissions (Metric Tons)
A	A-1	Demolition/Excavation	26.1
		Culvert Placement	36.6
		Road Reconstruction	26.3
A	A-2	Demolition	12.6
		Excavation	85.7
		Soil Removal/Hauling	57.2
B	B-1		173.8
B	B-2		79.6
B	B-3		184.1
B	B-4		118.0
Construction Period Total			800.0
BAAQMD Significance Threshold			1,100
<hr/> <p>Notes: All values are expressed as metric tons of carbon dioxide emissions for the construction period. BAAQMD = Bay Area Air Quality Management District.</p> <p>Source: CalEEMod emissions model.</p>			

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TECHNICAL APPENDIX

**WEST ANTIOCH CREEK
CHANNEL IMPROVEMENT PROJECT**

AIR QUALITY STUDY

TECHNICAL APPENDIX

Road Construction Emissions Model Output Reports

**With Dewatering Pump Emissions
Included in Each Sub-Reach Activity**

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Demolition											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	5.0	23.5	23.9	23.9	1.9	22.0	6.3	1.7	4.6	3,493.1	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (pounds/day)	5.0	23.5	23.9	23.9	1.9	22.0	6.3	1.7	4.6	3,493.1	
Total (tons/construction project)	0.0	0.2	0.2	0.2	0.0	0.2	0.1	0.0	0.0	28.8	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 104 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Demolition											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	2.3	10.7	10.9	10.9	0.9	10.0	2.9	0.8	2.1	1,587.8	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (kilograms/day)	2.3	10.7	10.9	10.9	0.9	10.0	2.9	0.8	2.1	1,587.8	
Total (megagrams/construction project)	0.0	0.2	0.2	0.2	0.0	0.2	0.0	0.0	0.0	26.1	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 80 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Culvert Placement											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.6	22.8	25.6	23.6	1.6	22.0	6.0	1.5	4.6	3,672.5	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.6	22.8	25.6	23.6	1.6	22.0	6.0	1.5	4.6	3,672.5	
Total (tons/construction project)	0.1	0.3	0.3	0.1	0.0	0.1	0.0	0.0	0.0	40.4	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Culvert Placement											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.1	10.4	11.7	10.7	0.7	10.0	2.7	0.7	2.1	1,669.3	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	2.1	10.4	11.7	10.7	0.7	10.0	2.7	0.7	2.1	1,669.3	
Total (megagrams/construction project)	0.0	0.2	0.3	0.1	0.0	0.1	0.0	0.0	0.0	36.6	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Reconstruct Rdway										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	3.9	17.7	18.1	1.3	1.3	-	1.2	1.2	-	2,633.1
Maximum (pounds/day)	3.9	17.7	18.1	1.3	1.3	-	1.2	1.2	-	2,633.1
Total (tons/construction project)	0.0	0.2	0.2	0.0	0.0	-	0.0	0.0	-	29.0
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Reconstruct Rdway										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	1.8	8.0	8.2	0.6	0.6	-	0.5	0.5	-	1,196.9
Maximum (kilograms/day)	1.8	8.0	8.2	0.6	0.6	-	0.5	0.5	-	1,196.9
Total (megagrams/construction project)	0.0	0.2	0.2	0.0	0.0	-	0.0	0.0	-	26.3
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Demolition										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	3.6	17.2	14.4	49.1	1.1	48.0	11.0	1.0	10.0	2,525.0
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	3.6	17.2	14.4	49.1	1.1	48.0	11.0	1.0	10.0	2,525.0
Total (tons/construction project)	0.0	0.1	0.1	0.3	0.0	0.3	0.1	0.0	0.1	13.9
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Demolition										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	1.6	7.8	6.6	22.3	0.5	21.8	5.0	0.4	4.5	1,147.7
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.6	7.8	6.6	22.3	0.5	21.8	5.0	0.4	4.5	1,147.7
Total (megagrams/construction project)	0.0	0.1	0.1	0.2	0.0	0.2	0.1	0.0	0.0	12.6
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Excavation										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.7	23.4	31.0	49.7	1.7	48.0	11.5	1.5	10.0	4,292.8
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.7	23.4	31.0	49.7	1.7	48.0	11.5	1.5	10.0	4,292.8
Total (tons/construction project)	0.1	0.5	0.7	0.5	0.0	0.5	0.1	0.0	0.1	94.4
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 63 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Excavation										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.2	10.6	14.1	22.6	0.8	21.8	5.2	0.7	4.5	1,951.3
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	2.2	10.6	14.1	22.6	0.8	21.8	5.2	0.7	4.5	1,951.3
Total (megagrams/construction project)	0.1	0.5	0.6	0.5	0.0	0.4	0.1	0.0	0.1	85.7
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 48 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Soil Removal											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	3.5	17.3	17.1	49.1	1.1	48.0	10.9	0.9	10.0	2,866.6	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	3.5	17.3	17.1	49.1	1.1	48.0	10.9	0.9	10.0	2,866.6	
Total (tons/construction project)	0.1	0.4	0.4	0.5	0.0	0.5	0.1	0.0	0.1	63.1	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Soil Removal											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.6	7.8	7.8	22.3	0.5	21.8	5.0	0.4	4.5	1,303.0	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.6	7.8	7.8	22.3	0.5	21.8	5.0	0.4	4.5	1,303.0	
Total (megagrams/construction project)	0.1	0.3	0.3	0.5	0.0	0.4	0.1	0.0	0.1	57.2	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-1										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.1	22.0	26.3	189.4	1.4	188.0	40.3	1.2	39.1	4,355.4
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.1	22.0	26.3	189.4	1.4	188.0	40.3	1.2	39.1	4,355.4
Total (tons/construction project)	0.2	1.0	1.2	3.8	0.1	3.7	0.8	0.1	0.8	191.6
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (acres) -> 9 Maximum Area Disturbed/Day (acres) -> 9 Total Soil Imported/Exported (yd ³ /day)-> 157 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach B-1										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.9	10.0	12.0	86.1	0.6	85.5	18.3	0.5	17.8	1,979.7
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.9	10.0	12.0	86.1	0.6	85.5	18.3	0.5	17.8	1,979.7
Total (megagrams/construction project)	0.2	0.9	1.1	3.4	0.1	3.4	0.7	0.0	0.7	173.8
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (hectares) -> 4 Maximum Area Disturbed/Day (hectares) -> 4 Total Soil Imported/Exported (meters ³ /day)-> 120 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-2											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.1	21.7	24.1	57.3	1.3	56.0	12.8	1.1	11.6	3,988.7	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.1	21.7	24.1	57.3	1.3	56.0	12.8	1.1	11.6	3,988.7	
Total (tons/construction project)	0.1	0.5	0.5	0.6	0.0	0.6	0.1	0.0	0.1	87.8	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 3 Maximum Area Disturbed/Day (acres) -> 3 Total Soil Imported/Exported (yd ³ /day)-> 94 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach B-2											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.9	9.9	11.0	26.1	0.6	25.5	5.8	0.5	5.3	1,813.0	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.9	9.9	11.0	26.1	0.6	25.5	5.8	0.5	5.3	1,813.0	
Total (megagrams/construction project)	0.1	0.4	0.5	0.5	0.0	0.5	0.1	0.0	0.1	79.6	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 72 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-3										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.3	23.6	28.4	175.5	1.5	174.0	37.4	1.3	36.2	4,614.0
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.3	23.6	28.4	175.5	1.5	174.0	37.4	1.3	36.2	4,614.0
Total (tons/construction project)	0.2	1.0	1.2	3.5	0.1	3.4	0.8	0.1	0.7	203.0
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (acres) -> 9 Maximum Area Disturbed/Day (acres) -> 9 Total Soil Imported/Exported (yd ³ /day)-> 141 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach B-3										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.0	10.7	12.9	79.8	0.7	79.1	17.0	0.6	16.5	2,097.3
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	2.0	10.7	12.9	79.8	0.7	79.1	17.0	0.6	16.5	2,097.3
Total (megagrams/construction project)	0.2	0.9	1.1	3.2	0.1	3.1	0.7	0.1	0.6	184.1
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (hectares) -> 4 Maximum Area Disturbed/Day (hectares) -> 4 Total Soil Imported/Exported (meters ³ /day)-> 108 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-4											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	4.2	23.1	24.3	21.4	1.4	20.0	5.3	1.2	4.2	3,941.8	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	4.2	23.1	24.3	21.4	1.4	20.0	5.3	1.2	4.2	3,941.8	
Total (tons/construction project)	0.1	0.8	0.8	0.3	0.0	0.3	0.1	0.0	0.1	130.1	
Notes: Project Start Year -> 2014 Project Length (months) -> 3 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 26 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach B-4											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.9	10.5	11.0	9.7	0.6	9.1	2.4	0.5	1.9	1,791.7	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.9	10.5	11.0	9.7	0.6	9.1	2.4	0.5	1.9	1,791.7	
Total (megagrams/construction project)	0.1	0.7	0.7	0.3	0.0	0.3	0.1	0.0	0.1	118.0	
Notes: Project Start Year -> 2014 Project Length (months) -> 3 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 20 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

**Road Construction Emissions Model
Output Reports**

**With Dewatering Pump Emissions
Not Included in Each Sub-Reach Activity**

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Demolition											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	2.6	15.4	15.2	23.2	1.2	22.0	5.7	1.1	4.6	2,506.0	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (pounds/day)	2.6	15.4	15.2	23.2	1.2	22.0	5.7	1.1	4.6	2,506.0	
Total (tons/construction project)	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.0	0.0	20.7	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 104 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Demolition											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	1.2	7.0	6.9	10.6	0.6	10.0	2.6	0.5	2.1	1,139.1	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (kilograms/day)	1.2	7.0	6.9	10.6	0.6	10.0	2.6	0.5	2.1	1,139.1	
Total (megagrams/construction project)	0.0	0.1	0.1	0.2	0.0	0.2	0.0	0.0	0.0	18.8	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 80 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Culvert Placement											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.2	14.7	16.9	23.0	1.0	22.0	5.4	0.8	4.6	2,685.4	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	2.2	14.7	16.9	23.0	1.0	22.0	5.4	0.8	4.6	2,685.4	
Total (tons/construction project)	0.0	0.2	0.2	0.1	0.0	0.1	0.0	0.0	0.0	29.5	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Culvert Placement											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.0	6.7	7.7	10.4	0.4	10.0	2.5	0.4	2.1	1,220.7	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.0	6.7	7.7	10.4	0.4	10.0	2.5	0.4	2.1	1,220.7	
Total (megagrams/construction project)	0.0	0.1	0.2	0.1	0.0	0.1	0.0	0.0	0.0	26.8	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Reconstruct Rdway				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	1.5	9.6	9.3	0.6	0.6	-	0.5	0.5	-	1,646.0
Maximum (pounds/day)	1.5	9.6	9.3	0.6	0.6	-	0.5	0.5	-	1,646.0
Total (tons/construction project)	0.0	0.1	0.1	0.0	0.0	-	0.0	0.0	-	18.1
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach A-1 Reconstruct Rdway				Total	Exhaust	Fugitive Dust	Total	Exhaust	Fugitive Dust	
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM10 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	-	-	-	-	-	-	-	-	-	-
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	0.7	4.3	4.2	0.3	0.3	-	0.2	0.2	-	748.2
Maximum (kilograms/day)	0.7	4.3	4.2	0.3	0.3	-	0.2	0.2	-	748.2
Total (megagrams/construction project)	0.0	0.1	0.1	0.0	0.0	-	0.0	0.0	-	16.4
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Demolition											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	1.2	9.1	5.7	48.5	0.5	48.0	10.3	0.4	10.0	1,538.0	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (pounds/day)	1.2	9.1	5.7	48.5	0.5	48.0	10.3	0.4	10.0	1,538.0	
Total (tons/construction project)	0.0	0.1	0.0	0.3	0.0	0.3	0.1	0.0	0.1	8.5	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Demolition											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	0.5	4.2	2.6	22.0	0.2	21.8	4.7	0.2	4.5	699.1	
Grading/Excavation	-	-	-	-	-	-	-	-	-	-	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	
Paving	-	-	-	-	-	-	-	-	-	-	
Maximum (kilograms/day)	0.5	4.2	2.6	22.0	0.2	21.8	4.7	0.2	4.5	699.1	
Total (megagrams/construction project)	0.0	0.0	0.0	0.2	0.0	0.2	0.1	0.0	0.0	7.7	
Notes: Project Start Year -> 2014 Project Length (months) -> 1 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Excavation										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	2.3	15.3	22.3	49.0	1.0	48.0	10.9	0.9	10.0	3,305.7
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	2.3	15.3	22.3	49.0	1.0	48.0	10.9	0.9	10.0	3,305.7
Total (tons/construction project)	0.1	0.3	0.5	0.5	0.0	0.5	0.1	0.0	0.1	72.7
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 63 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Excavation										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.0	7.0	10.1	22.3	0.5	21.8	4.9	0.4	4.5	1,502.6
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	1.0	7.0	10.1	22.3	0.5	21.8	4.9	0.4	4.5	1,502.6
Total (megagrams/construction project)	0.0	0.3	0.4	0.5	0.0	0.4	0.1	0.0	0.1	66.0
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 48 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Soil Removal											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.1	9.2	8.3	48.4	0.4	48.0	10.3	0.3	10.0	1,879.6	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	1.1	9.2	8.3	48.4	0.4	48.0	10.3	0.3	10.0	1,879.6	
Total (tons/construction project)	0.0	0.2	0.2	0.5	0.0	0.5	0.1	0.0	0.1	41.4	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 2 Maximum Area Disturbed/Day (acres) -> 2 Total Soil Imported/Exported (yd ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach A-2 Soil Removal											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.5	4.2	3.8	22.0	0.2	21.8	4.7	0.1	4.5	854.3	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	0.5	4.2	3.8	22.0	0.2	21.8	4.7	0.1	4.5	854.3	
Total (megagrams/construction project)	0.0	0.2	0.2	0.4	0.0	0.4	0.1	0.0	0.1	37.5	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 0 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-1										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.7	13.9	17.6	188.7	0.7	188.0	39.7	0.6	39.1	3,368.3
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	1.7	13.9	17.6	188.7	0.7	188.0	39.7	0.6	39.1	3,368.3
Total (tons/construction project)	0.1	0.6	0.8	3.8	0.0	3.7	0.8	0.0	0.8	148.2
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (acres) -> 9 Maximum Area Disturbed/Day (acres) -> 9 Total Soil Imported/Exported (yd ³ /day)-> 157 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach B-1										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.8	6.3	8.0	85.8	0.3	85.5	18.0	0.3	17.8	1,531.0
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	0.8	6.3	8.0	85.8	0.3	85.5	18.0	0.3	17.8	1,531.0
Total (megagrams/construction project)	0.1	0.6	0.7	3.4	0.0	3.4	0.7	0.0	0.7	134.4
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (hectares) -> 4 Maximum Area Disturbed/Day (hectares) -> 4 Total Soil Imported/Exported (meters ³ /day)-> 120 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

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Emission Estimates for -> W Antioch Crk Sub-Reach B-2											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.6	13.6	15.3	56.7	0.7	56.0	12.2	0.5	11.6	3,001.6	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	1.6	13.6	15.3	56.7	0.7	56.0	12.2	0.5	11.6	3,001.6	
Total (tons/construction project)	0.0	0.3	0.3	0.6	0.0	0.6	0.1	0.0	0.1	66.0	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (acres) -> 3 Maximum Area Disturbed/Day (acres) -> 3 Total Soil Imported/Exported (yd ³ /day)-> 94 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach B-2											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.7	6.2	7.0	25.8	0.3	25.5	5.5	0.2	5.3	1,364.4	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	0.7	6.2	7.0	25.8	0.3	25.5	5.5	0.2	5.3	1,364.4	
Total (megagrams/construction project)	0.0	0.3	0.3	0.5	0.0	0.5	0.1	0.0	0.1	59.9	
Notes: Project Start Year -> 2014 Project Length (months) -> 2 Total Project Area (hectares) -> 1 Maximum Area Disturbed/Day (hectares) -> 1 Total Soil Imported/Exported (meters ³ /day)-> 72 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-3										
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.8	15.5	19.6	174.8	0.8	174.0	36.8	0.6	36.2	3,626.9
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	1.8	15.5	19.6	174.8	0.8	174.0	36.8	0.6	36.2	3,626.9
Total (tons/construction project)	0.1	0.7	0.9	3.5	0.0	3.4	0.7	0.0	0.7	159.6
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (acres) -> 9 Maximum Area Disturbed/Day (acres) -> 9 Total Soil Imported/Exported (yd ³ /day)-> 141 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										
Emission Estimates for -> W Antioch Crk Sub-Reach B-3										
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.8	7.0	8.9	79.4	0.4	79.1	16.7	0.3	16.5	1,648.6
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	0.8	7.0	8.9	79.4	0.4	79.1	16.7	0.3	16.5	1,648.6
Total (megagrams/construction project)	0.1	0.6	0.8	3.2	0.0	3.1	0.7	0.0	0.6	144.7
Notes: Project Start Year -> 2014 Project Length (months) -> 4 Total Project Area (hectares) -> 4 Maximum Area Disturbed/Day (hectares) -> 4 Total Soil Imported/Exported (meters ³ /day)-> 108 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.										

Road Construction Emissions Model, Version 7.1.4

Emission Estimates for -> W Antioch Crk Sub-Reach B-4											
Project Phases (English Units)	ROG (lbs/day)	CO (lbs/day)	NOx (lbs/day)	Total PM10 (lbs/day)	Exhaust PM10 (lbs/day)	Fugitive Dust PM10 (lbs/day)	Total PM2.5 (lbs/day)	Exhaust PM2.5 (lbs/day)	Fugitive Dust PM2.5 (lbs/day)	CO2 (lbs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	1.7	15.0	15.5	20.7	0.7	20.0	4.7	0.6	4.2	2,954.7	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (pounds/day)	1.7	15.0	15.5	20.7	0.7	20.0	4.7	0.6	4.2	2,954.7	
Total (tons/construction project)	0.1	0.5	0.5	0.3	0.0	0.3	0.1	0.0	0.1	97.5	
Notes: Project Start Year -> 2014 Project Length (months) -> 3 Total Project Area (acres) -> 1 Maximum Area Disturbed/Day (acres) -> 1 Total Soil Imported/Exported (yd ³ /day)-> 26 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											
Emission Estimates for -> W Antioch Crk Sub-Reach B-4											
Project Phases (Metric Units)	ROG (kgs/day)	CO (kgs/day)	NOx (kgs/day)	Total PM10 (kgs/day)	Exhaust PM10 (kgs/day)	Fugitive Dust PM10 (kgs/day)	Total PM2.5 (kgs/day)	Exhaust PM2.5 (kgs/day)	Fugitive Dust PM2.5 (kgs/day)	CO2 (kgs/day)	
Grubbing/Land Clearing	-	-	-	-	-	-	-	-	-	-	-
Grading/Excavation	0.8	6.8	7.1	9.4	0.3	9.1	2.1	0.3	1.9	1,343.0	
Drainage/Utilities/Sub-Grade	-	-	-	-	-	-	-	-	-	-	-
Paving	-	-	-	-	-	-	-	-	-	-	-
Maximum (kilograms/day)	0.8	6.8	7.1	9.4	0.3	9.1	2.1	0.3	1.9	1,343.0	
Total (megagrams/construction project)	0.1	0.4	0.5	0.3	0.0	0.3	0.1	0.0	0.1	88.4	
Notes: Project Start Year -> 2014 Project Length (months) -> 3 Total Project Area (hectares) -> 0 Maximum Area Disturbed/Day (hectares) -> 0 Total Soil Imported/Exported (meters ³ /day)-> 20 PM10 and PM2.5 estimates assume 50% control of fugitive dust from watering and associated dust control measures if a minimum number of water trucks are specified. Total PM10 emissions shown in column F are the sum of exhaust and fugitive dust emissions shown in columns H and I. Total PM2.5 emissions shown in Column J are the sum of exhaust and fugitive dust emissions shown in columns K and L.											

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

APPENDIX B

Biological Resources Assessment

BIOLOGICAL RESOURCES ASSESSMENT

WEST ANTIOCH CREEK CHANNEL IMPROVEMENTS
CITY OF ANTIOCH, CONTRA COSTA COUNTY, CALIFORNIA



Prepared for

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APRIL 2013
REVISED SEPTEMBER 2013

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Section 1. INTRODUCTION

As requested by the City of Antioch, Nomad Ecology prepared this Biological Resources Assessment for the West Antioch Creek Channel Improvements Project located in the City of Antioch in Contra Costa County, California (Figure 1). The study area for this report comprises approximately 72.4 acres and includes portions of 40 parcels. The study area contains a 0.79 mile stretch of West Antioch Creek. A Biological Resources Assessment was prepared in 2009 for a 4.9-acre portion of this project area (previously called Drainage Area 55 Box Culvert at 10th Street), as requested by the Contra Costa County Public Works Department.

The original Drainage Area 55 Box Culvert at 10th Street project is identified as a covered project in the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) (Jones & Stokes 2006). The remainder of the project is not within the HCP/NCCP Inventory Area. The City of Antioch may apply for coverage for a portion or all of the project under the HCP/NCCP. This report is presented under the assumption that the project may be permitted through the HCP, may be permitted via typical non-HCP project permitting, or a combination of the two.

This report provides an assessment of existing conditions, evaluates habitat suitability for special-status plant and wildlife species, analyzes potential project impacts to biological resources, and provides recommendations for impact avoidance and minimization. This report identifies Planning Level Surveys required by the HCP/NCCP and complies with all requirements of the HCP/NCCP. This report also addresses biological resources, as required by the California Environmental Quality Act (CEQA).

A Wetland Delineation and Preliminary Jurisdictional Determination report (Nomad 2013a) and Botanical Resource Survey Report (Nomad 2013b) have been prepared for this project.

1.1. PURPOSE AND NEED

The purpose of the proposed project is to reduce flooding in the project area by increasing the capacity of the West Antioch Creek channel between West 10th Street and West 8th Street and re-establish the capacity of the channel downstream of West 8th Street to the BNSF railroad trestle.

1.2. PROJECT BACKGROUND

In 1993, the Contra Costa County Flood Control District completed channel improvements for West Antioch Creek (1993 Project). The 1993 Project improved the conveyance capacity of the West Antioch Creek channel, from approximately 200 feet north of the BNSF railroad crossing upstream to approximately West 8th Street in the City of Antioch, to convey up to the 25-year storm event flows. The 25-year level of protection was the design conveyance criterion for the 1993 Project. The available funding at the time did not allow channel improvements to extend upstream of West 8th Street. As a result, a 650-foot segment of undersized channel exists between the southern limits of the 1993 Project upstream to the earthen trapezoidal channel on the Contra Costa County Fairgrounds property south of West 10th Street.

This 650-foot segment of West Antioch Creek channel transitions from an earthen trapezoidal channel near the Contra Costa County Fairgrounds, to structural plate steel arch culverts under West 10th Street, then to a narrow concrete ditch in the stretch of the creek between West 10th Street and West 8th Street. This segment of the West Antioch Creek channel has the capacity to convey runoff from an approximately one to two year return period storm event, as compared to the Contra Costa County design criteria of a 100-year storm for watersheds this size. Furthermore, the previously improved channel

segment of West Antioch Creek (1993 Project) has significantly diminished capacity due to sediment deposition. As a result, annual flooding can occur adjacent to West Antioch Creek near the intersection of West 10th Street and O Street.

Flooding in this area is a public safety concern, results in property damage, and creates economic damages. Frequent flooding results in road closures at the intersection of West 10th Street and O Street and along 4th Street up to several times a year. Road closures result in the loss of commercial business which has led major businesses to relocate out of the area. Furthermore, the effort by the City to enforce road closures, fight floodwaters, and to clean up debris after flooding recedes is a drain on the City's resources and budget. The Proposed Project was developed to increase the capacity of the West Antioch Creek channel to reduce flooding in the area and the impacts that result from it.

1.3. PROJECT DESCRIPTION

The Proposed Project is intended to reduce flooding in the project area. Currently within the project area the West Antioch Creek channel transitions from structural plate steel arch culverts under West 10th street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a covered parking structure for an apartment building, to an earthen channel, to a concrete box culverts under West Fourth Street, to a concrete channel that extends approximately 400 feet north of West Fourth Street, to an earthen channel that continues north to the BNSF railroad trestle. The Proposed Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West 10th Street to the 1993 Project limits (approximately West 8th Street) (Figure 2). Project work in Reach B (desilting) would desilt the channel between the 1993 Project limits at approximately West 8th Street to approximately 200 feet north of the BNSF railroad trestle. Either reach can be improved independently from the other or concurrently, but work in both reaches must be conducted in order realize improved levels of flood protection.

Reach A – Conveyance Improvements

Reach A conveyance improvements would include the installation of four pre-cast concrete box culverts across West 10th Street and a new earthen channel from West 10th Street to the 1993 Project limits. Four barrels of pre-cast concrete box culverts measuring 14 feet by 7 feet each would be used for a total length of approximately 100 feet. The new earthen channel would avoid impacting existing buildings on a privately owned parcel and would require the City to acquire a permanent easement or right-of-way along the eastern parcel boundary. This design would allow for 25-year storm event flows.

This design would replace 400 feet of open, lined, channel (~0.25 acres) with wider earthen channel and add 200 feet of open earthen channel (total earthen channel area ~1.3 acres). A total of 0.5-acre of paved area currently used for parking would be converted to earthen channel. The northern section of 1400 West Tenth Street, including 0.2-acre of parking and access to service bays would be converted to earthen channel or become inaccessible. An additional 40 linear feet of parking structure associated with an apartment complex would be relocated.

Reach B – Desilting

Project work in Reach B (desilting) would include the removal of accumulated sediment from the earthen channel from the 1993 Project limits downstream to approximately 200 feet north of the BNSF railroad trestle. Approximately 3,000 linear feet of channel would be desilted. Approximately 30,000 cubic yards of sediment accumulated since the completion of the 1993 Project would be removed from the channel to re-establish the 1993 Project design contours, restoring the design capacity of the channel. Depending on the characterization of the material that is removed, it would be disposed at Jersey Island for use in levee

buttness construction, Ironhouse Sanitary District's Wastewater Treatment Plant, Keller Canyon Landfill or another suitable facility. In addition to sediment, the project would remove approximately 7,580 cubic yards of decayed marsh vegetation, which would be disposed of at Jersey Island, Keller Canyon Landfill, or a suitable nearby composting facility.

Section 2. STUDY METHODS

2.1. DEFINITIONS

The following terms were used to evaluate the sensitivity of on-site biological resources and potential impacts of the proposed project. Terms and definitions are derived from the CEQA Guidelines and regulatory agencies, where applicable.

Study Area The study area refers to the area where vegetation types were mapped and habitat was surveyed. The study area for this report comprises approximately 72.4 acres and includes portions of 40 parcels (Table 1). The analysis for this report extends beyond the immediate study area to address potential impacts to special-status wildlife species that could result from construction of the project.

Table 1. Parcels or Portions of Parcels in the Study Area

ASSESSOR'S PARCEL NUMBER (APN)			
066-081-XXX	074-040-047	074-130-038	074-130-067
066-110-005	074-040-XXX	074-130-040	074-130-068
066-110-009	074-130-002	074-130-050	074-130-069
067-010-003	074-130-011	074-130-053	074-130-074
074-030-003	074-130-012	074-130-056	074-130-076
074-040-023	074-130-025	074-130-057	074-130-077
074-040-035	074-130-031	074-130-058	074-130-080
074-040-036	074-130-032	074-130-060	074-130-081
074-040-044	074-130-033	074-130-061	074-130-082
074-040-046	074-130-035	074-130-064	074-130-XXX

Project Footprint The project area is based on construction plans and will be smaller than the study area. Construction-related activities within the project footprint include soils excavation, culvert installation, and erosion protection installation.

Action Area Defined by the U.S. Fish and Wildlife Service (USFWS) as the area directly or indirectly affected by the proposed action and not merely the immediate area involved in the action. The area is typically larger than the project area and may extend beyond the study area to account for direct and indirect effects to listed species.

Direct Impact Impacts (or primary effects) that are caused by the Project and occur at the same time and place [CEQA Guidelines, Title 14 CCR, Section 15358(a)(1)].

Indirect Impact Impacts (or secondary effects) that are caused by the Project and are later in time or farther removed in distance, but are still reasonably foreseeable. These may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on

air and water and other natural systems, including ecosystems [CEQA Guidelines, Title 14 CCR, Section 15358(a)(2)].

Cumulative Impact	Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time [CEQA Guidelines, Title 14 CCR, Section 15355].
Critical Habitat	Defined by the Endangered Species Act (ESA), as amended (Code of Federal Regulations, Title 50, Section 17), as “a specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery.” Critical habitat designations are published in the Federal Register. The final boundaries of the critical habitat area are also published in the Federal Register for federally listed species by USFWS and NOAA Fisheries.
DPS	A distinct population segment (DPS) is a vertebrate population or group of populations that are distinct from other populations of the species and significant in relation to the entire species. The ESA provides for listing species, subspecies, or distinct population segments of vertebrate species.
ESU	An evolutionarily significant unit (ESU) is a population or group of populations that is substantially reproductively isolated from other conspecific populations and that represents an important component of the evolutionary legacy of the species. The ESU policy for Pacific salmon defines the criteria for identifying a Pacific salmon population as a distinct population segment (DPS), which can be listed under the ESA.

2.2. SIGNIFICANCE CRITERIA

The significance criteria are based in part on the Environmental Checklist (CEQA Guidelines Appendix G [Title 14 CCR, Section 15000-15387]). These criteria are used to determine the extent to which the proposed project would impact sensitive biological resources. The threshold of significance may vary for each species or habitat, and is determined by the lead agency. Using these guidelines, the Project would result in a significant impact if it would:

- 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.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service.

- 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.
- 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.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

2.3. DATA RESOURCES

Prior to conducting the field evaluation, various data sources were examined for listed and special-status plant and wildlife species, and sensitive natural communities:

U.S. Fish and Wildlife Service (USFWS):

- Endangered and Threatened Wildlife and Plants (USFWS 1999, 2008)
- Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in Contra Costa County (USFWS 2013a)
- Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in the Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista USGS 7 ½ Minute Quads (USFWS 2013b)
- National Wetland Inventory for the Antioch North 7.5-minute USGS topographic quadrangle (USFWS 2013c)

National Oceanic and Atmospheric Administration Fisheries (NOAA):

- Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act (NOAA 2004)
- Endangered and Threatened Species; Revision of Species of Concern List, Candidate Species Definition, and Candidate Species List (NOAA 2006)

California Department of Fish and Wildlife¹ (CDFW):

- List of California Vegetation Alliances and Associations. The Vegetation Classification and Mapping Program (CDFG 2010)
- State and Federally Listed Endangered, Threatened and Rare Plants of California (CDFW 2013b)
- State and Federally Listed Endangered and Threatened Animals of California (CDFW 2013c)
- Special Vascular Plants, Bryophytes, Lichens List (CDFW 2013d)
- Special Animals (CDFG 2011)

¹ Formerly the California Department of Fish and Game (CDFG). The change to California Department of Fish and Wildlife occurred on January 1, 2013.

- California Natural Diversity Database (CNDDDB) Query for the Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista USGS 7 ½ Minute Quads (CDFW 2013a)

Other Sources:

- East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan (Jones & Stokes 2006)
- The Jepson Manual, 2nd Edition (Baldwin et al. 2012)
- The California Native Plant Society's Inventory of Rare and Endangered Plants of California (CNPS 2001a, 2012)
- Specimen Management System for California Herbaria (CCH 2013)
- A Manual of California Vegetation (Sawyer et al. 2009)
- Contra Costa County Breeding Bird Atlas (CCCBBA 2002)
- Contra Costa County Watershed Atlas (CCCCDD 2003)
- Annotated Checklist of the East Bay Flora (Ertter and Naumovich 2013)
- Unusual and Significant Plants of Alameda and Contra Costa Counties. Seventh Edition (Lake 2010)
- Biological Resource Assessment, Drainage Area 55 Box Culvert at 10th Street, City of Antioch, Contra Costa County (Nomad Ecology 2009)

Botanical taxonomy and nomenclature conforms to *The Jepson Manual*, 2nd Edition (Baldwin et al. 2012). Common names of plant species are derived from *The Calflora Database* (Calflora 2013). Land Cover Types described herein conform to the HCP/NCCP (Jones & Stokes 2006), *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986) and *A Manual of California Vegetation* (Sawyer et al. 2009); wetland and deepwater habitat classifications conform to *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979), where appropriate.

Nomenclature for special-status plant species conform to the *Inventory of Rare and Endangered Plants of California* (CNPS 2001a, 2012) and *Special Vascular Plants, Bryophytes and Lichens List* (CDFW 2013d). Nomenclature for common and special-status wildlife conforms to the *Complete List of Amphibian, Reptile, Bird and Mammal Species in California* (CDFG 2008) with taxonomic nomenclature updates conforming to the *Checklist of North American Birds* (AOU 2012) and supplements published in *The Auk* for birds, *An Annotated Check List of the Amphibians and Reptiles of California and Adjacent Waters* (Jennings 2004) for amphibians and reptiles, and *Mammals of California* (ASM 2013) for mammals. Nomenclature for freshwater and terrestrial invertebrates conforms to *Special Animals* (CDFG 2011) and *A List of Freshwater, Anadromous, and Euryhaline Fishes of California* (Moyle and Davis 2000) for freshwater, anadromous, and euryhaline fishes.

2.4. REGULATORY FRAMEWORK

Sensitive Natural Communities

Sensitive natural communities are characterized as plant assemblages that are unique in constituent components, restricted in distribution, supported by distinctive soil conditions, considered locally rare, potentially support special-status plant or wildlife species and/or receive regulatory protection from municipal, county, state and/or federal entities. The regulatory framework that protects sensitive natural communities is derived from local, state and federal laws and regulations including Section 10 of the federal Rivers and Harbors Act, Sections 401 and 404 of the federal Clean Water Act, Section 1600 *et seq.*

of the California Fish and Game Code, Section 15065 of the CEQA guidelines, and various other city or county codes. Implementation and enforcement of these regulations are conducted by their respective regulatory entities such as the U.S. Army Corps of Engineers, California Regional Water Quality Control Board, CDFW, lead agency and/or various cities or counties. The CNDDDB treats a number of natural communities as rare, which are given the highest inventory priority (Holland 1986; CDFG 2010). The HCP/NCCP also includes Uncommon Vegetation Types, which are a subset of Land Cover Types. For a summary of the laws and regulations regarding sensitive natural communities please refer to Appendix B.

Special-Status Species

Special-status plant species are defined as those species listed as endangered or threatened, are proposed or candidates for listing, or are designated as fully protected species under one or more of the following regulatory statutes: ESA, as amended (Code of Federal Regulations, Title 50, Section 17), California Endangered Species Act (CESA) (California Code of Regulations Title 14, Section 670.5), California Fish and Game Code (Sections 1901, 2062, 2067) and the Native Plant Protection Act (NPPA) of 1977. Special-status species may also include locally rare species defined by CEQA guidelines 15125(c) and 15380, which may include species that are designated as sensitive, declining, rare, locally endemic or as having limited or restricted distribution by various federal, state, and local agencies, organizations, and watchlists. Their status is based on their rarity and endangerment throughout all or portions of their range. Such species are referred to as special-status species or “target species” herein. For a summary of the laws and regulations regarding special-status species please refer to Appendix B.

The California Native Plant Society (CNPS) has developed and maintains an inventory of rare, threatened and endangered plants of California. This information is published in the *Inventory of Rare and Endangered Vascular Plants of California*. The rarity ranking contained in the CNPS inventory is endorsed by the CDFW and effectively serves as its list of “candidate” plant species. The following identifies the definitions of the CNPS California Rare Plant Ranks:

- Rank 1A: Plants presumed to be extinct in California;
- Rank 1B: Plants that are rare, threatened, or endangered in California and elsewhere;
- Rank 2: Plants that are rare, threatened, or endangered in California, but are more numerous elsewhere;
- Rank 3: Plants about which more information is needed (a review list); and
- Rank 4: Plants of limited distribution (a watch list).

California Rare Plant Rank 1B and 2 species are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code. As part of the CEQA process, such species should be fully considered, as they meet the definition of Threatened or Endangered under the NPPA and Sections 2062 and 2067 of the California Fish and Game Code. California Rare Plant Rank 3 and 4 species are considered to be either plants about which more information is needed or are uncommon enough that their status should be regularly monitored. Such plants may be eligible or may become eligible for state listing, and CNPS and CDFW recommend that these species be evaluated for consideration during the preparation of CEQA documents (CNPS 2001a, 2012), as some of these species may meet NPPA and CESA criteria as threatened or endangered.

The East Contra Costa County Habitat Conservation Plan/Natural Communities Conservation Plan Inventory Area (HCP/NCCP) (Jones & Stokes 2006) obtains authorization for take of covered species under FESA and CESA are evaluated and conservation will occur. Covered species (Table 2) are those

species fully addressed in the HCP/NCCP and are included in the ESA and NCCP incidental take permits by evaluating and complying with avoidance and minimization requirements at a regional scale. In addition, the HCP/NCCP covers “no-take” species (Table 3), which are species for which take is not authorized under the Natural Community Conservation Plan Act (NCCPA). In order to comply with the terms of the HCP/NCCP, the applicant must avoid all direct and indirect impacts on no-take species.

Table 2. Covered Species in the HCP/NCCP

COVERED SPECIES (28 SPECIES)	
<u>PLANTS</u>	<u>AMPHIBIANS</u>
Mount Diablo manzanita	California tiger salamander
Brittlescale	California red-legged frog
San Joaquin spearscale	Foothill yellow-legged frog
Big tarplant	<u>REPTILES</u>
Mount Diablo fairy lantern	Silvery legless lizard
Recurved larkspur	Alameda whipsnake
Round-leaved filaree	Giant garter snake
Diablo helianthella	Western pond turtle
Brewer’s dwarf flax	<u>BIRDS</u>
Showy madia	Tricolored blackbird
Adobe navarretia	Golden eagle
<u>INVERTEBRATES</u>	Western burrowing owl
Longhorn fairy shrimp	Swainson’s hawk
Vernal pool fairy shrimp	<u>MAMMALS</u>
Midvalley fairy shrimp	Townsend’s western big-eared bat
Vernal pool tadpole shrimp	San Joaquin kit fox

Table 3. No-Take Species in the HCP/NCCP

NO TAKE SPECIES (10 SPECIES)	
<u>PLANTS</u>	<u>WILDLIFE</u>
Large-flowered fiddleneck	American peregrine falcon
Alkali milk-vetch	Golden eagle
Mount Diablo buckwheat	Ringtail
Diamond-petaled poppy	White-tailed kite
Contra Costa goldfields	-
Caper-fruited tropidocarpum	-

2.5. PERSONNEL AND FIELD INVESTIGATION

Nomad senior botanist Heath Bartosh, botanist/wetland specialist Erin McDermott, and wildlife ecologist Jerry Roe conducted a site visit on March 12, 2013. An additional site visit was conducted on August 27, 2013 to assess parcels that had been added to the study area for staging areas and access. All proposed impact areas and vegetation communities within the study area were visited and evaluated for their potential to support sensitive biological resources. All plant species in bloom or otherwise recognizable were identified to a level necessary to determine their regulatory status. All wildlife species observed or

recognized by diagnostic sign (e.g. tracks, scat, burrow activity, carcasses, castings, prey remains) were recorded and identified to species, where feasible.

Rare plant surveys were conducted by Mr. Bartosh and Ms. McDermott on June 12, July 8, July 25, and August 27, 2013. The purpose of these surveys was to conduct a floristic analysis of vascular plants of the study area to document any occurrence of rare, threatened or endangered species and other special status plants and vegetation communities. Surveys were conducted in accordance with California Native Plant Society's *Botanical Survey Guidelines* (CNPS 2001b), California Department of Fish and Game's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFG 2009), and U.S. Fish and Wildlife's *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants* (USFWS 2000). Results of these surveys are summarized in this report and detailed in the Botanical Resource Survey Report (Nomad 2013b).

Timing of rare plant surveys was based on peak blooming periods of the potentially-occurring special-status species. Collection dates based on historical collection data compiled from the CNPS' Inventory of Rare and Endangered Plants and the Consortium of California Herbaria records were analyzed. Results of these surveys are summarized in this report and detailed in the Botanical Resource Survey Report (Nomad 2013b).

A wetland delineation was conducted for the study area during the March 12, 2013 site visit. Site visits for the Drainage Area 55 Box Culvert at 10th Street project were conducted on July 8, 2009 and February 24, 2010. Focused botanical surveys or focused species surveys for wildlife species were not conducted during the field investigations.

2.6. LIMITATIONS

Based on the timing of this assessment, not all potentially occurring special-status plant, fish or wildlife species can be entirely ruled out. However, determinations of presence/absence within the study area were possible for specific special-status plant species with blooming periods corresponding to the March 2013 site visit, or by direct observation or presence of diagnostic sign for wildlife species. Negative findings during site assessments or focused surveys may not indicate absence unless field surveys conform to agency approved protocols.

Based on the timing of the site visit, all plant species growing within the study area may not have been observed due to varying flowering phenologies and life forms, such as bulbs, biennials, and annuals. Other potentially dominant species within vegetation communities on site may be present during other times of the year. Therefore, the present study is not floristic in nature. A complete determination of the presence or absence of potentially occurring botanical resources would require focused surveys to be conducted during all appropriate blooming periods (CNPS 2001b, CDFG 2009, USFWS 2000). Specific plant species identifications in this report are tentative due to the absence of morphological characters, resulting from immature reproductive structures or seasonal desiccations, which are required to make species level determinations. In these cases, *cf* (compares to) is used to indicate provisional species identification based on gestalt, vegetative morphology and/or its known range.

Additionally, certain plant species, especially annuals, may be absent in some years due to annual variations in temperature and rainfall, which influence plant phenology. Colonization of new populations within an area may also occur from year to year. Therefore, since vegetation descriptions are based on one site visit conducted in 2013, vegetation descriptions may change in the event multiple season data are collected as annual species dominance may change depending on the sample season. The phrase "in part" is used to signify that vegetation descriptions may include additional annual species present if surveyed

during other seasons. The proposed areas evaluated in this report are based on the project description provided by the City. Significant changes in the project design may warrant further analysis.

Section 3. ENVIRONMENTAL SETTING

3.1. SETTING

3.1.1 REGIONAL SETTING

As described in the *Ecological Subregions of California* (USDA 1997), the study area is geographically situated on the western edge of the Great Valley within the West Side Fans and Alluvial Terraces subsection of California Ecoregions (USDA 1997). The *Ecological Subregions of California* is the basis for describing regional variation in California alliance descriptions in *A Manual of California Vegetation* (Sawyer et al. 2009).

Regionally, the West Side Fans and Alluvial Terraces consists of terraces and alluvial fans along the western edge of the San Joaquin Valley, adjacent to the South Coast Ranges, which are characterized by a hot and semi-arid to sub-humid climate. A subsection of the Great Valley subregion, West Side Fans and Alluvial Terraces range in elevation from 0 feet to about 1,500 feet. This ecological subsection is mainly comprised of Quaternary alluvium, and some Plio-Pleistocene sediments. The alluvium is predominantly from sedimentary rock sources in the South Coast Ranges (USDA 1997). Most of the soils are well drained, however some poorly drained soils also occur where calcium carbonates and even sodium can accumulate. For this subsection, the mean annual precipitation ranges from 8 to 16 inches and is almost entirely rainfall. The mean annual temperature is generally between 59° and 62°F, and the mean freeze-free period is from 250 to 275 days. Hydrologically, streams of this subsection drain into the San Joaquin River, and all but the largest streams are generally dry during the summer.

3.1.2 LOCAL SETTING

The study area is located in the City of Antioch approximately 0.75-mile north of Highway 4. It extends from just south of the intersection of O Street and 10th St. north to the marsh that borders the San Joaquin River. The study area lies approximately 10 miles northeast of the peak of Mount Diablo. It is located within the San Joaquin Valley subregion of the California Floristic Province and within the East and West Antioch Creek Watersheds (CCCCDD 2003). As recorded in the public land survey system, the study area lies within Township 2 North and Range 1 East of the Mount Diablo Baseline and Meridian. It is depicted on the Antioch North (38121a7) 7.5-minute USGS topographic quadrangle (Figure 3).

The study area includes portions of 40 parcels that total approximately 72.4 acres, located in an urban area of the City of Antioch. It includes an approximately 0.79-mile stretch of West Antioch Creek. At the upstream end of the project area, the creek is surrounded by homes, apartments, a hotel, the Contra Costa County Fairgrounds, a vacant lot, and a vacant car dealership, and runs under a four-lane roadway at 10th St. Further downstream the creek is bordered by the history museum and industrial warehouses, runs under West 4th Street, and is crossed by a railroad (Figure 4). West Antioch Creek flows into the Dow Wetlands Preserve, which borders the San Joaquin River.

Topography of the study area is fairly level, gradually sloping downstream, and ranges from approximately 10-30 feet elevation. Annual average rainfall is approximately 15 inches (PRISM 2007). The underlying geology of the study area consists of undivided Pleistocene and Holocene surficial deposits (Graymer et al. 1994). A total of five soil mapping units are located within the study area: Brentwood clay loam; Joice muck; Marcuse clay; Rincon clay loam, 9-15% slopes; and Sycamore silty clay loam (USDA 1977). Photographs of the study area are included in Appendix D.

3.2. HYDROLOGY CHARACTERISTICS

Hydrology on site can be influenced by many factors, such as precipitation, run-off, geologic stratigraphy, topography, soil permeability, and plant cover. The single hydrologic feature on site is an approximately 0.79-mile stretch of West Antioch Creek. West Antioch Creek is characterized as an intermittent “blue-line” stream on the Antioch North and Antioch South USGS 7.5-minute quadrangles and in the HCP/NCCP. However, it receives local runoff from adjacent development, which may contribute to surface water flow all year. West Antioch Creek contained flowing water during the March and August 2013 and April and July 2009 site visits.

West Antioch Creek originates in the Mount Diablo foothills to the south and drains north into the Sacramento-San Joaquin Delta. West Antioch Creek originates in Black Diamond Mine Regional Park, flows north into Antioch Municipal Reservoir, continues north and is joined by several tributaries near Highway 4. Markley Canyon Creek flows into West Antioch Creek approximately 0.5-mile south of the study area. West Antioch Creek flows through the study area and empties into the San Joaquin River, immediately north of the study area (Figure 5).

The reach of West Antioch Creek within the study area is highly urbanized. Historically, the creek was discontinuous, but has since been channelized into a continuous channel with engineered banks, surrounded predominately by impervious surfaces (SFEI 2011). Moving from the upstream end of the project to the downstream end, the drainage transitions from an earthen trapezoidal channel near the Contra Costa County Fairgrounds, to a culvert under 10th Street, to a concrete-lined drainage covered by wooden planking under the vacant car dealership’s parking lot, to an open concrete-lined ditch, to the improved open earthen/vegetated channel that continues all the way to the northern end of the study area with culverts under West 4th Street and the railroad tracks. In the study area, West Antioch Creek runs primarily in a north-south alignment; however, the drainage has four hard bends that form 90 degree angles. Garbage and debris were observed in the creek channel during the site visits. West Antioch Creek is tidally influenced near the confluence with the San Joaquin River; however, it is uncertain how far upstream the tidal influence occurs.

3.3. VEGETATION/LAND COVER TYPES

This subsection describes vegetation communities following the Land Cover Types described in the HCP/NCCP (Jones & Stokes 2006). HCP/NCCP Land Cover Types observed within the study area include ruderal grassland, alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, stream, and urban (Table 4). The location of Land Cover Types in the study area is shown in Figure 6 (Appendix A).

Vegetation on site is further described by referencing commonly used vegetation classification systems including *Preliminary Descriptions of the Terrestrial Natural Communities of California* (Holland 1986), *Manual of California Vegetation, Second edition* (Sawyer et al. 2009), and *California Vegetation* (Holland and Keil 1995)². Holland (1986) provides a generalized community-level description for natural vegetation communities present within the study area. More detail is accomplished using *Manual of*

² This is due to the fact that the HCP Land Cover Types, in many cases, do not refer to standard vegetation community treatments and is therefore an effort to relate HCP Land Cover Types to these commonly used classification systems for regional context and regulatory continuity.

California Vegetation, Second edition which identifies vegetation communities as alliances³. The codes used in Table 5 reflect those associated with Holland (1986) types and the *Vegetation Classification and Mapping Program List of California Vegetation Alliances* (CDFG 2010). Vegetation that interfaces with urban or developed landscapes, i.e. ruderal, is treated using Holland and Keil (1995). In addition, habitat types from the *CNPS Inventory of Rare and Endangered Plants of California* (CNPS 2001) are included to reference habitat types listed in the *CNPS Inventory* to vegetation types on site (Table 5).

Table 2. Land Cover Types in the Study Area

LAND COVER TYPE	ACREAGE
Ruderal Grassland	18.27
Alkali Grassland	0.07
Seasonal Wetland	2.23
Alkali Wetland	0.10
Permanent Wetland	4.93
Riparian Woodland/Scrub	1.12
Stream (Open Water)	1.54
Stream (in culvert)	0.10
Urban	44.03
Total	72.4

3.3.1 RUDERAL GRASSLAND

As described in the HCP/NCCP ruderal grassland vegetation is characterized by sparse nonnative, typically weedy vegetation, occupying vacant parcels surrounded by developed areas. Based on the description by Holland and Keil (1995), ruderal vegetation is an assemblage of plants, often a mixture of both native and nonnative weed species that thrive in waste areas, heavily grazed pastures, cultivated and fallow fields, roadsides, parking lots, footpaths, around residences and similar disturbed sites in towns and cities and along rural roadways. Ruderal communities are difficult to characterize and are often temporary assemblages. In areas of frequent human disturbance, the majority of wild plants are often introduced weeds rather than natives. Some urban weeds are ornamentals that have escaped from cultivation. Ruderal species may at times be integrated into various other communities (Holland and Keil 1995).

A large portion of the study area is characterized as ruderal grassland vegetation, primarily the banks of the berms adjacent to the channelized creek and in open fields. Upland areas in the creek channel were also considered ruderal based on species composition. Non-native plant species typical of ruderal grassland vegetation on site include ripgut brome (*Bromus diandrus**), wild oats (*Avena fatua**), hare barley (*Hordeum murinum* subsp. *leporinum**), Italian ryegrass (*Festuca perennis**), Bermuda grass (*Cynodon dactylon**), johnsongrass (*Sorghum halapense**), charlock (*Sinapis arvensis**), milk thistle (*Silybum marianum**), whitestem filaree (*Erodium moschatum**), red-stemmed filaree (*Erodium*

³ An alliance is a classification unit of vegetation, containing one or more associations and defined by one or more diagnostic species, often of high cover, in the uppermost layer or layer with the highest canopy cover. Alliances reflect regional to subregional climates, substrates, hydrology, and disturbance regimes.

* Denotes a non-native species that has an origin other than that of California

Table 3. Vegetation Community Classifications Systems Comparisons

HCP/NCCP LAND COVER TYPES ⁴	VEGETATION COMMUNITY AND WETLAND CLASSIFICATION SYSTEMS			
	TERRESTRIAL COMMUNITIES ^{5,6}	CALIFORNIA & NATIONAL VEGETATION ⁷	CNPS INVENTORY ⁸	WETLANDS & DEEPWATER HABITATS ⁹
Ruderal Grassland	Ruderal (Holland & Keil 1995)	Not Described	Not Described	Upland
Alkali Grassland	Not Described	<i>Distichlis spicata</i> Herbaceous Alliance (Saltgrass flats) (41.200.00)	Chenopod Scrub (in part) Valley and Foothill Grassland (in part)	Upland
Seasonal Wetland	Not Described	Not Described	Meadows and Seeps (in part)	Palustrine persistent emergent wetlands
Alkali Wetland	Alkali Meadow (in part) (45310) (Holland 1986)	<i>Distichlis spicata</i> Herbaceous Alliance (Saltgrass flats) (41.200.00)	Meadows and Seeps (in part) Vernal Pools (in part) Playas (in part)	Palustrine persistent emergent wetlands
Permanent Wetland	Coastal Brackish Marsh (52200) (Holland 1986)	<i>Typha angustifolia</i> Alliance (Cattail Marshes) (52.050.00)	Marshes and Swamps	Palustrine persistent emergent wetland
Riparian Woodland/Scrub	Central Coast Riparian Scrub (63200) (Holland 1986)	<i>Salix lasiolepis</i> Shrubland Alliance (Arroyo Willow Thickets) (61.201.00)	Riparian Scrub	Palustrine forested or shrub- scrub wetland
Stream	Not Described	Not Described	Not Described	Riverine streambed

⁴ East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (Jones & Stokes 2006)

⁵ Terrestrial Natural Communities of California (Holland 1986) or (Holland & Keil 1995)

⁶ These classification systems (Manual of California Vegetation and National Vegetation Classification) appear as listed in the Vegetation Classification and Mapping Program List of California Vegetation Alliances (CDFG 2007) and List of Terrestrial Natural Communities (CDFG 2003)

⁷ A Manual of California Vegetation (Sawyer & Keeler-Wolf 1995) & National Vegetation Classification (Grossman et al. 1998)

⁸ CNPS Inventory of Rare and Endangered Plants of California Habitat Types (CNPS 2001)

⁹ Classification of Wetlands & Deepwater Habitats of the U.S. (Cowardin et al. 1979)

HCP/NCCP LAND COVER TYPES ⁴	<u>VEGETATION COMMUNITY AND WETLAND CLASSIFICATION SYSTEMS</u>			
	TERRESTRIAL COMMUNITIES ^{5,6}	CALIFORNIA & NATIONAL VEGETATION ⁷	CNPS INVENTORY ⁸	WETLANDS & DEEPWATER HABITATS ⁹
Urban	Not Described	Not Described	Not Described	Upland

*cicutarium**), common vetch (*Vicia sativa* subsp. *sativa**), winter vetch (*Vicia villosa* subsp. *villosa**), stinkwort (*Dittrichia graveolens**), bur clover (*Medicago polymorpha**), wild radish (*Raphanus sativus**), English plantain (*Plantago lanceolata**), field bindweed (*Convolvulus arvensis**), black mustard (*Brassica nigra**), cut-leaved geranium (*Geranium dissectum**), prickly lettuce (*Lactuca serriola**), fat hen (*Atriplex prostratus**), bristly ox-tongue (*Helminthotheca echioides**), prickly sowthistle (*Sonchus asper* subsp. *asper**), fennel (*Foeniculum vulgare**) and perennial pepperweed (*Lepidium latifolium**), in part. Native species observed in low abundance within the vegetation type also include tall willowherb (*Epilobium brachycarpum*), common bedstraw (*Galium aparine*), evening primrose (*Oenothera elata* subsp. *hookeri*), horseweed (*Conyza canadensis*), cocklebur (*Xanthium strumarium*), and saltgrass (*Distichlis spicata*). Scattered native and non-native trees are present throughout the study area including black walnut (*Juglans hindsii*⁺), valley oak (*Quercus lobata*), California fan palm (*Washingtonia filifera*⁺), Chinese elm (*Ulmus parvifolia**), and ngaio tree (*Myoporum laetum**).

3.3.2 ALKALI GRASSLAND

As described by the HCP/NCCP, alkali grasslands are grasslands that generally occur on alkaline soil units within the Marcuse, Pescadero, Sacramento, and Solano soil series. Dominant grasses in alkali grassland include saltgrass (*Distichlis spicata*) and wild barley (*Hordeum* spp.) The associated herb cover consists of halophytes including saltbush (*Atriplex* spp.), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), alkali mallow (*Malvella leprosa*), and common spikeweed (*Centromadia pungens*). Within the study area alkali grassland is represented by one alliance: *Distichlis spicata* Herbaceous Alliance.

Distichlis spicata Herbaceous Alliance (Saltgrass Flats)

As described, saltgrass is dominant or co-dominant in the herbaceous layer with other herbaceous grassland and wetland species. Emergent shrubs such as iodine bush (*Allenrolfia occidentalis*), saltbush saltbush (*Atriplex* spp.) and others may be present at low cover. The canopy is open to continuous and herbs are less than one meter in height. Habitat for this vegetation community includes coastal salt marshes, and inland habitats including playas, swales, and terraces along washes that are typically intermittently flooded from 0 to 4,921 feet (0 to 1,500 meters) in elevation.

A small area of alkali grassland is present in the northern portion of the study area, just south of the railroad tracks, on the edge of an access road. It is dominated by saltgrass, with small amounts of Italian ryegrass*, Mediterranean barley (*Hordeum marinum* subsp. *gussoneanum**), alkali mallow (*Malvella leprosa**), and fivehook bassia (*Bassia hyssopifolia*).

3.3.3 SEASONAL WETLAND

As described by the HCP/NCCP, seasonal wetlands are freshwater wetlands that support ponded or saturated soil conditions during winter and spring and are dry through the summer and fall until the first substantial rainfall. Seasonal wetlands, although not specifically described in Holland (1986) or Holland and Keil (1995), would be classified by Cowardin (1979) as seasonally persistent palustrine emergent wetlands. As defined, this classification indicates that surface water is present for extended periods, especially early in the growing season, but is absent by the end of the season in most years. When surface water is absent, the water table is often near the land surface. Vegetation is characterized by erect, rooted,

⁺ Denotes a species of native origin but not indigenous to the site

herbaceous hydrophytes, excluding mosses and lichens, and is present for most of the growing season in most years.

This community typically occurs as shallow ephemeral bodies of water that occupy valley bottoms or low-lying depressions on poorly drained clay soils. Typically species of annual and perennial native and non-native grasses and forbs that begin their growth as aquatic or semiaquatic plants, typically resembling a wetland community, that make a transition to a dry-land environment as the pool dries and upland grasses and forbs enroot while wetland species desiccate. The length of time that water persists has a major effect on species composition. During and after the establishment of upland species these sites may no longer resemble wetlands. These plant species usually have a wetland indicator status of hydrophytic or facultative. Although seasonal wetlands and vernal pools share similar hydrologic characteristics, species composition of seasonal wetlands is typically ruderal in nature. Therefore, seasonal wetlands are not considered vernal pools, which support a more specialized and less common native flora.

Within the study area, seasonal wetlands were present on the margins and floodplain of the West Antioch Creek low flow channel, and extended from the vacant car dealership downstream to West 4th Street. Species present at the upstream end were typical of freshwater seasonal wetlands and became more brackish in nature heading downstream. These areas are likely supported by precipitation runoff in the winter months and urban runoff in the spring and summer months, as well as overflow from the low flow channel during high tides. Plant species characteristic of seasonal wetland in the study area include Italian ryegrass*, wild oats*, burclover*, rabbitsfoot grass (*Polypogon monspeliensis**), barnyard grass (*Echinochloa crus-galli**), birdfoot trefoil (*Lotus corniculatus**), evening primrose (*Oenothera elata* subsp. *hookeri*), tall flatsedge (*Cyperus eragrostis*), waterbentgrass (*Polypogon viridis**), perennial pepperweed (*Lepidium latifolium**), brass buttons (*Cotula coronopifolia**), sand spurrey (*Spergularia* sp.), wild radish*, Bermuda grass*, fat hen*, and celery (*Apium graveolens**).

3.3.4 ALKALI WETLAND

As described by the HCP/NCCP, alkali wetlands support ponded or saturated soil conditions and occur as perennial or seasonally wet features on alkaline soils. Alkali wetlands occur where wetlands are present within alkali grassland land cover type. The vegetation of alkali wetlands is composed of halophytic plant species adapted to both wetland conditions and high salinity levels. Typical species include those common to both seasonal and alkali wetlands, such as saltgrass, alkali heath, and common spikeweed.

A small area of alkali wetland is present in the northern portion of the study area, just south of the railroad tracks. It borders a dense stand of permanent wetland dominated by narrowleaf cattail (*Typha angustifolia*). Plant species characteristic of the alkali wetland on site include saltgrass, rabbitfoot grass*, Italian ryegrass*, Mediterranean barley*, and alkali mallow*. It differs from alkali grassland on site in that it is codominated by rabbitfoot grass and contains surface indicators of wetland hydrology.

3.3.5 PERMANENT WETLAND

As described by the HCP/NCCP, permanent wetland is characterized by a year-round water source. It is typically dominated by erect, rooted, herbaceous hydrophytic plant species adapted to growing in conditions of prolonged inundation. Of the vegetation types described by Holland (1986) the most similar is coastal brackish marsh. Coastal brackish marsh is dominated by perennial, emergent, herbaceous monocots to 2 meters tall. Cover is often complete and dense. This community is similar to salt marsh and freshwater marsh with some plants characteristic of each and it often intergrades with these communities. It is usually at the interior edges of coastal bays and estuaries or in coastal lagoons, where there is a freshwater input. Salinity may vary considerably, and may increase at high tide or during season of low freshwater runoff or both. Within the study area permanent wetland is represented by one alliance: *Typha angustifolia* Herbaceous Alliance.

Typha angustifolia Herbaceous Alliance (Cattail Marshes)

As described, narrowleaf cattail (*Typha angustifolia*) is dominant or co-dominant in the herbaceous layer with other herbaceous wetland species. Emergent trees such as willows may be present at low cover. Herbaceous species are less than 1.5 meters in height and the canopy is intermittent to continuous. According to the membership rules, broadleafed cattail must have greater than 50% relative cover in the herbaceous layer. Habitat for this vegetation community includes semi-permanently flooded freshwater or brackish marshes from 0 to 1,150 feet (0 to 350 meters) in elevation.

Within the study area cattail marsh is located adjacent to the low flow channel of West Antioch Creek downstream of West 4th Street and at the margin of the San Joaquin River. These areas are tidally influenced and contain brackish water. These areas are dominated by dense monoculture stands of narrowleaf cattail where standing water is present. Other species are present along the margins in low abundance including tall flatsedge, perennial pepperweed*, Himalayan blackberry (*Rubus armeniacus**), pampas grass (*Cortaderia jubata**), and western goldentop (*Euthamia occidentalis*). Scattered arroyo willow (*Salix lasiolepis*) are present.

3.3.6 RIPARIAN WOODLAND/SCRUB

The HCP/NCCP defines riparian woodland/scrub land cover type as dominated by phreatophytic woody vegetation associated with streams and permanent water sources. Riparian woodland is dominated by trees whereas riparian scrub is dominated by young trees and shrubs. Of the vegetation types described by Holland (1986) the most similar is central coast riparian scrub. Central coast riparian scrub is a scrubby streamside thicket, varying from open to impenetrable, dominated by any of several willow species. This early seral community may succeed to any of several riparian woodland or forest types in the absence of severe flooding disturbance. This community occurs on relatively fine-grained sand and gravel bars that are close to river channels and therefore close to ground water. It is distributed along and at the mouths of most perennial and many intermittent streams of the south Coast Ranges, from the Bay Area south to Point Conception.

Within the study area riparian woodland/scrub is represented by one alliance: *Salix lasiolepis* Shrubland Alliance, described below.

Salix lasiolepis Shrubland Alliance (Arroyo Willow Thickets)

As described, arroyo willow is dominant or co-dominant in the shrub layer or tree canopy with other native shrubs or trees. As a shrubland, emergent trees may be present at low cover. Plants are less than 10 meters in height and the canopy is open to continuous. According to the membership rules for this vegetation type, willow scrub must have greater than 50% relative cover in the shrub or tree canopy (Sawyer et al. 2009). Habitat for this vegetation community throughout California includes stream banks and benches, steep slopes, and stringers along drainages, growing on seasonally or intermittently flooded sites.

Arroyo willow shrubland is present in the channel, along a tributary ditch, and north of the railroad tracks. It is comprised almost entirely of arroyo willow. Scattered red willow (*Salix laevigata*), Fremont cottonwood (*Populus fremontii* subsp. *fremontii*) and Himalayan blackberry* are also present.

3.3.7 STREAM

The HCP/NCCP defines a stream as a long, narrow body of flowing water that occupies a channel with a defined bed and bank and moves to lower elevations under the force of gravity. West Antioch Creek is shown as a “blue-line stream” on the Antioch North and Antioch South 7.5 minute USGS quadrangles.

West Antioch Creek is a perennial creek that exhibits an Ordinary High Water Mark and evidence of scour. It has a low flow channel that is mostly unvegetated. Small amounts of permanent wetland vegetation are scattered along the margin of the creek, including tall flatsedge, narrowleaf cattail, and watercress (*Nasturtium officinale*).

3.3.8 URBAN

The HCP/NCCP defines urban sites as areas where the native vegetation has been cleared for residential, commercial, industrial, transportation, or recreational structures. Developed areas include areas that have structures, paved surfaces, horticultural plantings, and lawns smaller than 10 acres. Within the study area, areas mapped as urban include 10th St., O Street, West 4th St., industrial warehouses, apartment buildings, and other paved surfaces.

3.4. MOVEMENT CORRIDORS AND HABITAT FRAGMENTATION

Habitat loss, fragmentation, and degradation resulting from land use changes or habitat conversion can alter the use and viability of wildlife movement corridors (*i.e.* linear habitats that naturally connect and provide passage between two or more otherwise disjunct larger habitats or habitat fragments). In general, studies suggest that habitat corridors provide connectivity for and are used by wildlife, and as such are an important conservation tool (Beier and Noss 1998). According to Beier and Loe (1992), wildlife habitat corridors should fulfill several functions. They should maintain connectivity for daily movement, travel, mate-seeking, and migration; plant propagation; genetic interchange; population movement in response to environmental change or natural disaster; and recolonization of habitats subject to local extirpation.

The suitability of a habitat as a wildlife movement corridor is related to, among other factors, the habitat corridor's dimensions (length and width), topography, vegetation, exposure to human influence, and the species in question (Beier and Loe 1992). Species utilize movement corridors in several ways. "Passage species" are those species that use corridors as thru-ways between outlying habitats. The habitat requirements for passage species are generally less than those for corridor dwellers. Passage species use corridors for brief durations, such as for seasonal migrations or movement within a home range. As such, movement corridors do not necessarily have to meet any of the habitat requirements necessary for a passage species' everyday survival. Large herbivores, such as deer and elk, and medium-to-large carnivores, such as coyotes, bobcats and mountain lions, are typically passage species. "Corridor dwellers" are those species that have limited dispersal capabilities – a category that includes most plants, insects, reptiles, amphibians, small mammals, and birds – and that use corridors for a greater length of time. As such, wildlife movement corridors must fulfill key habitat components specific to a species' life history requirements in order for them to survive (Beier and Loe 1992). In general, however, the suitability and/or utility of the landscape – specifically, of the landscape as corridor habitat – is best evaluated on a species-level (Beier and Noss 1998).

The study area is almost entirely surrounded by urban development, limiting potential migration, dispersal and home range movement to the West Antioch Creek and its associated riparian corridor. West Antioch Creek is a relatively narrow, channelized and earthen stream corridor crossing through the northern portion of the City of Antioch. The creek and associated floodplain and riparian corridor meet open tidally influenced marshlands of the San Joaquin River at the northern project terminus. West Antioch Creek extends southward along a narrow, channelized corridor through dense urban habitat before going underground. Connection to the undeveloped lands of the northern Diablo Mountain Range is restricted by urbanization and State Route 4, limiting movement of special-status and common species. The study area provides connection to aquatic, marshland and riparian species to adjacent ruderal habitat and large contiguous tidally-influenced marshlands to the north. A number of species observed along West Antioch Creek may travel along the creek corridor and through the study area including western

pond turtle, river otter, muskrat, raccoon, Virginia opossum, and striped skunk, among others. The corridor also provides connectivity for invasive species such as the New Zealand mud snail, signal crayfish, Louisiana red swamp crayfish, red-eared slider turtles, house mouse, roof rat and brown rat. Habitat upstream of the study area becomes increasingly urbanized, culverted and undergrounded thereby preventing the upstream movement of resident and anadromous fish species.

Section 4. ASSESSMENT AND FINDINGS

In evaluating on-site habitat suitability for special-status plant and wildlife species within the study area, relevant literature, knowledge of regional biota, and observations made during the field investigations were applied as analysis criteria. Criteria determinations for occurrence potential of special-status species are divided into the five categories described below. These determination categories appear in Appendices C and D, which provide a summary of the status, habitat affinities, flowering phenology, habitat suitability and local distribution, and potential for occurrence for each of the target special-status species. It should be noted that local distribution references refer to the CNDDDB Element Occurrence Index (EONDX) number. The EONDX is an integer primary key (unique for each record) used within the CNDDDB for GIS relational databases. Although the EONDX is assigned sequentially, gaps may appear as records are merged or updated. Factors influencing which determination criteria are applied to target species are detailed below.

- None denotes a complete lack of habitat suitability, local range restrictions, and/or regional extirpations.
- Not Expected denotes situations where suitable habitat or key habitat elements may be present but may be of poor quality or isolated from the nearest extant occurrences. Incompatible habitat suitability refers to elevation, geology, soil chemistry and type, vegetation communities, microhabitats, and degraded/significantly altered habitats. These factors create unsuitable ecological conditions for the consideration of even a low occurrence potential within the study area.
- Absent indicates specified taxa not observed during field investigations and were consequently ruled out. This category also refers to diagnostic vegetative material of shrubby perennial species not observed on site. *This category refers only to plant species.*
- Possible indicates the presence of suitable habitat or key habitat elements that potentially support a specific species or taxa.
- Present indicates the target species was either observed directly or its presence was confirmed by diagnostic sign (*i.e.* tracks, scat, burrows, carcasses, castings, prey remains) during field investigations.

4.1. SENSITIVE NATURAL COMMUNITIES

A total of six sensitive communities were observed in the project area: alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream. Seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream are considered sensitive natural communities as they may qualify as a water of the U.S. and/or Waters of the State falling under U.S. Army Corps of Engineers and Regional Water Quality Control Board jurisdictions through the Clean Water Act and the Porter Cologne Water Quality Act. A wetland delineation has been completed for the study area but has not been submitted to the U.S. Army Corps of Engineers for verification. Alkali grassland is listed as an uncommon vegetation alliance in the HCP/NCCP.

4.2. SPECIAL-STATUS PLANTS

Based on the site reconnaissance, a review of available databases and literature (USFWS 1999, 2013a,b; CDFW 2013a,b,d; CNPS 2001a, 2013; CCH 2013; Baldwin et al. 2012) and familiarity with the regional flora, a total of 71 special-status plant species are known to occur within the vicinity¹⁰ of the study area (Appendix C). Of these species, 63 were ruled out based on the lack of suitable habitat such as coastal bluff scrub, coastal scrub, serpentine substrate, or volcanic soils. Species were also ruled out due to distribution restrictions, absence of suitable elevation ranges, or the fact that they would have been detectable during the 2013 March site visit. The 8 remaining species were considered to have the potential to occur within the study based on the presence of suitable habitat (*i.e.* brackish or freshwater marshes, mud banks, and riparian scrub) and were considered targets for rare plant surveys conducted in June, July, and August 2013. Table 6 summarizes species that had the potential to occur and were considered targets. No rare plants were observed during the surveys.

Additional parcels were added to the study area for staging areas and access in August 2013. These additional parcels contained primarily developed and ruderal grassland land cover types. These additional parcels contained two small areas of alkali grassland and alkali grassland, both dominated by dense saltgrass. These areas were surveyed on August 27, 2013 for special-status plant species that occupy alkali habitat and would be detectable in August. All other special-status plant species known from alkali habitats in the region were ruled out due to the quality of habitat on site. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which these special-status species prefer.

A complete list of all species considered as part of this assessment, their regulatory status, habitat requirements, local distribution, and potential for occurrence is presented in Appendix C. Special-status plant species recorded in the project vicinity from the California Natural Diversity Database (CNDDB) are depicted in Figure 7.

Table 6. Potentially Occurring Special-Status Plant Species

POTENTIALLY OCCURRING SPECIAL-STATUS PLANT SPECIES	LISTING STATUS ¹	POTENTIAL FOR OCCURRENCE
<u>FEDERAL/STATE LISTED SPECIES</u>		
<i>Chloropyron molle</i> subsp. <i>molle</i> ¹¹ Soft bird's-beak	FE, SR CRPR 1B.2	Not observed during 2013 rare plant surveys.
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	SR CRPR 1B.1	Not observed during 2013 rare plant surveys.
<u>CALIFORNIA RARE PLANT RANK SPECIES</u>		
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water hemlock	CRPR 2.1	Not observed during 2013 rare plant surveys.
<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i> Woolly rose-mallow	CRPR 2.2	Not observed during 2013 rare plant surveys.
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	CRPR 1B.2	Not observed during 2013 rare plant surveys.

¹⁰ Vicinity is defined as the area included within the nine USGS 7½-minute topographic quadrangles that are centered on the study area Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista.

¹¹ This species was previously recognized in the first edition of The Jepson Manual (Hickman 1993) as *Cordylanthus mollis* ssp. *mollis*. USFWS documents (USFWS 1995, 1997, 2007, 2009, 2013b) refer to this name.

POTENTIALLY OCCURRING SPECIAL-STATUS PLANT SPECIES	LISTING STATUS ¹	POTENTIAL FOR OCCURRENCE
<i>Limosella australis</i> Delta mudwort	CRPR 2.1	Not observed during 2013 rare plant surveys.
<i>Scutellaria lateriflora</i> Side-flowering skullcap	CRPR 2.2	Not observed during 2013 rare plant surveys.
<i>Symphotrichum lentum</i> Suisun Marsh aster	CRPR 1B.2	Not observed during 2013 rare plant surveys.

¹Explanation of State and Federal Listing Codes and HCP/NCCP Coverage

Federal listing codes:

FE Federally listed as Endangered

California listing codes:

SR State listed as Rare

California Native Plant Society codes:

1B Rare or Endangered in California and elsewhere

2 Rare or Endangered in California, more common elsewhere

California Native Plant Society Threat Codes:

.1 Seriously Endangered in California (over 80% of occurrences Threatened / high degree and immediacy of threat)

.2 Fairly Endangered in California (20-80% occurrences Threatened)

4.2.1 HCP/NCCP COVERED AND NO-TAKE PLANT SPECIES

There are seventeen covered and no-take species listed in the HCP/NCCP. The HCP/NCCP Planning Survey Report lists Land Cover Types that provide habitat for each of the covered and no-take species (Table 7). Of the seventeen covered/no-take species, all seventeen can be ruled out as occurring on site because there is no suitable habitat and they would have been detectable during rare plant surveys conducted in June, July, and August 2013. Table 7 outlines the 17 covered/no take plant species, habitat found on site, and their potential for occurrence.

Table 7. HCP/NCCP Covered and No Take Plant Species

LAND COVER TYPE	SPECIES NAME COMMON NAME	LISTING STATUS	HCP/NCCP STATUS	HABITAT PRESENT	POTENTIAL FOR OCCURRENCE
Annual grassland	<i>Amsinckia grandiflora</i> large-flowered fiddleneck	FE, SE CNPS 1B.1	No Take	Study area is outside of elevation range for this taxon and the study area does not include the preferred Altamont soil type of this species.	No habitat.
Chaparral and scrub	<i>Arctostaphylos auriculata</i> Mt. Diablo manzanita	CNPS 1B.3	Covered	No chaparral or scrub present in the study area.	No habitat. Would have been detectable during 2013 surveys.
Alkali wetland Annual Grassland Seasonal Wetland	<i>Astragalus tener</i> var. <i>tener</i> alkali milk-vetch	CNPS 1B.2	No Take	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers.	No habitat.
Alkali grassland Alkali wetland	<i>Atriplex depressa</i> brittlescale	CNPS 1B.2	Covered	Suitable vegetation associations are present.	Not Observed. Would have been detectable during 2013 surveys.

Alkali grassland Alkali wetland	<i>Atriplex joaquiniana</i> San Joaquin spearscale	CNPS 1B.2	Covered	Suitable vegetation associations are present.	Not Observed. Would have been detectable during 2013 surveys.
Annual grassland	<i>Blepharizonia plumosa</i> big tarplant	CNPS 1B.2	Covered	Study area is outside of elevation range for this taxon and the study area does not include the preferred Altamont soil type of this species.	No habitat.
Annual grassland	<i>California macrophylla</i> round-leaved filaree	CNPS 1B.1	Covered	Study area lacks heavy clay soils that support this species.	No habitat.
Annual grassland Chaparral and scrub Oak woodland Oak savanna	<i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	CNPS 1B.2	Covered	This taxon occurs on the ecotone of listed associations. Study area is outside of elevation range for this taxon which is restricted to Mount Diablo and its foothills.	No habitat.
Alkali grassland	<i>Delphinium recurvatum</i> recurved larkspur	CNPS 1B.2	Covered	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers.	No habitat.
Annual grassland Chaparral and scrub	<i>Eriogonum truncatum</i> Mt. Diablo buckwheat	CNPS 1B.1	No Take	This taxon occurs on the ecotone of listed associations and at higher elevations locally.	No habitat.
Annual grassland	<i>Eschscholzia rhombipetala</i> diamond-petaled California poppy	CNPS 1B.1	No Take	Study area lacks suitable alkaline and heavy clay characteristics.	No habitat.
Chaparral and scrub Oak savanna Oak woodland	<i>Helianthella castanea</i> Diablo helianthella	CNPS 1B.2	Covered	This taxon occurs on the ecotone of listed associations. Study area is also outside of elevation range for this taxon.	No habitat.
Annual grassland Chaparral and scrub Oak woodland	<i>Hesperolinon breweri</i> Brewer's western flax	CNPS 1B.2	Covered	This taxon occurs on the ecotone of listed associations. Study area is also outside of elevation range for this taxon.	No habitat.
Alkali grassland Annual grassland Seasonal wetland	<i>Lasthenia conjugens</i> Contra Costa goldfields	FE CNPS 1B.1	No Take	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers.	No habitat.
Annual grassland Oak woodland	<i>Madia radiata</i> showy madia	CNPS 1B.1	Covered	Study area is outside of elevation range for this taxon.	No habitat.

Seasonal wetland	<i>Navarettia nigelliformis</i> subsp. <i>nigelliformis</i> Adobe navarretia	CNPS 4.2	Covered	Study area lacks the preferred substrates and is outside of elevation range for this taxon.	No habitat.
Alkali grassland	<i>Tropidocarpum capparideum</i> caper-fruited tropidocarpum	CNPS 1B.1	No Take	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland on site is dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers.	No habitat.

¹Explanation of State and Federal Listing Codes and HCP/NCCP Coverage

Federal listing codes:

FE Federally listed as Endangered

California listing codes:

SE State listed as Endangered

California Native Plant Society codes:

1B Rare or Endangered in California and elsewhere

2 Rare or Endangered in California, more common elsewhere

4 Plants of limited distribution - Watch list

California Native Plant Society Threat Codes:

.1 Seriously Endangered in California (over 80% of occurrences Threatened / high degree and immediacy of threat)

.2 Fairly Endangered in California (20-80% occurrences Threatened)

.3 Not very Endangered in California (<20% of occurrences Threatened or no current threats known)

4.2.2 FEDERAL AND/OR STATE LISTED AND CALIFORNIA RARE PLANT SPECIES

Of the 71 special-status plant species known from the region, 11 are federal and/or state listed. Based on the field investigations, review of available databases and literature, familiarity with local flora, and on-site habitat suitability, 2 federal and/or state listed and California rare plant species were considered to have the potential to occur within the study area: soft bird's-beak (*Chloropyron molle* subsp. *molle*) and Mason's lilaeopsis (*Lilaeopsis masonii*) (Table 6). These two species were considered targets for rare plant surveys conducted in June, July, and August 2013, and were not observed on site.

4.2.3 CALIFORNIA RARE PLANT RANK SPECIES

Of the 71 special-status plant species known from the region, 60 are California Native Plant Society listed. Based on the field investigations, review of available databases and literature, familiarity with local flora, and on-site habitat suitability, 6 species are considered to have the potential to occur within the study area: Bolander's water hemlock (*Cicuta maculata* var. *bolanderi*), woolly rose-mallow (*Hibiscus lasiocarpus* var. *occidentalis*), Delta tule pea (*Lathyrus jepsonii* var. *jepsonii*), Delta mudwort (*Limosella australis*), side-flowering skullcap (*Scutellaria lateriflora*), and Suisun Marsh aster (*Symphyotrichum lentum*) (Table 6). These six species were considered targets for rare plant surveys conducted in June, July, and August 2013, and were not observed on site.

4.3. SPECIAL-STATUS WILDLIFE

Based on the field investigation, review of available databases and literature, familiarity with local fauna, and on-site habitat suitability, a total of 90 special-status fish and wildlife species were considered as part of this assessment (USFWS 1999, 2008, 2013a,b; CDFG 2011, CDFW 2013a,c; NOAA 2004, 2006). Eighteen were determined to have the potential to occur within the study area and could be affected by the project as proposed. These comprise four species listed as threatened or endangered, or designated as fully protected, and 14 special-status species considered to be rare, sensitive or declining by agency or non-governmental watchlists (Table 8). An additional twelve species are not expected to occur on site, but could not be entirely ruled out based on marginal habitat conditions, limited distribution information, or

the paucity of available life history data. The remaining taxa were ruled out based on the lack of suitable habitat (e.g., serpentine, interior sand dunes, vernal pools, scrub, dense woodlands, mud flats and shoreline habitats), local extirpations, lack of connectivity between areas of suitable and occupied habitat, incompatible land use, and habitat degradation. A complete list of all species considered as part of this assessment, their regulatory status, habitat requirements, local distribution, and potential for occurrence are listed in Appendix D. Special-status fish and wildlife species recorded in the California Natural Diversity Database (CDFW 2013a) are depicted in Figure 8.

Table 8. Potentially Occurring Special-Status Fish and Wildlife Species

SPECIES	LISTING STATUS ¹	HCP/NCCP STATUS	CRITICAL HABITAT	POTENTIAL FOR OCCURRENCE
Invertebrates				
<i>Helminthoglypta nickliniana bridgesi</i> Bridge's coast range shoulderband	Fed: None CA: SA	-	-	Possible
Fish				
<i>Hypomesus transpacificus</i> Delta smelt	Fed: FT, CH CA: ST, AFS-T	-	Yes	Possible
<i>Pogonichthys macrolepidotus</i> Sacramento splittail	Fed: None CA: SSC, AFS-V	-	-	Possible
Amphibians				
<i>Rana draytonii</i> California red-legged frog	Fed: FT, CH CA: SSC	Covered	Not within study area	Possible
Reptiles				
<i>Emys marmorata</i> Western pond turtle	Fed: None CA: SA	Covered	-	Possible
Birds				
<i>Accipiter cooperii</i> Cooper's hawk (nesting)	Fed: None CA: WL	-	-	Possible
<i>Agelaius tricolor</i> Tricolored blackbird (nesting colony)	Fed: None CA: SSC, ABC, BCC	Covered	-	Possible
<i>Asio flammeus</i> Short-eared owl (nesting)	Fed: None CA: SSC, ABC	-	-	Possible
<i>Athene cunicularia</i> Western burrowing owl (burrow sites & some wintering sites)	Fed: None CA: SSC, BCC	Covered	-	Possible
<i>Baeolophus inornatus</i> Oak titmouse (nesting)	Fed: None CA: SA, ABC	-	-	Possible
<i>Circus cyaneus</i> Northern harrier (nesting)	Fed: None CA: SSC	-	-	Possible
<i>Elanus leucurus</i> White-tailed kite (nesting)	Fed: None CA: FP	Covered (No Take)	-	Possible
<i>Geothlypis trichas sinuosa</i> Saltmarsh common yellowthroat	Fed: None CA: SSC, BCC	-	-	Possible
<i>Icteria virens</i> Yellow-breasted chat (nesting)	Fed: None CA: SSC	-	-	Possible
<i>Lanius ludovicianus</i> Loggerhead shrike (nesting)	Fed: None CA: SSC, BCC	-	-	Possible
<i>Laterallus jamaicensis coturniculus</i> California black rail	Fed: None CA: ST, FP, ABC, BCC	-	-	Possible
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	Fed: None CA: SSC, BCC	-	-	Possible
<i>Picoides nuttallii</i> Nuttall's woodpecker (nesting)	Fed: None CA: SA, ABC, BCC	-	-	Possible
Mammals				
None				

¹ Explanation of State and Federal Listing Codes

Federal listing codes:

FT Federally listed as Threatened
CH Critical Habitat (Designated or Proposed)

California listing codes:

ST State listed as Threatened
FP Fully Protected
SSC California Species of Special Concern
WL Watch List

ABC The American Bird Conservancy maintains a Green List of all the highest priority birds for conservation in the continental United States and Canada. Based off the species assessments prepared by Partners in Flight (PIF) and has been expanded to include shorebirds, waterbirds and waterfowl.

AFS American Fisheries Society identifies marine, estuarine and diadromous fish species that are at risk of extinction in North America. The AFS has designated the following four classifications in order of conservation importance E – Endangered, T – Threatened, V – Vulnerable, and CD – Conservation Dependent.

BCC U.S. Fish and Wildlife Service Birds of Conservation Concern. List of migratory and nonmigratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service’s highest conservation priorities.

SA “Special Animals” is a general term that refers to all of the taxa the CNDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of “species at risk” or “special status species”. The CDFW considers the taxa on this list to be those of greatest conservation need.

4.3.1 HCP/NCCP PLANNING SURVEYS

In accordance with Section 6.3 of the HCP/NCCP, planning surveys were conducted to: 1) avoid and minimize impacts on covered species and natural land cover types to the maximum extent practicable on a regional scale; 2) provide the necessary data to track project impacts to allow the Implementing Entity to meet Plan requirements (*e.g.*, land acquisition, stay ahead, wetland restoration); 3) simplify and reduce pre-project survey requirements relative to current and future environmental regulations without the HCP/NCCP; and 4) make survey requirements proportional to impacts—the survey burden should be lower on low-quality habitat than on high-quality habitat. Table 9 describes the results of the planning surveys for covered and no-take species as outlined in Table 6-1 in the HCP/NCCP. Habitat within the project area for each of the wildlife species in Table 9 is shown in Figures 9-13. Avoidance and minimization measures are included in Section 4.3.2.

Table 9. Results of Planning Surveys for Covered and No-Take Wildlife Species¹²

LAND COVER TYPES	SPECIES	PLANNING SURVEY REQUIREMENTS	PLANNING SURVEY OUTCOME
Grasslands, oak savanna, agriculture, ruderal	San Joaquin kit fox	<ul style="list-style-type: none"> Assumed if within modeled range of species Identify/map potential habitat 	<ul style="list-style-type: none"> Not within modeled range of species
	Western burrowing owl	<ul style="list-style-type: none"> Assumed if habitat is present Identify/map potential habitat 	<ul style="list-style-type: none"> Habitat present
Aquatic land cover types: Ponds, wetlands, streams, slough, channels & marshes	Giant garter snake	<ul style="list-style-type: none"> Aquatic habitat accessible from San Joaquin River Identify/map potential habitat 	<ul style="list-style-type: none"> Not within modeled range of species
	California tiger salamander	<ul style="list-style-type: none"> Ponds and wetlands in grassland, oak savannah, oak woodlands; vernal pools, reservoirs small lakes Identify/map potential breeding habitat; document habitat quality/features; photo-document 	<ul style="list-style-type: none"> No breeding habitat present

¹² Table taken from “City/County of (blank) Application Form and Planning Survey Report to Comply with and Receive Permit Coverage under the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan” template dated June 16, 2010.

LAND COVER TYPES	SPECIES	PLANNING SURVEY REQUIREMENTS	PLANNING SURVEY OUTCOME
	California red-legged frog	<ul style="list-style-type: none"> Slow-moving streams, ponds and wetlands Identify/map potential breeding habitat; document habitat quality/features; photo-document 	<ul style="list-style-type: none"> Breeding habitat present Marginal quality breeding habitat
Seasonal wetlands	Longhorn fairy shrimp Vernal pool fairy shrimp Midvalley fairy shrimp Vernal pool tadpole shrimp	<ul style="list-style-type: none"> Vernal pools, sandstone rock outcrops, and sandstone depressions Identify/map potential breeding habitat 	<ul style="list-style-type: none"> No breeding habitat present
Any land cover type	Townsend's big-eared bat	<ul style="list-style-type: none"> Rock formations with caves, mines, abandoned buildings outside of urban areas Map/document potential breeding/roosting habitat 	<ul style="list-style-type: none"> No breeding/roosting habitat present
	Swainson's hawk	<ul style="list-style-type: none"> Potential nest sites (trees within species' range usually below 200') Inspect large trees for presence/absence of nest sites 	<ul style="list-style-type: none"> No nests identified Not within modeled range of species
	Golden eagle	<ul style="list-style-type: none"> Potential nest sites (secluded cliffs with overhanging ledges; large trees) Document/map potential nests 	<ul style="list-style-type: none"> No nests identified No nesting habitat present

As outlined in Section 6.4.1. of the HCP/NCCP, several wildlife species that occur in the inventory area are listed as fully protected (as defined under Sections 3511 and 4700 of the California Fish and Game Code): white-tailed kite, peregrine falcon, golden eagle, and ringtail. As described in Chapter 1, CDFW cannot issue permits for take of these species. To comply with these regulations, covered activities will avoid any take of fully protected wildlife species as defined under the California Fish and Game Code. All three fully protected raptor species forage widely throughout the inventory area but nest in discrete locations. To comply with this measure, project proponents covered under the HCP/NCCP must not disturb or destroy nests of these fully protected species or of other birds (per Section 3503 of the California Fish and Game Code).

4.3.2 FEDERAL/STATE LISTED, PROPOSED, CANDIDATE, OR FULLY PROTECTED FISH AND WILDLIFE SPECIES

Invertebrates

Ten federally- or State-listed, proposed, candidate, or fully protected invertebrate species¹³ were considered during this assessment (CDFW 2013a,c; USFWS 2013a,b); none were determined to have the potential to occur within the study area (Appendix D). However, one species, vernal pool fairy shrimp, was reported approximately one-mile to the west along in a unvegetated depression on a dirt access road along the BNSF railroad tracks in 1999 (EONDX #41660). This species is not expected to occur within the study area based on the lack of suitable vernal pools and playa pools typically occupied by this species.

¹³ Lange's metalmark butterfly, conservancy fairy shrimp, longhorn fairy shrimp, vernal pool fairy shrimp, San Bruno elfin butterfly, valley elderberry longhorn beetle, delta green ground beetle, vernal pool tadpole shrimp, Callippe silverspot butterfly and California freshwater shrimp.

Fish

Eight federally- or State-listed, proposed, candidate, or fully protected fish species¹⁴ were considered during this assessment (CDFW 2013a,c; NOAA 2004, 2006; USFWS 2013a,b), including two steelhead Evolutionary Significant Units (ESU), two Chinook salmon ESUs, one Coho salmon ESU and one green sturgeon DPS. One species, the delta smelt, was determined to have the potential to occur within the study area (Appendix D). The study area is within the steelhead California Central Valley DPS and suitable habitat is present within the study area; however, the species is not reported from West Antioch Creek (Leidy 2007) and is not expected to occur within the study area.

Delta Smelt (*Hypomesus transpacificus*)

Status, Distribution and Habitat Requirements

Delta smelt was federally listed as a threatened species on March 5, 1993 (58 FR 12854), State listed as threatened on December 9, 1993, and was proposed for State listing as endangered on January 16, 2009 (CDFG 2011). A Five Year Status Review for the delta smelt was published on March 31, 2004 (Service 2004). Delta smelt are slender-bodied euryhaline fish endemic to Sacramento-San Joaquin Delta and its tributaries extending west to Suisun and San Pablo bays (Moyle 2002). They occur in the Sacramento River upstream to Isleton and in the San Joaquin River to Mossdale (Moyle 2002). Delta smelt spawn in freshwater from January to July and rear in shallow water habitat where salinities range from 2-7 ppt (Moyle 2002, 59 FR 65256). Larval sampling surveys suggest spawning occurs in the Sacramento River, Barker, Lindsey, Cache, Georgiana, Prospect, Beaver, Hog, and Sycamore sloughs, in the San Joaquin River off Bradford Island including Fisherman's Cut, False River along the shore zone between Frank's and Webb tracts (Wang 1991). During wet years spawning may also occur in Montezuma Slough and Suisun Slough (Wang 1986). Preferred rearing habitat is within the region where fresh and brackish water mix, typically in the region of Suisun Bay, which is associated with the area of highest zooplankton productivity (Knutson and Orsi 1983, Orsi and Mecum 1986, Moyle 2002). Delta smelt typically school in the top 2 m of the water column in the open waters of the Delta and Suisun Bay where they feed primarily on planktonic copepods, cladocerans and amphipods.

Critical Habitat

Critical habitat for delta smelt was designated on December 19, 1994 (59 FR 65256) and a recovery plan was published in 1996 (USFWS 1996). The Primary Constituent Elements (PCE) for the delta smelt are: 1) spawning habitat – shallow, fresh or slightly brackish backwater sloughs and edgewaters; 2) larval and juvenile transport – to ensure delta smelt larvae are transported from the spawning area to productive rearing or nursery habitat, which comprises the Sacramento and San Joaquin rivers and their tributaries; 3) rearing habitat – maintenance of a 2 ppt isohaline salinity condition and suitable water quality; and 4) adult migration – adequate flow and suitable water quality to attract and provide unrestricted access to suitable spawning habitat (59 FR 65256). Specific areas that have been identified as important delta smelt spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore sloughs and the Sacramento River in the Delta, and tributaries of northern Suisun Bay (59 FR 65256). The study area is located within designated critical habitat and contains all four PCE's (Figure 9).

Habitat Assessment and Occurrence in the Project Vicinity

West Antioch Creek provides suitable breeding and rearing for delta smelt and contributes toward adequate water flow and suitable water quality to support larval and juvenile transport and adult

¹⁴ Green sturgeon (southern DPS), tidewater goby, delta smelt, Coho salmon (Central California Coast ESU), steelhead (Central California Coast ESU, California Central Valley DPS), and Chinook salmon (Central Valley spring-run ESU, Sacramento River winter-run ESU).

migration; although no spawning records have been reported for this watershed. West Antioch Creek is shown as an intermittent blue-line stream on the Antioch North and Antioch South 7.5 minute USGS quadrangles; however, residential and commercial surface water runoff has led to perennial flows in the creek. South of Tenth Street the creek consists of a narrow earthen channel that flows downstream through two large concrete box culverts into a concrete-lined trapezoidal channel running under and adjacent to a vacant car dealership parking lot. In the vicinity of 8th Street the channel opens into a wider, natural substrate channel and floodplain that has been modified for flood control and is comprised of silt, clay and gravel substrate. The creek flows into a tidally influenced marsh at the northern project terminus, emptying into the San Joaquin River. The study area could potentially support spawning delta smelt; however, no spawning records have been reported for this watershed. West Antioch Creek is more likely to support delta smelt by contributing to adequate water flows in the delta, which supports larval development, transport and adult migration; however, the presence of the species cannot be ruled out.

Potential Project Related Effects

There is 6.47 acres of Delta Smelt habitat in the study area (Figure 9). The project is likely to affect 4.44 acres of delta smelt habitat resulting in mortality or injury to any or all delta smelt life history stages by increasing turbidity, reducing water quality, temporarily altering shallow water habitat, and changing water velocities. The project may also reduce recruitment, increase the risk of predation, reduce feeding success, and temporarily degrade overall habitat quality. Suspended sediments may contain toxic substances, which may interfere with the development and survivability of delta smelt. The vegetation upon which delta smelt may depend for egg attachment and refugia may become silted over or removed by the proposed actions. As shallow water habitat is removed and turbidity increased, the delta smelt's feeding, breeding, and sheltering habitat may be reduced as food sources associated with the aquatic plants and found in the water column are removed, and habitat used for spawning substrate and refugia is eliminated.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to delta smelt the following avoidance and minimization measures should be implemented:

1. To minimize take of delta smelt and minimize disturbance to delta smelt habitat, desilting activities will be confined to a single calendar year. However, based on the extent of desilting required, in-stream work will be conducted during an extended work window from March 15 to October 15. If work cannot be completed by October 15, the City will request an extension.
2. Standard BMPs should be implemented to maintain water quality and control sedimentation.
3. Prior to dewatering and cofferdam installation/removal, a USFWS-approved biologist should conduct a fish rescue for native fish and immediately relocate them to a suitable location upstream or downstream of the project site as directed by the USFWS. The USFWS-approved biologist should be on site during initial dewatering activities to ensure any fish that remain in the drawdown area are relocated to nearby suitable habitat. The City should submit the qualifications of all potential USFWS-approved biologists to the USFWS for review and approval at least thirty (30) calendar days prior to project initiation.
4. Temporary fills including cofferdams and access roads should be completely removed following project completion.
5. If dewatering is used, pump intakes should be screened with mesh in accordance with NMFS fish screening criteria for anadromous salmonids (NOAA 1997) to prevent uptake of steelhead.

6. Sediment curtains should be placed downstream of the construction area during the installation and removal of the cofferdam to minimize downstream sediment transfer.
7. A spill prevention plan for potentially hazardous materials should be prepared that includes procedures for handling and storing potentially hazardous materials, as well as cleanup and reporting of any spills. If necessary, containment berms should be constructed to prevent spilled materials from reaching the creek channel.
8. Equipment and materials should not be stored within 50 feet of the creek unless it is on established paved areas. However, if it is necessary to store equipment or materials within 50 feet of the creek, temporary containment berms should be constructed around the equipment/materials. Staging and storage areas for equipment, materials, fuels, lubricants, and solvents should be located outside of the stream channel and banks. Secondary containment should be provided for stationary equipment such as motors, pumps, generators, and compressors located within or adjacent to the West Antioch Creek to contain potential spills. Any equipment or vehicles driven or operated within or adjacent to the creek should be checked and maintained daily to prevent leaks of materials that, if introduced to water, could be deleterious to aquatic life. Maintenance and fueling should be conducted in an area that meets the criteria set forth in the spill prevention plan (i.e., away from the creek).
9. No fueling, cleaning or maintenance of vehicles or equipment, or placement of construction debris, spoils or trash should occur within 50 feet of the creek or floodplain as measured from the top of bank unless it occurs in designated refueling/staging areas on existing paved surfaces with secondary containment in place. Contractors should inspect all equipment/vehicles for leaks prior to using on the project site and should be inspected regularly throughout the project duration.
10. All temporarily disturbed areas should be revegetated with native species suitable for the area.
11. Due to the presence of New Zealand mud snails (a non-native species that range in size from a grain of sand to 1/8 inch in length and are black or brown in color) within West Antioch Creek, which are classified as an invasive species by CDFW, the following precautions are advised:
 - a. All project personnel should be trained in the identification, preventative measures, and physical and chemical cleaning methodologies for New Zealand mud snails prior to working on the project. Brochures or identification cards should be available to all project personnel and CDFW informational posters should be installed at the project site.
 - b. After work in West Antioch Creek, all waders, boots, gear, and other equipment should be thoroughly inspected for New Zealand mud snails. A cleaning station should be established on the project site and maintained throughout the project duration employing both physical and chemical cleaning methodologies. The cleaning station should implement the preventative and treatment methodologies in accordance with CDFW available at <http://www.dfg.ca.gov/invasives/mudsnail/>.
 - c. A designated cleaning area should be established for heavy equipment and vehicles. All heavy equipment should be cleaned prior to leaving the site in accordance with CDFW guidelines.
 - d. Fish should be relocated to a safe location outside the work area, but should not be translocated to another location other than West Antioch Creek.

Amphibians

Two federally- or State-listed, proposed, candidate, or fully protected amphibian species¹⁵ were considered during this assessment (CDFW 2013a,c; USFWS 2013a,b); one was determined to have the potential to occur within the study area (Appendix D).

California Red-Legged Frog (*Rana draytonii*)

Status, Distribution and Habitat Requirements

The California red-legged frog was listed by the USFWS as a threatened species on May 23, 1996 (61 FR 25813) and is designated a California Species of Special Concern by CDFG (2011). A recovery plan was published for the California red-legged frog on September 12, 2002 (USFWS 2002). The California red-legged frog is one of two species of red-legged frog endemic to the Pacific Coast. The northern red-legged frog (*Rana aurora*) ranges from southern British Columbia, Canada south to northern Marin County. The California red-legged frog is distributed throughout 26 counties in California, but is most abundant in the San Francisco Bay Area. Populations have become isolated in the Sierra Nevada, northern Coast, northern and southern Transverse and Peninsular Ranges (Jennings and Hayes 1994, Stebbins 2003). Red-legged frogs occurring from southern Del Norte County to northern Marin County are known to hybridize, often exhibiting characteristics of both species (Hayes and Krempels 1986).

California red-legged frogs predominantly inhabit permanent water sources such as streams, lakes, marshes, natural and man-made ponds, and ephemeral drainages in valley bottoms and foothills up to 1,500 meters (4,921 feet) in elevation (Jennings and Hayes 1994, Bulger *et al.* 2003, Stebbins 2003). Adults breed in a variety of aquatic habitats, while larvae and metamorphs use streams, deep pools, backwaters of streams and creeks, ponds, marshes, sag ponds, dune ponds, and lagoons. Stock ponds are frequently used for breeding when they provide suitable hydroperiod, pond structure, vegetative cover, and are managed to control nonnative predators such as bullfrogs and exotic fish. Breeding occurs between November and April within still or slow-moving water with light to dense, riparian or emergent vegetation, such as cattails (*Typha* spp.), tules (*Scirpus* spp.) or overhanging willows (*Salix* spp.) (Hayes and Jennings 1988). Egg masses are attached to vegetation below the surface and hatch after 6 to 14 days (Storer 1925, Jennings and Hayes 1994). Larvae undergo metamorphosis 3½ to 7 months following hatching and reach sexual maturity 2 to 3 years of age (Jennings and Hayes 1984, 1994).

Tatarian (2008) noted that a 57% majority of frogs fitted with radio transmitters in the Round Valley of eastern Contra Costa County stayed at their breeding pools, whereas 43% moved into adjacent upland habitat or to other aquatic sites. This study reported a peak of seasonal terrestrial movement in the fall months corresponding to 0.2-inches of precipitation that tapered off into spring. Upland movement activities ranged from 3 to 233 feet, averaging 80 feet, and were associated with a variety of refugia including ground squirrel burrows at the bases of trees or rocks, logs, grass thatch, crevices, cow hoof prints, and a downed barn door; others were associated with upland sites lacking refugia (Tatarian 2008). The majority of terrestrial movements lasted from 1 to 4 days; however, one female was reported to remain in upland habitat for 50 days (Tatarian 2008). Uplands closer to aquatic sites were more often used and were more commonly associated with areas exhibiting higher object cover, *e.g.* small woody debris, rocks, and vegetative cover.

Most frogs move away from breeding ponds to upland areas. The distance moved is site dependent, though one recent study shows that only a few frogs move farther than the nearest suitable non-breeding habitat (Fellers and Kleeman 2007). In this Marin County study, the furthest distance traveled was 1.4

¹⁵ California red-legged frog and California tiger salamander – Central Valley DPS

kilometers (0.9-mile) and most dispersing frogs moved through grazed pastures to reach the nearest riparian habitat (Fellers and Kleeman 2007). Bulger *et al.* (2003) did not observe habitat preferences among frogs moving between ponds. They did note that when breeding ponds dry, California red-legged frogs use moist microhabitats of dense shrubs and herbaceous vegetation within 100 meters (328 feet) of ponds.

Critical Habitat

Critical habitat was designated for this species on April 13, 2006 (71 FR 19244) and revisions to the critical habitat designation were published on March 17, 2010 (75 FR 12816). Critical habitat unit designations were determined based on the physical and biological features that are essential to the conservation of the California red-legged frog. Critical habitat units CCS-1, 2A and 2B are located within Contra Costa County, and unit ALA-1A borders the southwest corner of the County; however, the study area is not located within designated critical habitat units. Contra Costa County is located within the East San Francisco Bay recovery unit (CDFG 2006b).

Habitat Assessment and Occurrence in the Project Vicinity

The creek south of 10th Street consists of a narrow earthen channel that flows downstream through two large concrete culverts into a concrete-lined trapezoidal channel under a vacant car dealership parking lot. The channel opens up into a slightly wider natural channel that has been modified for flood control. Although the earthen and concrete-lined channel do not provide suitable breeding habitat, the natural reach of West Antioch Creek does provide suitable breeding and non-breeding aquatic habitat (Figure 10). The lower reach of the creek flows within a low flow channel and expanded floodplain. Near the confluence with the tidally influenced marsh the creek is increasingly filled with cattails with small areas of open water habitat. Upland and dispersal habitat is along the riparian corridor and degraded ruderal lots above top of bank. The ruderal field on the west side of the creek, north of the vacant car dealership parking lot also provides low quality upland habitat with minimal cover from shrubs or woody debris. This species has not been reported north of State Route 4 and both branches of West Antioch Creek as well as Markley Creek, a main tributary, are underground for at least a half-mile before day-lighting into a natural channel. The nearest reported occurrence (EONDX #48404), consisting of four adult frogs, is located approximately 1.8 miles upstream and south of SR-4 in Markley Canyon Creek in 2002 (Figure 8) (CDFW 2013a).

Potential Project Related Effects

Within the study area there is 6.47 acres of potential California red-legged frog breeding habitat, 2.23 acres of non-breeding aquatic habitat, and 18.44 acres of upland and dispersal habitat (Figure 10). The project would result in the temporary loss of 4.44 acres of potential California red-legged frog breeding habitat, 2.20 acres of non-breeding aquatic habitat, and 13.75 acres of upland and dispersal habitat (3.29 in the project extent and 10.46 in potential staging areas). If present within the study area, the project could result in direct mortality, injury or harassment to individual California red-legged frogs and may disrupt breeding, foraging, and dispersal activities, and normal behaviors. Replacement of the concrete-lined v-ditch with an earthen lined creek channel would benefit the species by restoring a portion of the channel to more natural conditions.

HCP/NCCP Conservation Measures (HCP/NCCP Chapter 6, Section 6.4.3)

1) Preconstruction Survey

No preconstruction surveys are required by the HCP/NCCP.

2) Avoidance and Minimization Measures

Written notification to USFWS, CDFW, and the Implementing Entity, including photos and habitat assessment, is required prior to disturbance of any suitable breeding habitat. The project proponent

will also notify these parties of the approximate date of removal of the breeding habitat at least 30 days prior to this removal to allow USFWS or CDFW staff to translocate individuals, if requested. USFWS or CDFW must notify the project proponent of their intent to translocate California red-legged frog within 14 days of receiving notice from the project proponent. The applicant must allow USFWS or CDFW access to the site prior to construction if they request it.

There are no restrictions under this HCP/NCCP on the nature of the disturbance or the date of the disturbance unless USFWS or CDFW notify the project proponent of their intent to translocate individuals within the required time period. In this case, the project proponent must coordinate the timing of disturbance of the breeding habitat to allow USFWS or CDFW to translocate the individuals. USFWS and CDFW shall be allowed 45 days to translocate individuals from the date the first written notification was submitted by the project proponent (or a longer period agreed to by the project proponent, USFWS, and CDFW).

3) Construction Monitoring

No construction monitoring is required by the HCP/NCCP.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to California red-legged frogs the following avoidance and minimization measures should be implemented:

1. No work should occur during or within 24 hours following a rain event exceeding 0.2-inch as measured by the NOAA National Weather Service for Concord, CA (KCCR) base station available at:
<http://www.wrh.noaa.gov/mesowest/getobext.php?wfo=mtr&sid=KCCR&num=72&raw=0>.
2. To prevent California red-legged frogs from becoming entangled, trapped or injured, erosion control materials that use plastic or synthetic mono-filament netting should not be used. This includes products that use photodegradable or biodegradable synthetic netting, which can take several months to decompose. Acceptable materials may include tackified hydroseeding compounds and natural fibers such as jute or twine with a wide aperture mesh.
3. A USFWS-approved biologist(s) should be on site during all project activities that occur below the top of bank that may result in take of California red-legged frogs. The City should submit the qualifications of all potential USFWS-approved biologists to the USFWS for review and approval at least thirty (30) calendar days prior to project initiation.
4. Preconstruction surveys should be conducted by a USFWS-approved biologist(s) immediately prior to the initiation of any ground disturbing activities and vegetation clearing that may result in take of California red-legged frogs. All suitable aquatic and upland habitat including refugia habitat such as dense vegetation, small woody debris, refuse, burrows, should be thoroughly inspected. The USFWS-approved biologist(s) should conduct clearance surveys at the beginning of each day and regularly throughout the workday when construction activities are occurring that may result in take of California red-legged frogs. If a California red-legged frog is observed, the USFWS-approved biologist(s) should implement the species observation and handling protocol outlined below unless otherwise directed by the USFWS.
5. If a California red-legged frog(s) is encountered in the action area, work activities within 50 feet of the California red-legged frog(s) should cease immediately and the Resident Engineer should

be notified. The Resident Engineer will notify the USFWS-approved biologist. Based on the professional judgment of the USFWS-approved biologist, if project activities can be conducted without injuring or killing the California red-legged frog(s), it may be left at the location of discovery and monitored by the USFWS-approved biologist. All project personnel should be notified of the finding and at no time will work occur within 50 feet of the California red-legged frog(s) without a USFWS-approved biologist present. If it is determined by the USFWS-approved biologist that relocating the California red-legged frog(s) is necessary, the following steps should be followed:

- a. Prior to handling and relocation the USFWS-approved biologist should take precautions to prevent introduction of amphibian diseases in accordance with the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS 2005). Disinfecting equipment and clothing is especially important when biologists are coming to the project area to handle amphibians after working in other aquatic habitats.
- b. California red-legged frogs should be captured by hand, dipnet or other USFWS-approved methodology, transported by hand, dipnet or temporary holding container, and released as soon as practicable the same day of capture. Handling of California red-legged frogs should be minimized to the maximum extent practicable. Holding/transporting containers and dipnets should be thoroughly cleaned, disinfected and rinsed with freshwater prior to use within the action area.
- c. California red-legged frogs should be relocated to nearby suitable habitat outside of the work area and released at a location approved by the USFWS. If suitable habitat cannot be identified, the USFWS should be contacted to determine an acceptable alternative. If California red-legged frogs are relocated, the USFWS should be notified within 24 hours of relocation.

Reptiles

Two federally- or State-listed, proposed, candidate, or fully protected reptile species¹⁶ were considered during this assessment (CDFW 2013a,c; USFWS 2013a,b); however, neither were determined to have the potential to occur within the study area (Appendix D).

Birds

Eleven federally- or State-listed, proposed, candidate, or fully protected bird species¹⁷ were considered during this assessment (CDFW 2013a,c; USFWS 2013a,b); two of which were determined to have the potential to nest/winter, roost and forage within the study area (Appendix D). Although suitable habitat is present within the freshwater marsh area for the California clapper rail, this species has not been reported west of Bay Point in northern Contra Costa County; the nearest occurrence is located 9.3 miles to the west (CDFW 2013a). Therefore it is not expected to occur within the study area.

¹⁶ Alameda whipsnake and giant garter snake.

¹⁷ Golden eagle, Swainson's hawk, western snowy plover, white-tailed kite, American peregrine falcon, California black rail, California brown pelican, California clapper rail, bank swallow, California least tern and northern spotted owl.

California Black Rail (*Laterallus jamaicensis coturniculus*)

Status, Distribution and Habitat Requirements

The California black rail is State-listed as threatened and designated as fully protected by §3511 of the California Fish and Game Code. It is the smallest subspecies inhabiting North America and is distinguished by its slender bill and darker brown coloration on its crown and back. California black rails are secretive and inhabit shallow, tidal and freshwater marshes and wetlands characterized by tall, dense stands of emergent vegetation such as cattails (*Typha* spp.) and bulrushes (*Scirpus* spp.). In the Bay Area, black rails prefer habitat associated with alkali heath (*Frankenia grandifolia*), and high insect and low amphipod abundance (Eddleman et al. 1994). Within Central California, black rails are year-round residents that occur throughout the San Francisco Bay estuary, Bodega Bay, Tomales Bay, Morro Bay, and Bolinas Lagoon (Eddleman et al. 1994). Nests are built on the ground in tufts of grass or *Salicornia* spp. beginning in mid-March (Baicich and Harrison 2005). The breeding season lasts through mid-July and the species is typically single-brooded. Precocial young leave the nest within 24 hours of hatching (Baicich and Harrison 2005).

Critical Habitat

Critical habitat is not designated for this species.

Habitat Suitability and Occurrence Data

The permanent wetland at the northernmost section of the project area is comprised of narrowleaf cattail forming nearly complete cover except within the low flow channel. Other vegetation species along the margins include flatsedge, perennial pepperweed, Himalayan blackberry, pampas grass, marsh baccharis and scattered arroyo willows. The study area does not contain pickleweed and therefore, does not support California black rail nesting habitat (Figure 11). However, the permanent wetland provides year-round nonbreeding habitat. The nearest reported occurrences are located approximately 2.3 miles to the northwest (EONDX #69045) on Browns Island as reported from surveys conducted between 2004-2006 (CDFW 2013a).

Potential Project-Related Effects

The project will not result in direct impacts to California black rail nesting habitat based on the lack of nesting habitat within the study area; however, pickleweed dominated habitat may be present within the greater Dow Wetlands Preserve. In such case, project activities could result in nest disturbance, abandonment and nest failure. Disturbance could cause short-term impacts such as failure to breed, nest abandonment, lower numbers of eggs, juvenile abandonment, and overall lower juvenile survivorship.

There is 4.93 acres of nonbreeding habitat in the study area (Figure 11). Desilting of the lower reach of West Antioch Creek downstream of 4th Street will result in the loss of 3.01 acres of nonbreeding habitat through the removal of cattails. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and increased movement or flushing from cover, or altered activity patterns, that reduce energy reserves and increase predation risk.

Additional Recommended Avoidance and Minimization Measures

To minimize potential impacts to California black rails, the following avoidance and minimization measures should be implemented:

1. Within 700 feet of the project footprint, focused preconstruction surveys for active California black rail nests, broods and calling centers should be conducted by a CDFW-approved biologist(s) within two weeks prior to the start of construction and monthly thereafter throughout the duration of the nesting season from February 1 to September 30. If active nests – nests with egg(s) or young present – broods, or calling centers are located the survey area, all construction

activities within 700 feet of the nest, brood or call center should cease immediately, CDFW should be notified within 24 hours of the observation and a 700 foot no-disturbance buffer should be established until the young have fledged unless otherwise directed by CDFW.

2. A CDFW-approved biologist(s) should be present on site to monitor for California black rails during construction activities occurring downstream of 4th Street. The biological monitor should have the authority to stop work if deemed necessary for any reason to protect federally listed species. If a California black rail is observed in the work area, work within 100 feet of the rail(s) should cease immediately and the CDFW-approved biologist(s) should monitor the rail until it leaves the work area. If the rail does not leave the work area, work should not restart until after the CDFW have made a decision on how to proceed with further construction activities. CDFW should be notified within 24 hours of an observation of a California black rail.

White-tailed Kite (*Elanus leucurus*)

Status, Distribution and Habitat Requirements

The white-tailed kite is designated as a fully protected species by §3511 of the California Fish and Game Code. This species receives additional protection under the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code §3503. White-tailed kites inhabit open grasslands and savannahs, and breed in a variety of habitats, including grasslands, cultivated fields, oak woodlands and suburban areas where prey is abundant. Nests are built in trees typically near a water source and may occur in suburban areas with adjacent open areas with abundant prey. Breeding occurs between February and July and the species can be double-brooded in some years (Baicich and Harrison 2005). During the non-breeding season, white-tailed kites may roost communally (Dunk 1995). White-tailed kites prey on small mammals, reptiles and occasionally, birds.

Habitat Assessment and Occurrence in the Project Vicinity

Suitable nesting and roosting habitat is present in the mature trees throughout the study area (Figure 12), and suitable foraging habitat is available in the open riparian and ruderal grassland areas. No white-tailed kites or their nests were observed within the study area; however, a total of four nesting occurrences have been reported within 10 miles of the study area (CDFW 2013a). The nearest two reports of breeding are located approximately 2.2 miles to the northwest in 2005 (EONDX 64354) and approximately 3.7 miles to the northeast in 2004 (EONDX 54958) (CDFW 2013a). White-tailed kite are known to breed throughout all of Contra Costa County (CCCBBA 2002).

Potential Project Related Effects

The project would not result in the loss of known white-tailed kite nests, but may result in the loss of potential nesting trees and foraging habitat. If present, the project could result in harassment to individual white-tailed kites and may temporarily disrupt foraging activities.

Additional Recommended Avoidance and Minimization Measures

To minimize potential impacts to white-tailed kites, the following avoidance and minimization measures should be implemented:

1. The removal or trimming of tree within 250 feet of the project footprint should be conducted during the non-breeding season, i.e. between September 1 and February 1, to avoid impacts to nesting white-tailed kites. If tree removal during the non-breeding season is infeasible, trimming or delimbing of suitable trees to discourage nesting should be conducted during the non-breeding season.
2. If project construction begins during the breeding season, i.e. February 1 to August 31, preconstruction surveys should be conducted within the project footprint and a 300-foot buffer,

by a qualified biologist no more than two weeks prior to equipment or material staging, pruning/grubbing or surface-disturbing activities.

3. If active nests (*i.e.* nests in the egg laying, incubating, nestling or fledgling stages) are found within 300 feet of the project footprint, non-disturbance buffers should be established at a distance sufficient to minimize disturbance based on the nest location, topography, cover, the nesting pair's tolerance to disturbance and the type/duration of potential disturbance. No work should occur within the non-disturbance buffers until the young have fledged as determined by a qualified biologist. Buffer size should be determined in cooperation with CDFW and USFWS based on the type of work activity to be performed and the sensitivity of the species/individual(s) to disturbance. If buffers are established and it is determined that project activities are resulting in nest disturbance, work should cease immediately and the CDFW and USFWS should be contacted for further guidance.

Mammals

Two federally- or State-listed, proposed, candidate, or fully protected mammal species¹⁸ were considered during this assessment (CDFW 2013a,c; USFWS 2013a,b); neither of which were determined to have the potential to occur within the study area (Appendix D).

4.3.3 SENSITIVE AND LOCALLY RARE WILDLIFE SPECIES

Invertebrates

Eighteen sensitive or locally rare invertebrate species¹⁹ were considered during the preparation of this assessment (CDFG 2011; CDFW 2013a); one species was determined to have the potential to occur within the study area (Appendix D).

Bridges' Coast Range Shoulderband Snail (*Helminthoglypta nickliana bridgesi*)

Status, Distribution and Habitat Requirements

Bridge's Coast Range shoulderband snail has no formal protection or legal status; however, it is tracked as a Special Animal by the California Department of Fish and Game (CDFG 2011). The ecological requirements of the species include rock piles, thistles and weedy grasslands on open hillsides (CDFW 2013a). Also found under woody debris in streamside oak woodland habitat. Their known range includes the hillsides of Contra Costa County and northern Alameda Counties; recorded in the west slope of Berkeley Hills, Marsh Creek Canyon, Marsh Creek Springs, Tilden Park, Point Isabel (Roth 1999).

Habitat Assessment and Occurrence in the Project Vicinity

Suitable habitat is present within the ruderal grassland vegetation community types within the study area. One occurrence (EONDX 23088) was recorded from Perkins Canyon on the eastern slope of Mt. Diablo in 1995 (CDFW 2013a). A single shell was observed under a piece of plywood in the ruderal grasslands within the study area on April 23, 2009, 2.5 miles to the east while conducting a site assessment for the Oakley-Trembath Flood Detention Basin (Nomad 2010a).

¹⁸ Salt marsh harvest mouse and San Joaquin kit fox.

¹⁹ Blennospermatis vernal pool andrenid bee, Antioch dunes anthicid beetle, Sacramento anthicid beetle, midvalley fairy shrimp, San Joaquin dune beetle, Hairy water flea, Antioch efferian robberfly, redheaded sphecid wasp, Bridges' coast range shoulderband snail, curved-foot hygrotus diving beetle, Middlekauff's shieldback katydid, California linderiella, molestan blister beetle, Hurd's metapogon robberfly, Antioch multilid wasp, Antioch andrenid bee, Antioch sphecid wasp, and Antioch dunes halcitic beetle.

Potential Project Related Effects

The project would result in the loss of ruderal areas that support tall, weedy vegetation suitable for this species. If present, the project could result in the direct mortality or injury of individuals of this species.

Recommended Avoidance and Minimization Measures

Impacts to Bridges' coast range shoulderband snails can be avoided or minimized by implementing the following mitigation measures:

1. Minimize habitat loss in areas known to support Bridges' Coast Range shoulderband snail.

Fish

Three sensitive or locally rare fish species²⁰ were considered during the preparation of this assessment (CDFG 2011; NOAA 2004, 2006; CDFW 2013a); one of which was determined to have the potential to occur within the study area (Appendix D). The study area lies within the designated ESU for the Chinook salmon Central Valley fall/late fall-run ESU and suitable habitat is present within West Antioch Creek; however, the species has not been reported from West Antioch Creek (Leidy 2007). The reaches of the creek upstream of the study area provide low quality habitat for salmonids based on low flows, silty sediment, and portions of the creek that have been undergrounded or channelized. There is the potential for Chinook salmon to wander into the reach of creek within the study area, but this is unlikely; therefore, this species is not expected to occur within the study area.

Sacramento Splittail (*Pogonichthys macrolepidotus*)

Status, Distribution and Habitat Requirements

The Sacramento splittail is designated a California Species of Special Concern by CDFW and is designated as vulnerable by the American Fisheries Society (CDFG 2011). Endemic to the lakes and rivers of the Central Valley, the Sacramento splittail is now confined to the Delta, Suisun Bay, lower Napa River, lower Petaluma River, the San Francisco Estuary and associated marshes (Moyle 2002). They inhabit slow-moving river sections, dead-end sloughs and require flooded vegetation for spawning and foraging for young. They have been reported from the deep-water channel near Chipps Island during midwater trawl salmonid surveys every year from 1976-2002 (Moyle et al. 2003). Spawning occurs from late February to early July; peaking March through April (Moyle 2002). The Yolo and Sutter bypasses are important spawning grounds for this species (Moyle 2002). Splittail feed on bottom dwelling invertebrates such as opossum shrimp (*Meomysis mercedis*), benthic amphipods (*Corophium*), harpacticoid copepods, clams, and crustaceans (Moyle 2002).

Habitat Suitability and Occurrence Data

Suitable habitat is present within study area. This species is reported from Delta, Marsh Creek, Walnut Creek and San Ramon Creek (Leidy 2007). Although the species has not been reported from West Antioch Creek (Leidy 2007), there is a possibility of Sacramento splittail occurring within the lower reached of West Antioch Creek within the study area. No in-stream barriers to movement are present between the study area and San Joaquin River.

Potential Project-Related Effects

If present within the study area, desilting of the lower reaches of West Antioch Creek and channel improvements could result in injury or mortality to Sacramento splittail. In-stream work could result in increasing turbidity, reducing water quality, temporarily altering habitat, and changing water velocities. The project may also reduce feeding success and temporarily degrading overall habitat quality.

²⁰ Chinook salmon Central Valley fall/late fall-run ESU, Sacramento perch and Sacramento splittail.

Additional Recommended Avoidance and Minimization Measures

To minimize potential impacts to Sacramento splittail, the avoidance and minimization measures outlined for the delta smelt should be implemented.

Amphibians

One sensitive or locally rare amphibian species²¹ was considered during the preparation of this assessment (CDFG 2011; CDFW 2013a), but was determined not to have the potential to occur within the study area (Appendix D).

Reptiles

Three sensitive or locally rare reptile species²² were considered during this assessment (CDFG 2011; CDFW 2013a); one of which was determined to have the potential occur within the study area (Appendix D).

Western pond turtle (*Emys marmorata*)

Status, Distribution and Habitat Requirements

The western pond turtle, a California Species of Special Concern (CDFG 2011), is the only fresh-water turtle native to greater California and is distributed along much of the western coast from the Puget Sound in Washington south to the Baja Peninsula, Mexico (Storer 1930). The literature describes two subspecies of western pond turtle; the northwestern pond turtle (*C. m. marmorata*) and the southwestern pond turtle (*C. m. pallida*). Overall, western pond turtles are habitat generalists, and have been observed in slow-moving rivers and streams (e.g. in oxbows), lakes, reservoirs, permanent and ephemeral wetlands, stock ponds, and sewage treatment plants. They prefer aquatic habitat with refugia such as undercut banks and submerged vegetation (Holland 1994), and require emergent basking sites such as mud banks, rocks, logs, and root wads to thermoregulate their body temperature (Holland 1994, Bash 1999). Pond turtles are omnivorous and feed on a variety of aquatic and terrestrial invertebrates, fish, amphibians and aquatic plants.

Western pond turtles regularly utilize upland terrestrial habitats, most often during the summer and winter, especially for oviposition (females), overwintering, seasonal terrestrial habitat use, and overland dispersal (Reese 1996, Holland 1994). Females have been reported ranging as far as 500 meters (1,640 feet) from a watercourse to find suitable nesting habitat (Reese and Welsh 1997). Their nest sites are most often situated on south or west-facing slopes, are sparsely vegetated with short grasses or forbs, and are scraped in sands or hard-packed, dry, silt or clay soils (Holland 1994, Rathbun *et al.* 1992, Holte 1998, Reese and Welsh 1997). Western pond turtles exhibit high site fidelity, returning in sequential years to the same terrestrial site to nest or overwinter (Reese 1996). Females lay their clutch as early as late April in southern and central California to late July, although they predominantly lay in June and July. In the early morning or late afternoon, gravid females leave the water and move upland to nest (Holland 1994). Natural incubation times vary, ranging from 80 – 100+ days in California. In northern California and Oregon, hatchlings remain in the nest after hatching and overwinter, emerging in the spring. In southern and central California, those that do not overwinter emerge from the nest in the early fall (Holland 1994).

Habitat Assessment and Occurrence in the Project Vicinity

Two western pond turtles were observed during the April 23, 2009 site visit; one basking on a log in mid-channel and the other in the creek itself. The northern portion of the study area downstream of the

²¹ Foothill yellow-legged frog.

²² Silvery legless lizard, western pond turtle and coast horned lizard.

concrete-lined trapezoidal channel provides suitable aquatic and basking habitat for this species (Figure 13). The adjacent floodplain and vacant ruderal lot to the west may serve as nesting habitat, but these species are long lived and their presence does not always indicate an active breeding population. Eighteen adults were reported in 1998 at the Dow Wetland Preserve, approximately 0.5-mile to the northwest within easy access to the extensive marshlands to the north and West Antioch Creek to the east (CDFW 2013a). This locale may function as a source population, and if extant, likely augments the population within the Creek. Six red-eared sliders were observed during the March 12, 2013 site visit. Although, these species can co-occur, the red-eared slider is a non-native species that often outcompetes the native western pond turtle.

Potential Project-Related Effects

There is 8.71 acres of western pond turtle habitat in the study area, 6.64 acres of which could be temporarily impacted (Figure 13). The project could result in direct mortality or injury to individual western pond turtles and cause abandonment, reduced feeding success, loss of nests if breeding on site, decreased recruitment, increased risk to predation, or subject individuals to poor water quality during construction.

Additional Recommended Avoidance and Minimization Measures

To minimize potential impacts to western pond turtles, the following avoidance and minimization measures should be implemented:

1. A qualified biologist should conduct a preconstruction survey for western pond turtles immediately prior to work activities within the creek or floodplain downstream from the concrete-lined channel. If western pond turtles are detected within the work area, no work should occur until they move or are captured and relocated outside of the work area. The on-site biologist should determine, in consultation with CDFW, if capturing and relocating the individual(s) is necessary. If authorized by CDFW, only a biologist in possession of a valid Scientific Collecting Permit should handle or relocate the turtles.
2. Western pond turtles should be relocated to a safe location outside the work area, but should not be translocated to another location other than West Antioch Creek to prevent the spread of New Zealand mud snails.

Birds

Twenty sensitive or locally rare bird species²³ were considered during this assessment (CDFG 2011; CDFW 2013a); three species were observed on site, and eleven were determined to have the potential to nest, roost and forage within the study area (Appendix D). All birds covered by the HCP/NCCP (tricolored blackbird, western burrowing owl, golden eagle, and Swainson's hawk) are also considered migratory birds and subject to the prohibitions of the MBTA. Actions conducted under the HCP/NCCP must comply with the provisions of the MBTA and avoid killing or possessing covered migratory birds, their young, nests, feathers, or eggs. Because none of the covered bird species are currently listed under the ESA, none of the covered birds are eligible for a Special Purpose Permit associated with the HCP/NCCP. Should any of the covered birds become listed under the ESA during the permit term, the ESA permit would also constitute an MBTA Special Purpose Permit for that species as specified under 50

²³ Cooper's hawk, sharp-shinned hawk, tricolored blackbird, grasshopper sparrow, great blue heron, short-eared owl, burrowing owl, oak titmouse, ferruginous hawk, mountain plover, northern harrier, yellow warbler, saltmarsh common yellowthroat, yellow-breasted chat, loggerhead shrike, Suisun song sparrow, double-crested cormorant, Nuttall's woodpecker, purple martin, and Allen's hummingbird.

CFR Sec. 21.27 subject to renewal by the Permittee. To fulfill the requirements of the MBTA, covered activities must not result in take as defined by the MBTA of covered bird species. Conservation Measures 1.12 and 1.14 of the HCP/NCCP incorporate avoidance guidelines for compliance with the MBTA.

Protection is afforded to these bird species by the Migratory Bird Treaty Act (16 U.S.C. 703-712; MBTA) administered by the U.S. Fish and Wildlife Service (Division of Migratory Bird Management), which makes it unlawful, unless expressly authorized by permit pursuant to federal regulations, to “pursue, hunt, take, capture, kill, attempt to take, capture or kill, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird.” This includes direct and indirect acts, with the exception of harassment and habitat modification, which are not included unless they result in direct loss of birds, nests or eggs. Most bird species occurring within California fall under the protection of the MBTA, except those species that belong to the families not listed in any of the four treaties, such as wren (Chamaea fasciata), European starling (Sturnus vulgaris), California quail (Callipepla californica), ring-necked Pheasant (Phasianus colchicus) and chukar (Alectoris chukar), among others less common in California. In addition, the Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, PL 108-447; MBTRA), excludes all migratory birds nonnative or that have been human introduced to the U.S. or its territories. It defines a native migratory bird as a species present within the U.S. and its territories as a result of natural biological or ecological processes. This list excluded two additional species commonly observed in the U.S., the rock pigeon (Columba livia) and domestic goose (Anser anser ‘domesticus’). The California Fish and Game Code (CFG) §3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird; §3503.5 prohibits the take, possession, or needless destruction of any nests, eggs or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys and falcons, among others) or Strigiformes (owls); §3511 prohibits the take or possession of fully protected birds; and §3513 prohibits the take or possession of any migratory nongame bird or part thereof as designated in the MBTA.

Burrowing owl (*Athene cunicularia*)

Status, Distribution and Habitat Requirements

The burrowing owl is designated a California Species of Special Concern by the CDFW (CDFG 2011) and is federally designated as a Bird of Conservation Concern. This species receives additional protection under the MBTA and California Fish and Game Code §3503. Burrowing owls range throughout the Central Valley, the inner and outer Coastal regions, portions of the San Francisco Bay Area, the southern California Coast, from southern California to the Mexican Border, the Imperial Valley, and in portions of the desert and high desert habitats in southeastern and northeastern California. Burrowing owls require habitat with three basic attributes: open, well drained terrain; short, sparse vegetation; and underground burrows or burrow facsimiles. Throughout their range, burrowing owls occupy grasslands, deserts, sagebrush scrub, agricultural areas (including pastures and untilled margins of cropland), earthen levees and berms, coastal uplands, urban vacant lots, and the margins of airports, golf courses, and roads (Haug et al. 1993). Burrowing owls rely on burrows excavated by fossorial mammals or reptiles, including prairie dogs, ground squirrels, badgers, skunks, armadillos, woodchucks, foxes, coyotes, and gopher tortoises (Karalus and Eckert 1987). Where the number and availability of natural burrows is limited (for example, where burrows have been destroyed or ground squirrels eradicated), owls will occupy drainage culverts, cavities under piles of rubble, discarded pipe, and other tunnel-like structures (Haug et al. 1993). Like other owls, burrowing owls breed once each year in an extended reproductive period, during which most adults mate monogamously. Both sexes reach sexual maturity at one year of age. Clutch sizes vary, and the number of eggs laid is proportionate to prey abundance. The breeding season occurs from February 1 to August 31, but peaks between late April and July in most years.

Habitat Assessment and Occurrence in the Project Vicinity

Suitable nesting habitat is present within the study area in the areas designated as ruderal grassland habitat (Figure 12). California ground squirrel burrows were observed along the earthen channel south of Tenth Street and in the ruderal areas, but no burrowing owl or diagnostic sign was observed. Although no burrowing owls were observed during the site visit; owls could use the site for denning, breeding or foraging at any time of the year. Burrowing owls are widespread throughout the Antioch, Oakley and Brentwood area. In 2008, two adults were observed among six burrows along the railroad tracks near Somersville Road in an area currently under development (CDFW 2013a). This area is approximately 0.6 mile west of the study area.

Potential Project-Related Effects

There is 18.27 acres of suitable nesting habitat in the study area; 3.15 acres are in the project extent and 10.46 acre may be used for staging areas (Figure 12). The project could result in direct mortality or injury to breeding, resident or transient burrowing owls or cause harassment from noise or increased human activity. The project could impact this species by disrupting breeding, causing the abandonment of nests, altering foraging behaviors, temporarily displacing individuals, or causing reduced reproductive success due to stress.

*HCP/NCCP Conservation Measures (HCP/NCCP Chapter 6, Section 6.4.3)***1) Preconstruction Survey**

Prior to any ground disturbance related to covered activities, a USFWS/CDFW-approved biologist shall conduct a preconstruction survey in areas identified in the planning surveys as having potential burrowing owl habitat. The surveys will establish the presence or absence of western burrowing owl and/or habitat features and evaluate use by owls in accordance with CDFW survey guidelines (CDFG 2012).

On the parcel where the activity is proposed, the biologist shall survey the proposed disturbance footprint and a 500-foot radius from the perimeter of the proposed footprint to identify burrows and owls. Adjacent parcels under different land ownership will not be surveyed. Surveys should take place near sunrise or sunset in accordance with CDFW guidelines. All burrows or burrowing owls will be identified and mapped. Surveys will take place no more than 30 days prior to construction. During the breeding season (February 1 – August 31), surveys will document whether burrowing owls are nesting in or directly adjacent to disturbance areas. During the nonbreeding season (September 1 – January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any disturbance area. Survey results will be valid only for the season (breeding or nonbreeding) during which the survey is conducted.

2) Avoidance and Minimization Measures and Construction Monitoring

If burrowing owls are found during the breeding season (February 1 – August 31), the project proponent will avoid all nest sites that could be disturbed by project construction during the remainder of the breeding season or while the nest is occupied by adults or young. Avoidance will include establishment of a non-disturbance buffer zone (described below). Construction may occur during the breeding season if a qualified biologist monitors the nest and determines that the birds have not begun egg-laying and incubation or that the juveniles from the occupied burrows have fledged. During the nonbreeding season (September 1 – January 31), the project proponent should avoid the owls and the burrows they are using, if possible. Avoidance will include the establishment of a buffer zone (described below).

If occupied burrows for burrowing owls are not avoided, passive relocation will be implemented. Owls should be excluded from burrows in the immediate impact zone and within a 160-foot buffer

zone by installing one-way doors in burrow entrances. These doors should be in place for 48 hours prior to excavation. The project area should be monitored daily for 1 week to confirm that the owl has abandoned the burrow. Whenever possible, burrows should be excavated using hand tools and refilled to prevent reoccupation (CDFG 2012). Plastic tubing or a similar structure should be inserted in the tunnels during excavation to maintain an escape route for any owls inside the burrow.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to burrowing owls, the following avoidance and minimization measures should be implemented:

1. Within the same calendar year the project is scheduled to begin, focused surveys for burrowing owls should be conducted prior to the burrowing owl breeding season, which occurs from February 1 through August 31. Surveys should be conducted in accordance with the 2012 CDFW survey guidelines (CDFG 2012). If no burrowing owls are observed, ground squirrel burrows should be collapsed within the project footprint to discourage burrowing owls from moving onto the project site. Ground squirrel control and burrow abatement should continue throughout the active construction period. If burrowing owls are observed within the project footprint or 500 feet (150 meters) from the project footprint, burrowing owl exclusion and closure should be conducted in accordance with the 2012 CDFW survey guidelines (CDFG 2012) and in coordination with CDFW.
2. If burrowing owls are found during the breeding season (February 1 – August 31), disturbance to occupied burrows should be avoided until the end of the nesting season. If disturbance cannot be avoided non-disturbance buffers should be established in coordination with CDFW. CDFW should be contacted to determine if passive relocation should be implemented.

Cooper's Hawk (*Accipiter cooperii*)

Status, Distribution and Habitat Requirements

The Cooper's hawk (nesting) is included on the CDFW Watchlist (CDFG 2011). Their range extends across the contiguous United States extending into southern Canada and Mexico, and they are distributed throughout most of California (Curtis *et al.* 2006). Cooper's hawks inhabit dense stands of oak woodlands, riparian deciduous forests, or other forest habitats often near water and suburban areas (Baicich & Harrison 2005). This woodland raptor hunts in broken woodlands, along forest edges and suburban areas for medium-sized birds and mammals (Curtis *et al.* 2006). Typical nest site selection is characterized by mature trees with significant canopy cover, although species will nest in suburban areas in a variety of trees (Curtis *et al.* 2006). Their breeding begins in April and they are single-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present among mature trees throughout the study area. A juvenile Cooper's hawk was observed roosting in a willow tree within the study area during the April 23, 2009 site visit; however, no adults or nests were observed. It is unlikely that this individual nested in the study area based on the lack of nest structures nearby. Suitable foraging habitat is present within the study area. Several bird species that are potential prey for this species were observed in the study area, including red-winged blackbird (*Agelaius phoeniceus*), Brewer's blackbird (*Euphagus cyanocephalus*), goldfinch (*Carduelis* spp.), cedar waxwing (*Bombycilla cedrorum*), rock pigeon, mourning dove (*Zenaida macroura*), belted kingfisher (*Ceryle alcyon*) and house finch (*Carpodacus mexicanus*).

Potential Project-Related Effects

If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to Cooper's hawks, the avoidance and minimization measures outlined for the white-tailed kite should be implemented.

Loggerhead Shrike (*Lanius ludovicianus*)

Status, Distribution and Habitat Requirements

The loggerhead shrike (nesting) is designated as a Species of Special Concern and is included on the Birds of Conservation Concern watchlist (CDFG 2011). This species inhabits a variety of habitats from open grasslands and scrub to woodlands and riparian areas (Yosef 1996, Baicich & Harrison 2005). Loggerhead shrikes are a year-round resident throughout much of California; however, population declines have been observed in the San Francisco Bay Area in areas where oak savannah habitat has been lost (Shuford and Gardali 2008). Trees, shrubs, and fence posts are important habitat features, which serve as hunting perches and an announcement site for territory pair maintenance (Shuford and Gardali 2008). Breeding begins in February and the species is double- to triple-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present in shrubs and small trees throughout the study area. The Contra Costa County Breeding Bird Atlas (2002) identifies the loggerhead shrike as a confirmed nester in the northern, eastern, central and southern regions of the county. The nearest nesting occurrence (EONDX #51565) was reported 7 miles to the east in Oakley in 2003 (CDFW 2013a).

Potential Project-Related Effects

If shrike are nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to loggerhead shrikes, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 beyond the project footprint in lieu of the 300 for birds of prey.

Northern Harrier (*Circus cyaneus*)

Status, Distribution and Habitat Requirements

The northern harrier is designated as a California Species of Special Concern by CDFW (CDFG 2011). The harrier is a medium-sized raptor with long wings and tail and a distinctive white rump patch. The northern harrier is distributed throughout North America, breeding in the northern lands of Alaska, Canada and northern continental United States (Macwhirter and Bildstein 1996). This species migrates long distances and winters in the southern states, Mexico and Central America, and is a year-round resident of coastal California and the Central Valley (Macwhirter and Bildstein 1996). Northern harriers inhabit both freshwater and saltwater marshes and adjacent upland grasslands, and nest on the ground in

tall grasses or clumps of tall vegetation in grasslands and meadows (Macwhirter and Bildstein 1996). This species breeds from Late March through September; it is single-brooded (Baicich & Harrison 2005). Northern harriers forage on the wing in low flight in marshes, prairies, heavily grazed grasslands, and harvested fields primarily for voles (*Microtus* spp.), but also feed opportunistically on other small mammals, reptiles, amphibians and small birds (Macwhirter and Bildstein 1996).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present in permanent wetland south of 4th Street. Suitable foraging habitat is present throughout the study area. The Contra Costa County Breeding Bird Atlas identifies the northern harrier as a confirmed breeder in the northern and eastern regions of the county (2002). Several northern harriers were observed foraging over the Dow Wetland Preserve during the field March 12, 2013 survey.

Potential Project-Related Effects

Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to northern harriers, the avoidance and minimization measures outlined for the white-tailed kite should be implemented.

Nuttall's woodpecker (*Picoides nuttallii*)

Status, Distribution and Habitat Requirements

The Nuttall's woodpecker (nesting) is included on the American Bird Conservancy watchlist (CDFG 2011). The primary habitat for Nuttall's woodpecker includes riparian woodlands and oak woodlands in canyons and shaded areas, characterized especially by coast live (*Quercus agrifolia*) and valley (*Quercus lobata*) oaks, oftentimes mixed with willows and western sycamore (*Platanus racemosa*) (Lowther 2000). The species forages along bark of trees for insects and will feed on acorns (Lowther 2000). The Nuttall's woodpecker is a cavity nester, building its nests in soft woods such as oaks, willows, cottonwoods, maple, alders, elderberry, snags, and on some occasions fence posts (Lowther 2000). Breeding begins in March and it is single-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present among mature trees within the study area. The Contra Costa County Breeding Bird Atlas identifies the Nuttall's woodpecker as a confirmed breeder throughout the county (CCCBB 2002). No Nuttall's woodpeckers were observed during the field surveys.

Potential Project-Related Effects

The project may result in the loss of potential nesting and foraging habitat if the removal of mature trees is required. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, lower numbers of eggs, and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to Nuttall's woodpeckers, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

Oak titmouse (*Baeolophus inornatus*)

Status, Distribution and Habitat Requirements

The oak titmouse (nesting) is included on the American Bird Conservancy watchlist (CDFG 2011). Primarily an oak obligate species, the oak titmouse inhabits oak woodlands, oak savannahs, piñon and juniper woodlands and occasionally suburban areas with oaks (Cicero 2000, Baicich & Harrison 2005). This species is a year-round resident throughout much of California in oak woodlands and oak savannah communities. Nests are situated in natural or excavated cavities in trunks, primary and secondary branches, and stumps (Cicero 2000). Breeding begins in March and the species is single-brooded (Baicich & Harrison 2005).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present among mature trees within the study area. The Contra Costa County Breeding Bird Atlas identifies the oak titmouse as a confirmed breeder throughout the county (CCCBBA 2002, CDFW 2013a). No oak titmice were observed during the field surveys.

Potential Project-Related Effects

The project may result in the loss of potential nesting and foraging habitat if the removal of mature trees is required. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, lower numbers of eggs, and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the oak titmouse, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

Saltmarsh Common Yellowthroat (*Geothlypis trichas sinuosa*)

Status, Distribution and Habitat Requirements

The saltmarsh common yellowthroat is designated as a California Species of Special Concern and is included on the Birds of Conservation Concern watchlist (CDFG 2011). A year-round resident of the San Francisco Bay Area, the species inhabits dense vegetation in wetlands, marshes, estuaries, prairies and riparian areas of San Francisco and San Pablo bays, and along the coastal areas of Marin, San Francisco, and San Mateo counties (Shuford and Gardali 2008). The species forages on insects and spiders on the ground or within dense vegetation (Guzy and Ritchison 1999). Nests are built near the base of dense vegetation, sometimes over water (Baicich & Harrison 2005). Saltmarsh common yellowthroat breeds from mid-March to late July; it is double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present within the permanent wetland in the study area. The Contra Costa County Breeding Bird Atlas identifies the saltmarsh common yellowthroat as a confirmed breeder along the shoreline in northern Contra Costa County (CCCBBA 2002). No saltmarsh common yellowthroats were observed during the field surveys.

Potential Project-Related Effects

Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the saltmarsh common yellowthroat, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 beyond the project footprint in lieu of the 300 for birds of prey.

Short-Eared Owl (*Asio flammeus*)

Status, Distribution and Habitat Requirements

The short-eared owl is designated as a California Species of Special Concern by CDFW and as a migratory nongame bird of management concern by the USFWS (CDFG 2011). The short-eared owl historically bred throughout California, west of the deserts (Grinnell and Miller 1944). This species has declined dramatically throughout the state. It is more numerous in winter, concentrating in areas with little snow cover and abundant prey, but even winter numbers have declined (Remsen 1978). Breeding populations have been extirpated from the southern coast and from the San Joaquin Valley (Remsen 1978). The species still breeds in the southern portion of the Sacramento Valley (Yolo and Solano Counties), the Sacramento-San Joaquin Delta, Suisun Marsh, northeastern portions of the state, in the Coast Ranges from Sonoma to Santa Barbara Counties, and in the Owens Valley (Small 1994, Zeiner et al. 1990).

The short-eared owl is generally a migratory species, although it is resident in portions of California (Zeiner et al. 1990). Short-eared owls are more numerous in winter, with migrating birds arriving in September and October and leaving in April (Zeiner et al. 1990). Nests are built on the ground in tall stands of grasses in lowland habitats near hunting grounds in marshes, meadows, and even agricultural fields (Grinnell and Miller 1944). The breeding season is from late March to July (Zeiner et al. 1990). The primary cause of decline in short-eared owl populations is the loss of breeding and foraging habitat. In some areas with suitable habitat intact, grazing and hunting have also led to further declines (Remsen 1978).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present in permanent wetland south of 4th Street. Suitable foraging habitat is present throughout the study area. The Contra Costa County Breeding Bird Atlas reports the short-eared owl as a possible breeder from one location along the Carquinez shoreline in northern Contra Costa County (2002). No short-eared owls were observed during the field surveys.

Potential Project-Related Effects

Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to short-eared owls, the avoidance and minimization measures outlined for the white-tailed kite should be implemented.

Suisun Song Sparrow (*Melospiza melodia maxillaris*)*Status, Distribution, and Habitat Requirements*

The Suisun song sparrow is designated as a California Species of Special Concern by CDFW and included on the USFWS' Birds of Conservation Concern (CDFG 2011). They are one of four subspecies endemic to the Bay Area. It is a year-round resident of tidal salt and brackish marshes of Suisun Bay, Carquinez Strait and the Sacramento-San Joaquin Delta west of Kimball Island (Shuford and Gardali 2008). The Suisun song sparrow primarily inhabits tidal channels with dense, short vegetation such as California cord grass (*Spartina foliosa*), pickleweed (*Salicornia virginica*), gumplant (*Grindelia stricta*), rushes (*Juncus* spp.), and rarely in taller vegetation such as tules (*Scirpus* spp.) and cattails (*Typha* spp.) (Shuford and Gardali 2008). Their diet consists mostly of grains with some invertebrates; therefore, exposed ground is a habitat requirement (Shuford and Gardali 2008). Breeding begins in April and the species is often treble-brooded (Baichich & Harrison 2005). The species prefers to nest in dense vegetation, which also provides cover from predators (Shuford and Gardali 2008).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present within the permanent wetland in the study area. The Contra Costa County Breeding Bird Atlas identifies the song sparrow as a confirmed breeder along the shoreline in northern Contra Costa County (CCCBBA 2002). Several song sparrows were observed during the March 12, 2013 site visit within the permanent wetland and are presumed to be the *M.m. maxillaris* based on the location of the observation and the subspecies distribution.

Potential Project-Related Effects

Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, lower numbers of eggs, and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the Suisun song sparrow, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

Tricolored Blackbird (*Agelaius tricolor*)*Status, Distribution and Habitat Requirements*

The tricolored blackbird is designated a California Species of Special Concern by CDFW and is included on the American Bird Conservancy Green List and U.S. Fish and Wildlife Service Bird Conservation Concern list (CDFG 2011). They primarily inhabit freshwater marshes dominated by cattails (*Typha* spp.) and bulrushes (*Schoenoplectus* spp.) in the Central Valley and the surrounding foothills with outlying populations in Oregon, Washington, and Southern California (Beedy and Hamilton 1999). More recently, tricolored blackbirds have been observed breeding in a wider diversity of habitats including agricultural and upland communities in close proximity to water and abundant food sources (Beedy and Hamilton 1999). Tricolored blackbirds are largely endemic to California, highly colonial and have been reported to breed in groups exceeding 100,000 nests (Shuford and Gardali 2008). This species exhibits low site fidelity and are known to change their nesting location from year to year (Beedy and Hamilton 1999).

Tricolored blackbird nests are created in emergent vegetation within aquatic and riparian habitats. Breeding occurs from late March to early August and may be double-brooded (Baicich and Harrison 2005).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present within the permanent wetland among the dense stands of tule/bulrush within the study area (Figure 12). The Contra Costa County Breeding Bird Atlas identifies the tricolored blackbird as a breeder in southern Contra Costa County; no breeding records in northern Contra Costa County (CCCBBA 2002, CDFW 2013a). No tricolored blackbirds were observed during the field surveys. The nearest reported nesting occurrence (EONDX 11811) is located approximately 10 miles to the southeast at Marsh Creek Reservoir dating back to 1989 (CDFW 2013a).

Potential Project-Related Effects

There is 4.93 acre of potential nesting and foraging habitat in the study area (Figure 12). Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of 3.01 acre of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity, and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the tricolored blackbird, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

HCP/NCCP Conservation Measures (HCP/NCCP Chapter 6, Section 6.4.3)

Covered activities with the potential to take tricolored blackbird nests will be avoided during the nesting season (April 1 to July 1).

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the tricolored blackbird, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

Yellow-Breasted Chat (*Icteria virens*)

Status, Distribution and Habitat Requirements

The yellow-breasted chat (nesting) is designated as a Species of Special Concern (CDFG 2011). Yellow-breasted chat is a widespread summer resident of the eastern U.S. and has a fragmented distribution in the west. Its western North America range includes the Cascade range, central Oregon valleys, southern Idaho and northern Nevada, portions of California, Utah, western Colorado, and central Arizona. In California, its range is primarily in northern California, and this species is scarce in central and southern California (Eckerle and Thompson 2001).

The yellow-breasted chat is a large, secretive wood warbler that inhabits early successional riparian area, pond margins, marshes, hedgerows, old pastures and edge habitats with dense shrub understories and an open canopy (Shuford and Gardali 2008). It occurs in forests especially regenerating burned and logged areas (Eckerle and Thompson 2001, Baicich & Harrison 2005). The species nests in dense shrubs up to eight feet in height and breeds from late April through early August; it is double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008). The species appears to be closely tied to streamside thickets of willows, mesquite, mulefat with tangles of grapevines and other riparian species. During migration,

yellow-breasted chat uses habitat similar to its breeding habitat (Dunn and Garrett 1997). Major threats to yellow-breasted chat are loss of lowland riparian habitat and nest parasitism by brown-headed cowbirds (Garrett and Dunn 1981; Roberson and Tenney 1993; Gallagher 1997).

Habitat Suitability and Occurrence Data

Suitable nesting habitat is present within the permanent wetland in the study area. The Contra Costa County Breeding Bird Atlas identifies the yellow-breasted chat as a confirmed breeder along the shoreline in northeastern Contra Costa County (CCCBBA 2002). No yellow-breasted chats were observed during the field surveys.

Potential Project-Related Effects

Removal of cattails and other emergent vegetation north of 4th Street would result in the loss of potential nesting and foraging habitat. If nesting within the study area, the project could result in short-term impacts such as failure to breed, nest abandonment, reduced fecundity and decreased survivorship. Such disturbance may alter the bird's behavior in ways that result in injury, mortality, or reduced foraging success; the temporary loss of habitat due to avoidance of areas that have suitable habitat but intolerable levels of disturbance; and altered activity patterns.

Recommended Avoidance and Minimization Efforts

To minimize potential impacts to the yellow-breasted chat, the avoidance and minimization measures outlined for the white-tailed kite should be implemented; however, the survey buffer should extend 50 feet beyond the project footprint in lieu of the 300 feet for birds of prey.

Mammals

Ten sensitive or locally rare mammal species²⁴ were considered during the preparation of this assessment (CDFG 2011; CDFW 2013a); none of which were determined to have the potential to occur within the study area (Appendix D). Planning surveys were conducted for the Townsend's western big-eared bat and ringtail; however, no suitable breeding or roosting habitat was identified within the study area.

²⁴ Pallid bat, ringtail, Townsend's western big-eared bat, Berkeley kangaroo rat, western red bat, hoary bat, Yuma myotis bat, San Joaquin pocket mouse, Suisun shrew and American badger.

Section 5. CONCLUSIONS, AVOIDANCE AND MINIMIZATION MEASURES

5.1. CONCLUSIONS

5.1.1 CRITICAL HABITAT

The project is located within delta smelt critical habitat and supports all four PCE's: 1) spawning habitat; 2) larval and juvenile transport; 3) rearing habitat; and 4) adult migration. The project would result in the temporary loss of submergent and emergent vegetation upon which delta smelt may depend for egg attachment and refugia by removal to increase the flood capacity or by sedimentation during desilting activities. All four PCE's may also be temporarily impacted by desilting activities, which would increase turbidity, decrease water quality and cause increased sedimentation of breeding and rearing habitat.

5.1.2 SENSITIVE NATURAL COMMUNITIES

A total of six sensitive communities were observed in the project area: alkali grassland, seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream. Seasonal wetland, alkali wetland, permanent wetland, riparian woodland/scrub, and stream are considered sensitive natural communities as they may qualify as waters of the U.S. and/or Waters of the State falling under U.S. Army Corps of Engineers and Regional Water Quality Control Board jurisdictions through the Clean Water Act and the Porter Cologne Water Quality Act. A wetland delineation has been completed for the study area but has not been submitted to the U.S. Army Corps of Engineers for verification. Alkali grassland is listed as an uncommon vegetation alliance in the HCP/NCCP.

Within the study area, alkali grassland and wetland were mapped in the northern portion of the study area, just south of the railroad tracks. Seasonal wetlands were present on the margins and floodplain of the West Antioch Creek low flow channel, and extended from the vacant car dealership downstream to West 4th Street. Species present at the upstream end were typical of freshwater seasonal wetlands and became more brackish in nature heading downstream. Permanent wetland is located adjacent to the low flow channel of West Antioch Creek downstream of West 4th Street to the margin of the San Joaquin River. Riparian woodland/scrub is present in the channel, along a tributary ditch, and north of the railroad tracks. The low flow channel of West Antioch Creek was mapped as stream land cover type.

5.1.3 SPECIAL-STATUS PLANTS

HCP/NCCP Covered and No-Take Plant Species

Based on the field investigations, review of available databases and literature, familiarity with local flora, on-site habitat suitability, and results of 2013 rare plant surveys, none of the 17 covered and no-take species listed in the HCP/NCCP are considered to have the potential to occur on site.

Federal and/or State Listed and California

Rare Plant Species

Based on the field investigations, review of available databases and literature, familiarity with local flora, on-site habitat suitability, and results of 2013 rare plant surveys, none of the 11 federal and/or state-listed plant species known from the vicinity are considered to have the potential to occur within the study area.

California Native Plant Society Listed and/or Locally Rare Plant Species

Based on the field investigations, review of available databases and literature, familiarity with local flora, on-site habitat suitability, and results of 2013 rare plant surveys, none of the 60 California Native Plant

Society listed plant species known from the vicinity are considered to have the potential to occur within the study area.

If these species are present on site, the Project could result in mortality of individuals, loss of subpopulations, or the removal or reduction of their seed bank. However, if avoidance is not feasible, the implementation of mitigation measures described in Section 5.3.1 may reduce impacts to a less than significant level.

5.1.4 SPECIAL-STATUS WILDLIFE

HCP/NCCP Covered and No-Take Wildlife Species

Based on the field investigations, review of available databases and literature, familiarity with local fauna, and on-site habitat suitability, five of the 21 covered and no-take species listed in the HCP/NCCP are considered to have the potential to occur on site. These include the California red-legged frog, western pond turtle, white-tailed kite, western burrowing owl and tricolored blackbird.

Federal/State Listed, Proposed, Candidate, or Fully Protected Fish and Wildlife Species

Four federally/state-listed, proposed, Candidate or fully protected fish or wildlife species were determined to have the potential to occur within the study area based on habitat suitability and connectivity and occurrence data. These include the delta smelt, California red-legged frog, California black rail and white-tailed kite. If present during construction activities, the project could result in direct mortality, injury, harassment, or nest abandonment, and would result in the loss of nesting, breeding, feeding and sheltering habitat. Additional impacts may include increase turbidity, decrease water quality reduced food sources associated with the aquatic plants and macroinvertebrates, and the loss of potential spawning and rearing habitat due to sedimentation.

Sensitive and Locally Rare Wildlife Species

A total of 13 sensitive or locally rare fish and wildlife species were considered to have the potential to occur within the study area including Bridge's coast range shoulderband snail, Sacramento splittail, western pond turtle, burrowing owl, Cooper's hawk, loggerhead shrike, oak titmouse, northern harrier, Nuttall's woodpecker, saltmarsh common yellowthroat, short-eared owl, Suisun song sparrow and yellow-breasted chat. Three of these species, i.e. western pond turtle, Cooper's hawk and Suisun song sparrow were observed during the April 23, 2009, and March 12, 2013 site visits. If present on site during construction activities, the project could result in direct mortality, injury, harassment, or nest abandonment, and could indirectly impact species by temporarily removing or altering breeding, foraging, and wintering habitat.

5.2. SURVEY RECOMMENDATIONS

5.2.1 WETLAND RESOURCES

A Wetland Delineation and Preliminary Jurisdictional Determination report has been completed for the project (Nomad 2013a).

5.2.2 SPECIAL-STATUS PLANTS

Surveys performed for this project have met survey requirements for CEQA related sensitive botanical resources. Additional surveys for sensitive natural communities or special-status plant species are neither warranted nor recommended. Results of the rare plant surveys are detailed in the Botanical Resource Survey Report for the project (Nomad 2013b).

5.3. AVOIDANCE AND MINIMIZATION MEASURES

5.3.1 SENSITIVE NATURAL COMMUNITIES

Sensitive natural communities should be avoided to the extent possible. Specifically, alkali wetland and alkali grassland in the study area should be fenced to prevent access during construction and to avoid impacts.

5.3.2 SPECIAL-STATUS PLANTS

Surveys should be conducted in June, July, August and September to determine if special-status plant species are present on site. If any special-status plant species are present on site, impacts should be avoided to the maximum extent possible and should be the primary objective. If avoidance is not feasible, minimization measures will be developed for the special-status plant species with the potential to be impacted.

5.3.3 SPECIAL-STATUS WILDLIFE

The avoidance and minimization measures outlined in Section 4.3 should be implemented to reduce impacts to listed and special-status species and their habitats. In addition, Conservation Measures outlined in the HCP/NCCP in Sections 5.3.1 and 6.4.1 should be implemented to promote landscape, community and species level conservation, management, enhancement and restoration of vegetation and species habitat. Particular emphasis should be placed on the following Conservation Measures:

- **Conservation Measure 1.7.** Establish Stream Setbacks
- **Conservation Measure 1.10.** Maintain Hydrologic Conditions and Minimize Erosion
- **Conservation Measure 1.11.** Avoid Direct Impacts on Extremely Rare Plants, Fully Protected Wildlife Species, or Covered Migratory Birds
- **Conservation Measure 1.13.** Best Management Practices for Flood Control Facility Maintenance
- **Conservation Measure 2.12.** Wetland, Pond, and Stream Avoidance and Minimization

5.3.4 GENERAL AVOIDANCE AND MINIMIZATION RECOMMENDATIONS

1. Prior to the start of construction, a qualified biologist will conduct an educational training program for all construction personnel including contractors and subcontractors. The training will include, at a minimum, a description of the species that could be encountered in the project area, and migratory birds; and the associated habitats of these species; an explanation of the status of these species and protection under state and federal laws; the avoidance and minimization measures to be implemented to reduce impacts to these species; communication and work stoppage procedures in case a listed or special-status species is observed within the project area; and an explanation of the environmental regulatory laws and permit conditions. A fact sheet conveying this information should be prepared and distributed to all construction personnel. Upon completion of the program, personnel should sign a form stating that they attended the program and understand all the avoidance and minimization measures and permit conditions.
2. All slopes or unpaved areas affected by the proposed action should be restored to natural conditions. Slopes and bare ground should be reseeded with native grasses and shrubs characteristic of the floristic region and native local habitats to stabilize soils and prevent erosion. Where disturbance includes the removal of trees or plants, native species should be replanted and maintained until they become established.

3. Only sandbags filled with clean gravel or sand, i.e. gravel or sand free of dirt, silt or other debris that would adversely affect water quality if released into the stream, should be used for construction of the cofferdams. The dewatering pumps should be screened with 1/4-inch mesh screen material during all dewatering in accordance with NMFS Fish Screening Criteria (1997) for fingerling-sized fish unless otherwise directed by NMFS.
4. Storm Water Pollution Prevention Plans (SWPPP) and erosion control BMPs should be developed and implemented to minimize any wind or water-related erosion and should be in compliance with the requirements of the Regional Water Quality Control Board. The SWPPP should provide guidance for design staff to include provisions in construction contracts for measures to protect sensitive areas and prevent and minimize storm water and non-storm water discharges. Protective measures should include, at a minimum:
 - a. No discharge of pollutants from vehicle and equipment cleaning is allowed into any storm drains or water courses.
 - b. Vehicle and equipment fueling and maintenance operations must be at least 50 feet away from watercourses, except at established commercial gas stations or established vehicle maintenance facility.
 - c. Concrete wastes are collected in washouts and water from curing operations is collected and disposed. Neither should be allowed into watercourses.
 - d. Spill containment kits should be maintained on site at all times during construction operations and/or staging or fueling of equipment.
 - e. Coir rolls or straw wattles that do not contain plastic or synthetic mono-filament netting should be installed along or at the base of slopes during construction to capture sediment.
 - f. Protect graded areas from erosion using a combination of silt fences, fiber rolls, or other suitable materials along toes of slopes or along edges of designated staging areas, and erosion control netting (such as jute or coir) as appropriate on sloped areas. No erosion control materials that use plastic or synthetic mono-filament netting should be used.
5. Staging areas should be located outside areas containing sensitive aquatic resources.
6. All food and food-related trash items will be enclosed in sealed trash containers and properly disposed of off-site.
7. No pets from project personnel will be allowed anywhere in the action area during construction.

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APPENDIX A FIGURES



September 2013

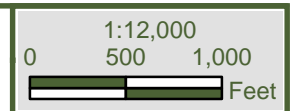
Biological Resources Assessment

Legend

Study Area

2010 Proposed Project Boundaries

Figure 1
Project Vicinity
 West Antioch Creek Channel Improvements
 City of Antioch



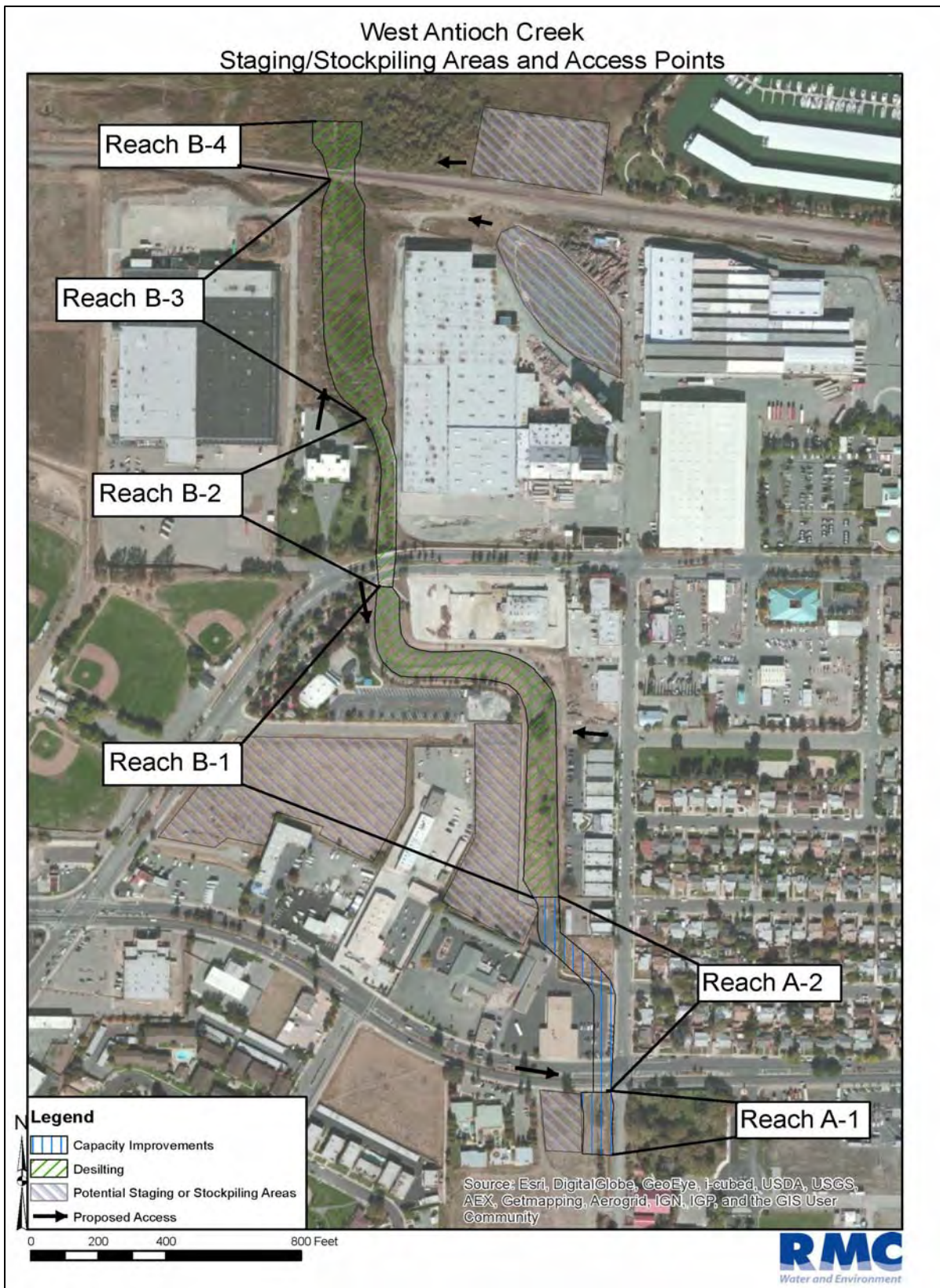
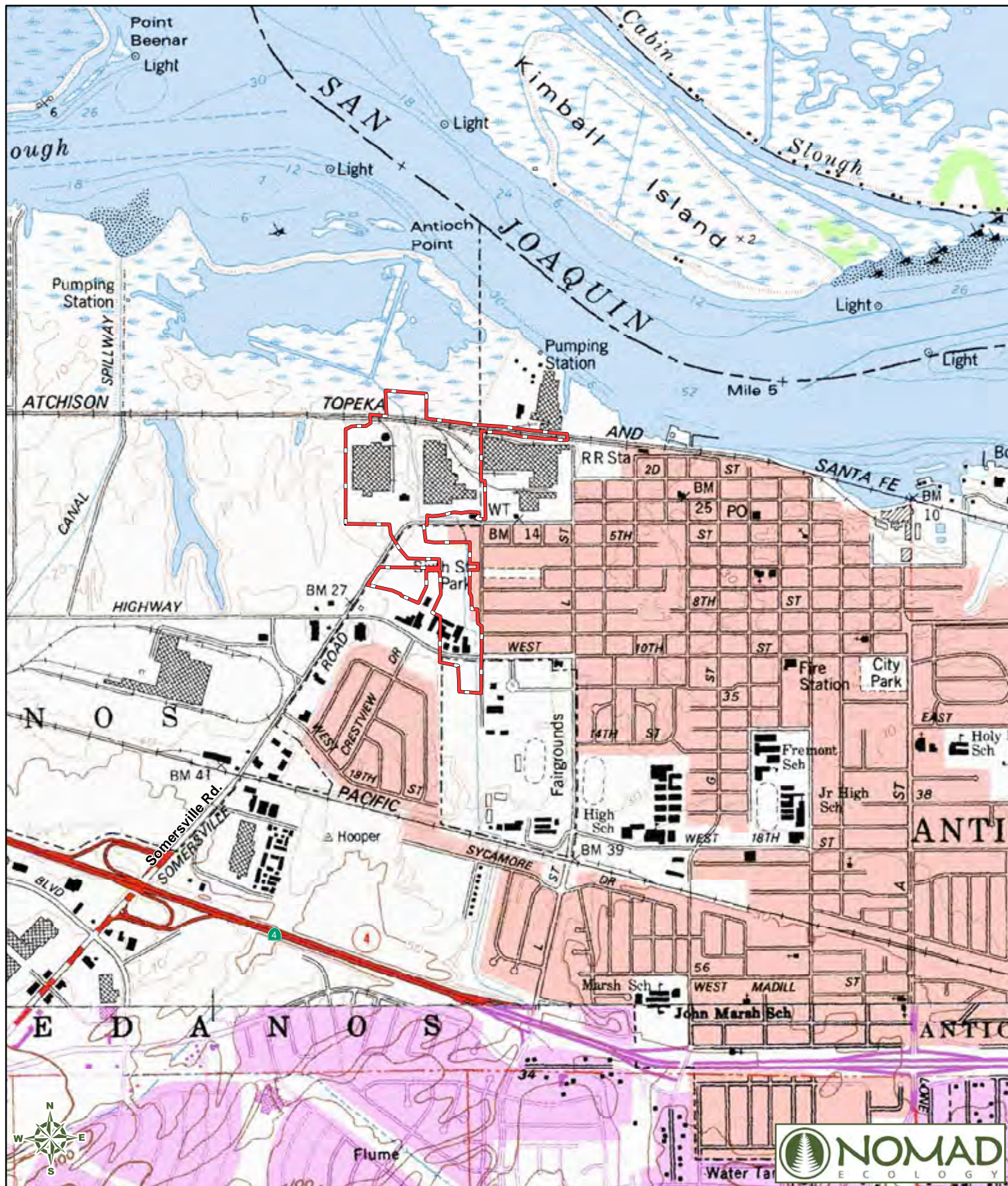


Figure 2. Project Components



September 2013

Biological Resources Assessment

Legend
Study Area

Figure 3
Study Area on the USGS Quadrangle
West Antioch Creek Channel Improvements
City of Antioch

1:18,000
0 750 1,500
Feet



September 2013

Biological Resources Assessment

Legend

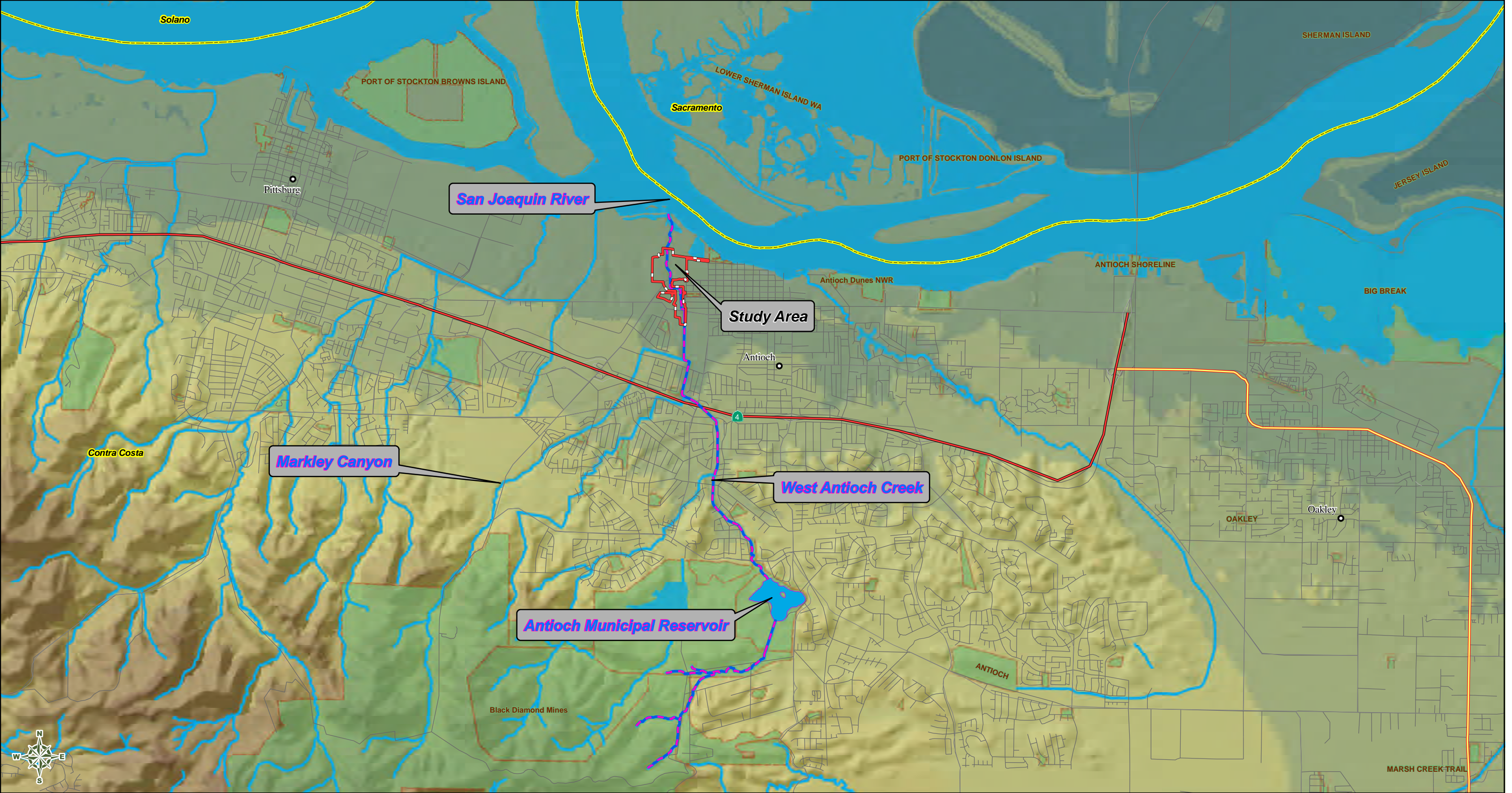
Study Area



Figure 4

Aerial View of the Study Area
West Antioch Creek Channel Improvements
City of Antioch

1:4,800
0 200 400
Feet



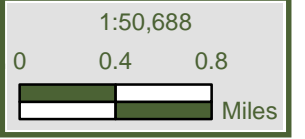
September 2013

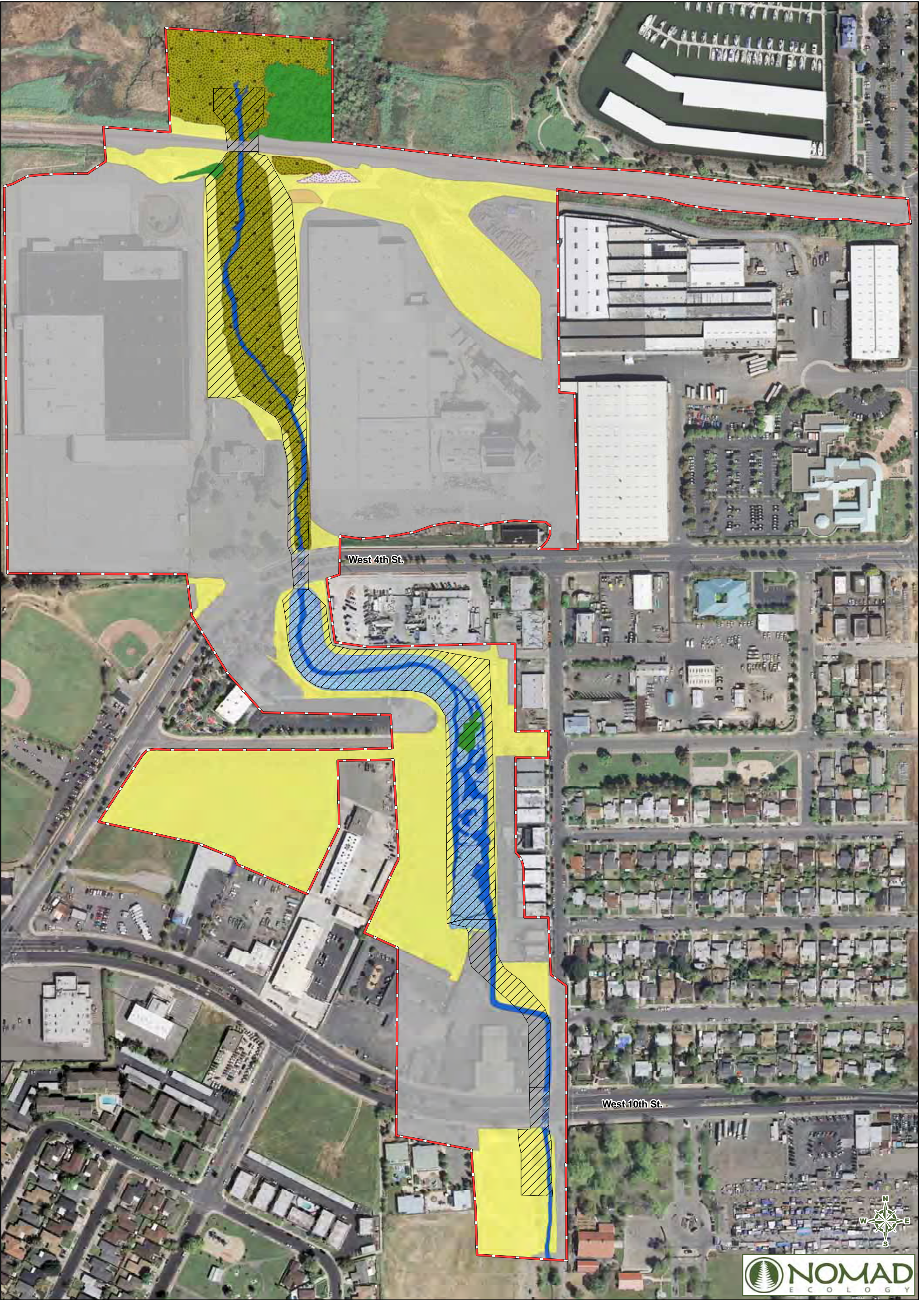
Biological Resources Assessment

Legend

Study Area	County Boundaries
Hydrologic Connection	Water Bodies
Public Land and Easements	Waterways

Figure 5
Hydrologic Connection of West Antioch Creek
West Antioch Creek Channel Improvements
City of Antioch



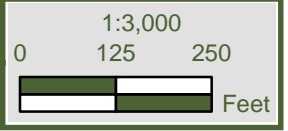


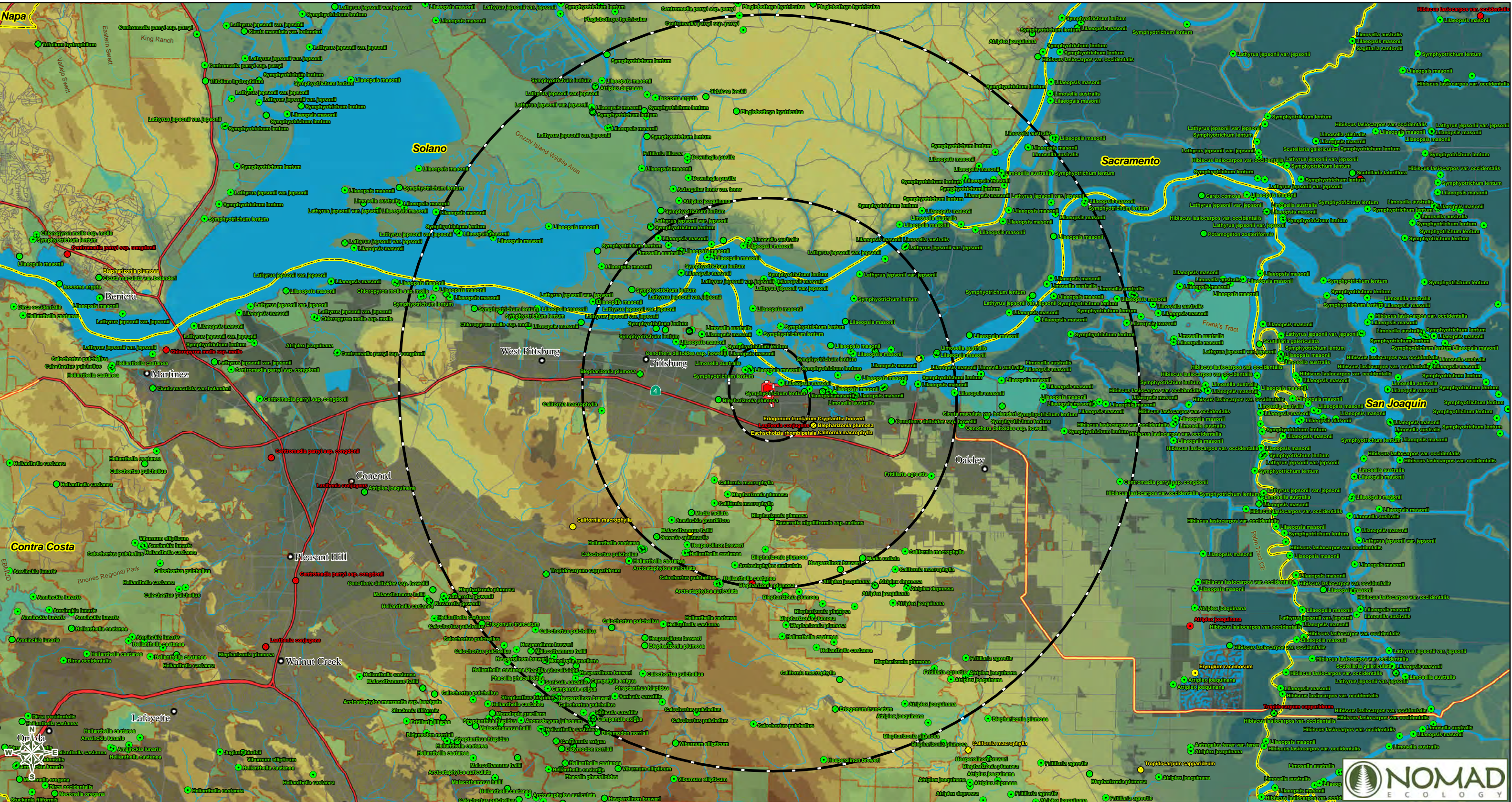
September 2013

Biological Resources Assessment

Legend		
Study Area	Land Cover Types	
	Ruderal	Permanent Wetland
	Alkali Grassland	Riparian Woodland/Scrub
	Seasonal Wetland	Stream
	Alkali Wetland	Stream (in Culvert)
		Developed

Figure 6
Land Cover Types
West Antioch Creek Channel Improvements
City of Antioch





September 2013

Study Area

Distance Radii

County Boundaries

Public Land and Easements

Water Bodies

Waterways

California Natural Diversity Database Occurrences Presence

●

 Presumed Extant

●

 Possibly Extirpated

●

 Extirpated

California Natural Diversity Database Occurrences Precision

○

 Non-Specific

⊙

 Specific

1:158,400

0 1.25 2.5 Miles

Figure 7

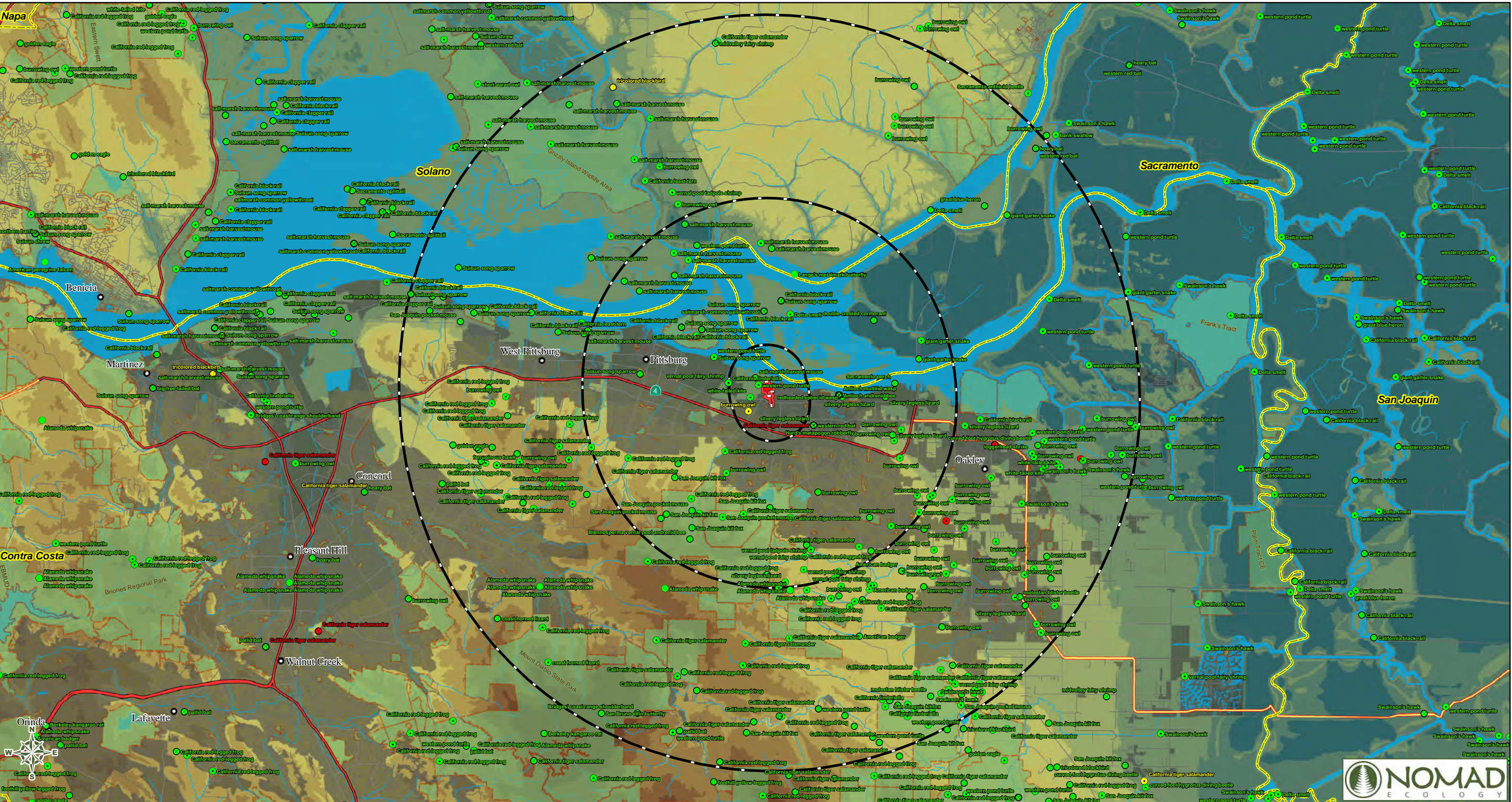
Special Status Plant Species within the Vicinity

West Antioch Creek Channel Improvements

City of Antioch

Sources: ESRI, Contra Costa Information Technology Department, California Spatial Information Library, California Department of Fish and Game.

Contra Costa County, California



September 2013 Biological Resource Assessment

Study Area

Distance Radii

1, 5, & 10 miles

County Boundaries

Public Land and Easements

Water Bodies

Waterways

California Natural Diversity Database Occurrences Presence

Presumed Extant

Possibly Extirpated

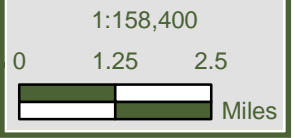
Extirpated

California Natural Diversity Database Occurrences Precision

Non-Specific

Specific

Figure 8
Special Status Wildlife Species within the Vicinity
West Antioch Creek Channel Improvements
City of Antioch





September 2013

Biological Resources Assessment

Legend

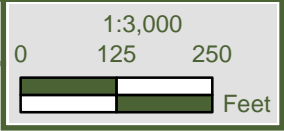
Study Area

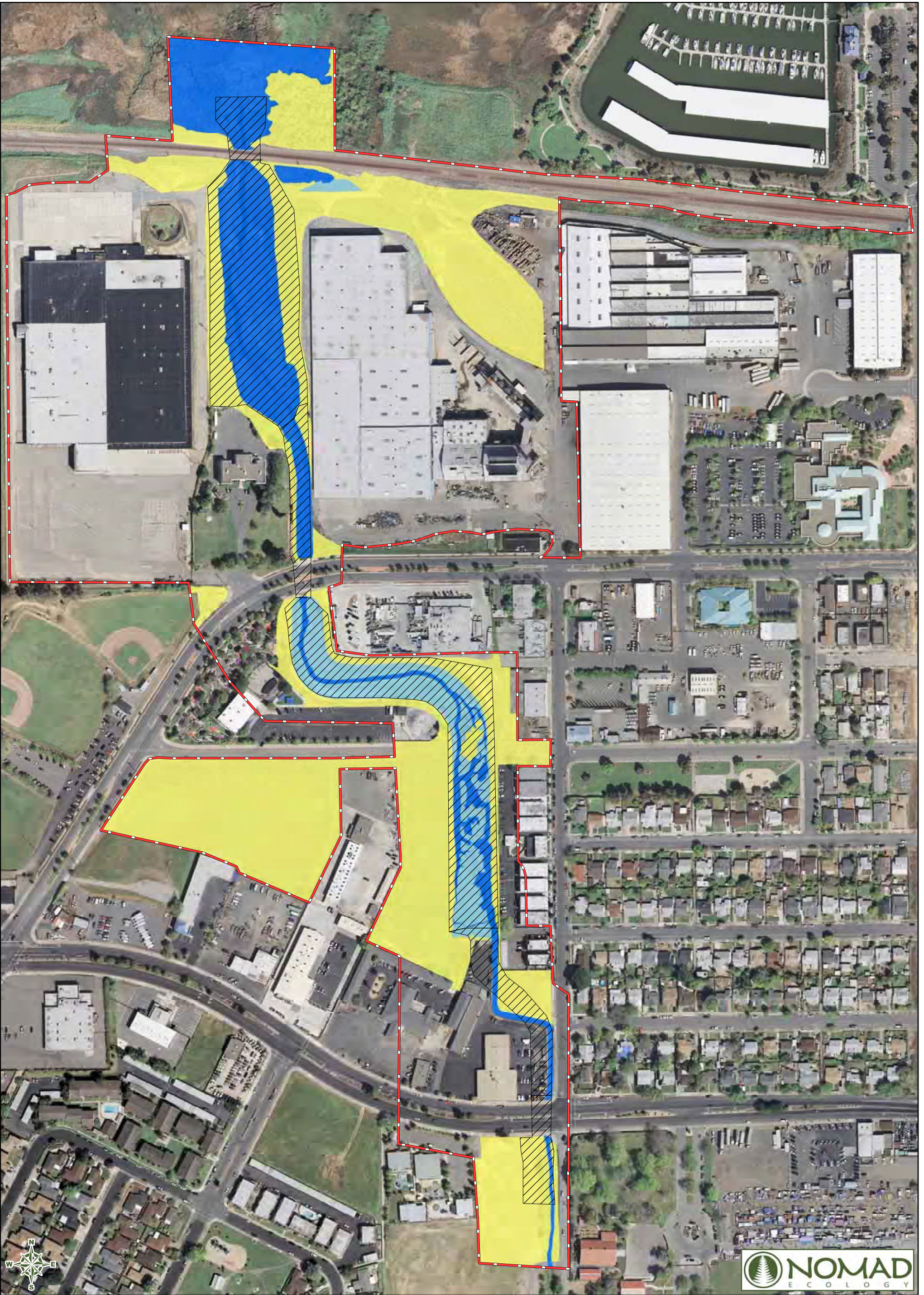
Project Extent

Delta Smelt Habitat (6.47 ac. in Study Area; 4.44 ac. in Project Extent)*

*The entire study area is within Designated Delta Smelt Critical Habitat.

Figure 9
Delta Smelt Designated Critical Habitat
and Habitat in the Study Area
West Antioch Creek Channel Improvements
City of Antioch



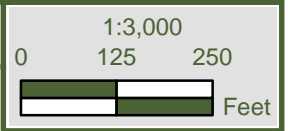


September 2013

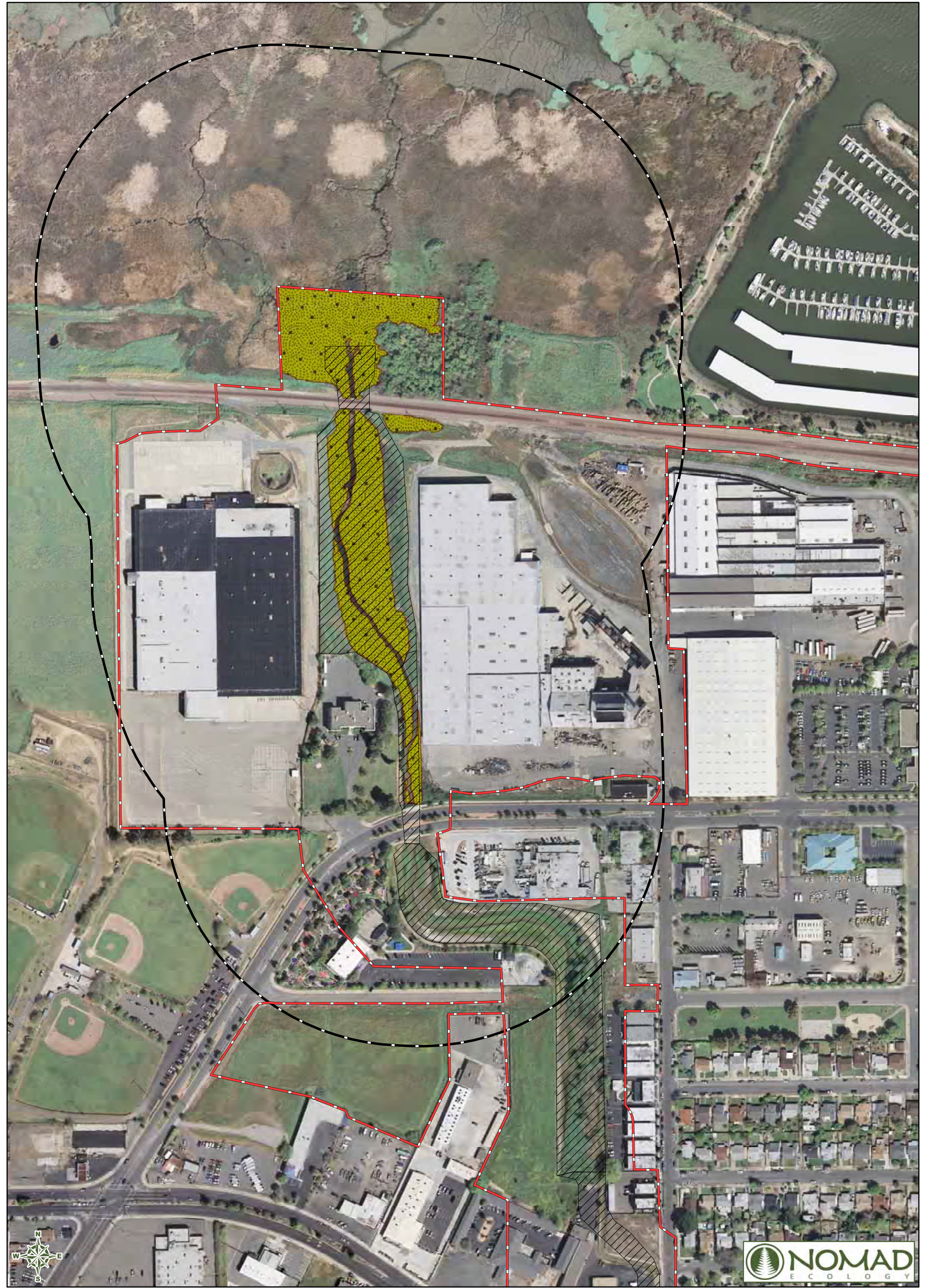
Biological Resources Assessment

Legend	
Study Area	CRF Habitat
	Breeding Habitat (6.47 ac. in Study Area; 4.44 ac. in Project Extent)
	Non-Breeding Aquatic Habitat (2.33 ac. in Study Area; 2.20 ac. in Project Extent)
	Upland Habitat (19.46 ac. in Study Area; 3.29 ac. in Project Extent*)

Figure 10
California Red-legged Frog Habitat
West Antioch Creek Channel Improvements
City of Antioch



*An additional 10.46 ac. of upland CRF habitat may be temporarily impacted by staging areas in ruderal grassland.

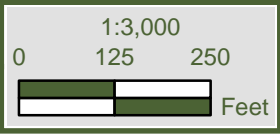


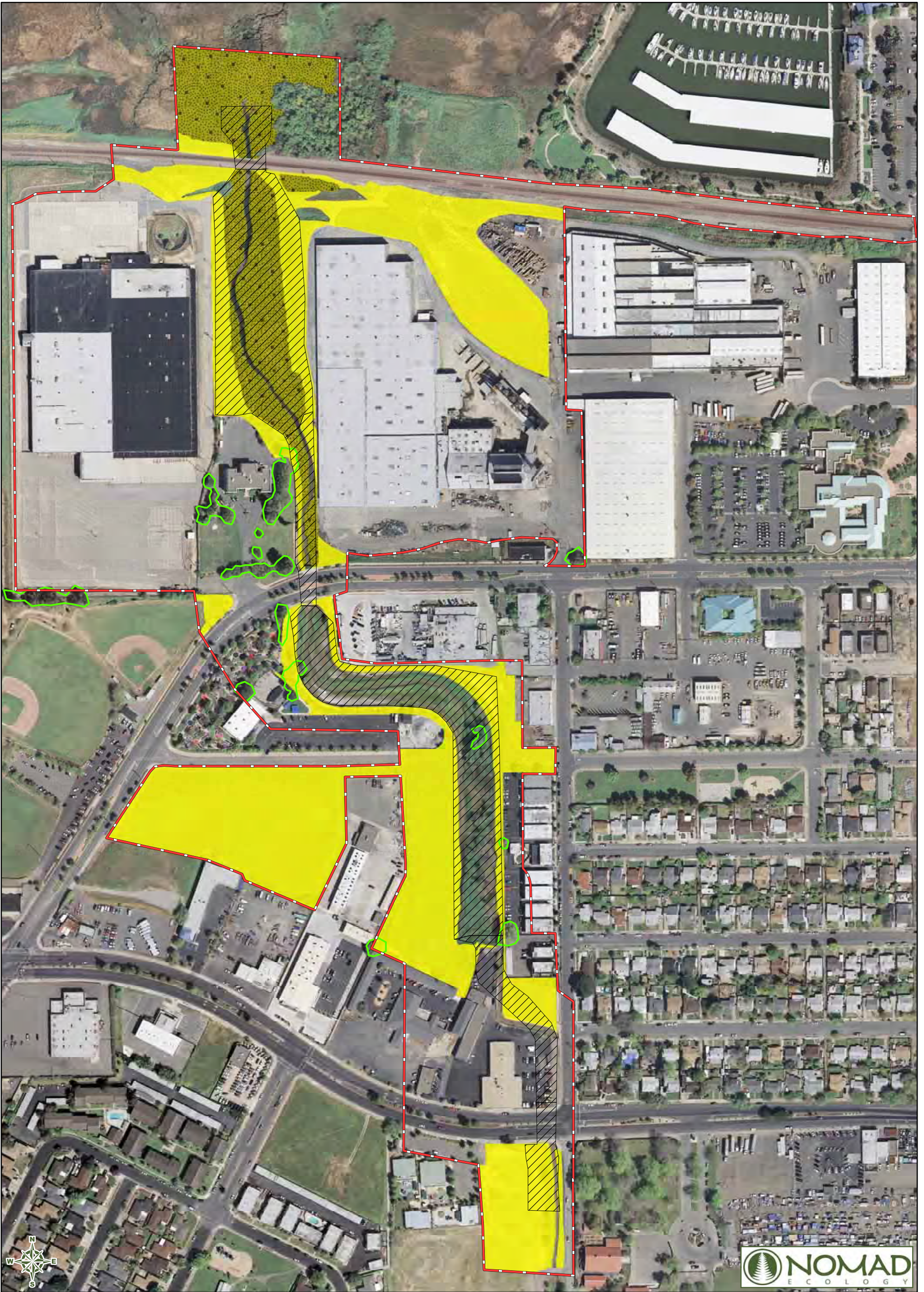
September 2013

Biological Resources Assessment

Legend	
Study Area	Non-Breeding Rail Habitat (4.93 ac. in Study Area; 3.01 ac. in Project Extent)
	700 foot buffer around Habitat

Figure 11
California Black Rail Habitat
West Antioch Creek Channel Improvements
City of Antioch



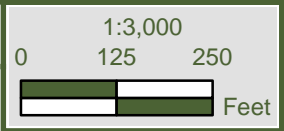


September 2013

Biological Resources Assessment

Legend	
Study Area	White-Tailed Kite Nesting Habitat (1.23 acre in Study Area)
	Project Extent
	Breeding Tricolored Blackbird Habitat (4.93 ac. in Study Area; 3.01 ac. in Project Extent)
	Burrowing Owl Breeding Habitat (18.27 ac. in Study Area; 3.15 ac. in Project Extent*)
	*An additional 10.46 ac. of BUOW habitat may be impacted by staging areas in ruderal grassland.

Figure 12
White-Tailed Kite, Burrowing Owl,
and Tricolored Blackbird Habitat
West Antioch Creek Channel Improvements
City of Antioch





September 2013

Biological Resources Assessment

Legend

Study Area

Project Extent

WPT Habitat (8.71 ac. in Study Area; 6.64 ac. in Project Extent)

Figure 13
Western Pond Turtle Habitat
West Antioch Creek Channel Improvements
City of Antioch

1:3,000

0 125 250

Feet

APPENDIX B LAWS, ORDINANCES & REGULATIONS

Laws, Ordinances & Regulations

FEDERAL REGULATIONS

FEDERAL ENDANGERED SPECIES ACT (FESA)

The Federal Endangered Species Act of 1973, as amended (FESA), was created to “conserve the ecosystems upon which endangered and threatened species depend.” The U.S. Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration, National Marine Fisheries Service have authority over projects that may result in a “take” of a species listed as threatened or endangered under the FESA. Under the FESA, plant and wildlife species, including all lower taxa including subspecies and varieties, are listed threatened or endangered based on (A) the present or threatened destruction, modification, or curtailment of their habitat or range, (B) overutilization for commercial, recreational, scientific, or educational purposes, (C) disease or predation, (D) the inadequacy of existing regulatory mechanisms, or (E) other natural or manmade factors affecting their continued existence. FESA listing categories include endangered, threatened and candidates for listing. FESA provides protection for species listed as endangered, and prohibits the “take” of such species in areas under federal jurisdiction or in violation of state law. A “take” is defined as any action to “harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Species listed as threatened do not warrant listing as endangered and are not provided the same protection under Section 9; however, USFWS often applies the same protection as authorized by Section 4(d) of the FESA. Section 4(d) also allows for exceptions to the take rule under special circumstances. If a project would result in a take of a federally listed species, either an incidental take permit, under Section 10(a) of the FESA, or a federal interagency consultation under Section 7 of FESA, is required prior to the take. Current inventories published for species listed under the FESA include the *Endangered and Threatened Wildlife and Plants* (USFWS 1999), *Endangered and Threatened Wildlife and Plants; Review of Native Species That are Candidates or Proposed for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule* (USFWS 2005a), *Endangered and Threatened Species; Establishment of Species of Concern List, Addition of Species to Species of Concern List, Description of Factors for Identifying Species of Concern, and Revision of Candidate Species List Under the Endangered Species Act* (NOAA 2004).

CLEAN WATER ACT

The U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (EPA) have jurisdiction over “Waters of the United States, which include navigable waters of the United States, interstate waters, all other waters where the use or degradation or destruction of the waters could affect interstate or foreign commerce, tributaries to any of these waters, and wetlands that meet any of these criteria or that are adjacent to any of these waters or their tributaries. Waters of the United States include marine waters, tidal areas, and stream channels. Under federal regulations, wetlands are defined as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas” [33 C.F.R. §328.3(b)]. Presently, to be considered a wetland, a site must exhibit three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology existing under the “normal circumstances” for the site.

Wetlands that are non-navigable, isolated, and intrastate only may not be subject to USACE jurisdiction under Section 404 of the CWA, pursuant to the “SWANCC” decision, *Solid Waste Agency of Northern Cook County vs. United States Army Corps of Engineers* (2001) 531 U.S. 159. Although isolated wetlands may not be subject to USACE jurisdiction under Section 404, they are considered “waters of the

State” under California’s Porter-Cologne Water Quality Control Act (Cal. Water Code §§ 13020, et seq.) and, as such, are subject to regulation by Regional Water Quality Control Boards (RWQCB). There are nine RWQCBs under the State Water Resources Control Board.

Policies regulating the loss of wetlands generally stress the need to compensate for wetland acreage losses by creating wetlands from non-wetland habitat on at least an acre-for-acre basis. That is, mitigation requiring a no-net-loss of wetland functions and values is typically required. Projects that cause the discharge of dredged or fill materials in Waters of the United States require permits from the USACE. Actions affecting small areas of jurisdictional Waters may qualify for a Nationwide Permit (NWP), provided conditions of the NWP are met (such as avoiding impacts to threatened or endangered species or to important cultural sites). Projects that do not meet the Nationwide Permit conditions, or projects that disturb a larger area, require an Individual Permit. The process for obtaining an Individual Permit requires a detailed alternatives analysis and development of a comprehensive mitigation/monitoring plan.

Section 401 of the Clean Water Act is discussed below.

WATERS OF THE UNITED STATES

“Waters of the United States”, which includes “wetlands” and “other waters”, are defined by 33 CFR §328.3 as follows:

- All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
- All interstate waters including interstate wetlands.
- All “other waters” such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
 - which are or could be used by interstate or foreign travelers for recreational or other purposes; or
 - from which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
 - which are used or could be used for industrial purpose by industries in interstate commerce.
- All impoundments of waters otherwise defined as waters of the United States under the definition.
- Tributaries of waters identified above.
- The territorial seas.
- Wetlands adjacent to waters (other than wetlands) identified above.

The USACE generally does not consider the following waters to be “waters of the United States.” However, the USACE reserves the right on a case-by-case basis to determine that a particular water body within these categories of waters is a water of the United States. The Environmental Protection Agency also has the right to determine on a case-by-case basis if any of these waters are “waters of the United States.”

- Non-tidal drainage and irrigation ditches excavated on dry land.
- Artificially irrigated areas which would revert to upland if the irrigation ceased.

- Artificial lakes or ponds created by excavating and/or diking dry land to collect and retain water and which are used exclusively for such purposes as stock watering, irrigation, settling basins, or rice growing.
- Artificial reflecting or swimming pools or other small ornamental bodies of water created by excavating and/or diking dry land to retain water for primarily aesthetic reasons.
- Water filled depressions created in dry land incidental to construction activity and pits excavated in dry land for the purpose of obtaining fill, sand, or gravel unless and until the construction or excavation operation is abandoned and the resulting body of water meets the definition of waters of the United States [see 33 CFR 328.3(a)].

Wetlands

USACE jurisdictional “wetlands”, as defined by 33 CFR §328.3(b), are those areas which are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Ordinary High Water Mark

The USACE’s jurisdiction over “other waters” extends to the limit of the Ordinary High Water Mark or the upward extent of any adjacent wetland. The Ordinary high water mark, as defined by 33 CFR §328.3(e), is the visible line on the shore/bank established by the fluctuations of water and indicated by physical characteristics such as:

- A 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.

RIVERS AND HARBORS ACT

Section 10 of the Rivers and Harbors Act of 1899 requires authorization from the Secretary of the Army, acting through the U.S. Army Corps of Engineers, to construct any structure in or over any “navigable water of the United States.” Structures or work outside the limits defined as navigable waters requires a Section 10 permit if the structure or work affects the course, location, or condition of the water body. The law applies to dredging or disposal of dredged materials, excavation, filling, rechannelization, or any other modification of a navigable water of the United States. It includes without limitation, any wharf, dolphin, weir, boom breakwater, jetty, groin, bank protection (*e.g.* riprap, revetment, bulkhead), mooring structures such as pilings, aerial or subaqueous power transmission lines, intake or outfall pipes, permanently moored floating vessel, tunnel, artificial canal, boat ramp, aids to navigation, and any other permanent, or semi-permanent obstacle or obstruction.

Navigable waters are generally defined as waters of the United States that are subject to the ebb and flow of the tide, shoreward to the mean high water mark, and/or are presently used, or have been used in the past, or may be susceptible to use to transport interstate or foreign commerce, as defined in 32 CFR §322.2(a).

MIGRATORY BIRD TREATY ACT (MBTA)

The Migratory Bird Treaty Act (16 U.S.C. 703-712), administered by the U.S. Fish and Wildlife Service, implements four treaties between the United States and Canada, Mexico, Japan and Russia, respectively, to manage and conserve migratory birds that cross national borders. The Migratory Bird Treaty Act makes it unlawful in any manner, unless expressly authorized by permit pursuant to federal regulations, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to barter, barter, offer to purchase, purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird. The definition of “take” is defined as any act to “pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect.” This includes most actions, direct and indirect, that could result in “take” or possession, whether it is temporary or permanent, of any protected species (APLIC and USFWS 2005d). Although harassment and habitat modification do not constitute a take in themselves under the Migratory Bird Treaty Act or Fish and Game Code, such actions that result in direct loss of birds, nests or eggs including nest abandonment or failure are considered take under such regulations. A list of migratory birds protected under the Migratory Bird Treaty Act, available in Section 10.13 of Title 50 of the Code of Federal Regulation, excludes nonnative species that have not been introduced into the U.S. or its territories, and species that belong to the families not listed in any of the four treaties underlying the Migratory Bird Treaty Act, such as wrenit (*Chamaea fasciata*), European starling (*Sturnus vulgaris*), California quail (*Callipepla californica*), Ring-necked Pheasant (*Phasianus colchicus*) and Chukar (*Alectoris chukar*), among other species less common in California.

On December 8, 2004 the U.S. Congress passed the Migratory Bird Treaty Reform Act (Division E, Title I, Section 143 of the Consolidated Appropriations Act, 2005, PL 108-447; MBTRA), which excludes all migratory birds nonnative or have been human introduced to the U.S. or its territories. It defines a native migratory bird as a species present within the U.S. and its territories as a result of natural biological or ecological processes. The USFWS published a list of the bird species excluded from the Migratory Bird Treaty Act on March 15, 2005 (70 FR 12710), which included two species commonly observed in the U.S., the rock pigeon (*Columba livia*) and domestic goose (*Anser anser ‘domesticus’*).

BALD AND GOLDEN EAGLE PROTECTION ACT

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; June 8, 1940) as amended, provides protection for the bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*) by prohibiting the taking, possession and commerce of such birds, their nests, eggs or feathers unless expressly authorized by permit pursuant to federal regulations. The Act also provides criminal and civil penalties for violations of the Act and defines take as any action to pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb.

STATE REGULATIONS

CALIFORNIA ENDANGERED SPECIES ACT (CESA)

The California Endangered Species Act of 1984, administered by the California Department of Fish and Wildlife (CDFW), recognizes that certain species of fish, wildlife and plants are in danger of, or threatened with, extinction because their habitats are threatened with destruction, adverse modification, or severe curtailment, or because of overexploitation, disease, predation, or other factors. The Legislature recognized that these species of fish, wildlife and plants are of ecological, educational, historical, recreational, aesthetic, economic and scientific value to the people of the state, and the conservation, protection and enhancement of these species and their habitat is of statewide concern. The CESA built on the California Native Plant Protection Act (NPPA) (discussed below) and increased regulatory protection

for plant species to parallel the CESA. Listing categories under the CESA include endangered, threatened, rare or candidate for listing (Cal. Fish and Game Code §§ 2062, 2067 and 2068). The current inventories published for plants listed under the CESA are the *State and Federally Listed Endangered, Threatened and Rare Plants of California* (CDFW 2013b) and the *Special Vascular Plants, Bryophytes and Lichens List* (CDFW 2013d). Current inventories for fish and wildlife species include *State and Federally Listed Endangered and Threatened Animals of California* (CDFW 2013c) and the *Special Animals* (CDFG 2011).

CESA requires state agencies to consult with the CDFW when preparing California Environmental Quality Act (CEQA) documents to ensure that the state lead agency actions do not jeopardize the existence of listed species. It directs agencies to consult with CDFW on projects or actions that could affect listed species, directs CDFW to determine whether jeopardy would occur, and allows CDFW to identify “reasonable and prudent alternatives” to the project consistent with conserving the species.

CESA prohibits the taking of state-listed endangered or threatened plant and wildlife species. CDFW exercises authority over mitigation projects involving state-listed species, including those resulting from CEQA mitigation requirements. CDFW may authorize a taking through an incidental take permit, if the impacts of the take are minimized and fully mitigated. Mitigation often takes the form of an approved habitat management plan or management agreement that avoids or compensates for possible jeopardy. CDFW requires preparation of mitigation plans in accordance with published guidelines.

CALIFORNIA FISH AND GAME CODE

The California Fish and Game Code provides protection for California’s plant and wildlife species and precludes taking of species listed as fully protected by the California Department of Fish and Wildlife. Section 86 defines take as any action to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill. Unless expressly authorized under Chapter 1.5, Article 3, Section 2081, which outlines exceptions for taking of endangered and threatened species, endangered, threatened and fully protected species shall not be taken for any purpose. Section 3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird; §3503.5 prohibits the take, possession, or needless destruction of any nests, eggs or birds in the orders Falconiformes (new world vultures, hawks, eagles, ospreys and falcons, among others) or Strigiformes (owls); §3511 prohibits the take or possession of fully protected birds; and §3513 prohibits the take or possession of any migratory nongame bird or part thereof as designated in the Migratory Bird Treaty Act. Section 4700 provides protection for fully protected mammals unless expressly authorized under §2081.7. Fully protected mammals include Morrow Bay kangaroo rat, bighorn sheep, except Nelson bighorn sheep (*Ovis canadensis nelsoni*), northern elephant seal, Guadalupe fur seal, ring-tailed cat, Pacific right whale, salt-marsh harvest mouse, southern sea otter and wolverine. Section 5050 provides protection for fully protected amphibians and reptiles unless expressly authorized under §2081.7. Fully protected amphibians and reptiles include blunt-nosed leopard lizard, San Francisco garter snake, Santa Cruz long-toed salamander, limestone salamander and black toad. Section 5515 provides protection for fully protected fish unless expressly authorized under §2081.7. Fully protected fish include Colorado River squawfish, thicktail chub, Mohave chub, Lost River sucker, Modoc sucker, shortnose sucker, humpback sucker, Owens River pupfish, unarmored threespine stickleback and rough sculpin.

PORTER-COLOGNE WATER QUALITY CONTROL ACT AND SECTION 401 OF THE CLEAN WATER ACT

The Regional Water Quality Control Board administers both the Porter-Cologne Water Quality Control Act and Section 401 of the Clean Water Act. The Porter-Cologne Water Quality Control Act requires “any person discharging waste, or proposing to discharge waste, within any region that could affect the ‘waters of the State’ to file a report of discharge” with the RWQCB (Cal. Water Code Section 13260). Waters of the State are “any surface water or groundwater, including saline waters, within the boundaries of the state” [Cal. Water Code Section 13050(e)].

Pursuant to Section 401 of the Clean Water Act, the RWQCBs consider waters of the State to include (without limitation) rivers, streams, lakes, bays, marshes, mudflats, unvegetated seasonally ponded areas, drainage swales, sloughs, wet meadows, natural ponds, vernal pools, diked bay lands, seasonal wetlands, and riparian woodlands. The RWQCBs have also claimed jurisdiction and exercised discretionary authority over “isolated waters”, as discussed above.

NATIVE PLANT PROTECTION ACT (NPPA)

The Native Plant Protection Act of 1977, which is implemented by the CDFW, was created to “preserve, protect and enhance rare and endangered plants in this State.” The NPPA gave the CDFW the authority to designate native plants as endangered or rare and to regulate, through permits, activities such as collecting, transporting, or selling plants protected by the NPPA. The NPPA also provides the definitions of native, threatened and endangered plants in Section 1901 of the California Fish and Game Code.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The California Environmental Quality Act of 1970 requires public agencies to evaluate the environmental implications of their actions, and to prevent environmental effects by avoiding or reducing significant impacts of their decisions, where feasible. CEQA was intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects. In enacting CEQA, the Legislature expressed a policy that public agencies should not approve projects as proposed if there are such feasible alternatives or mitigation measures. Among its goals, CEQA was intended “to preserve for future generations representations of all plant and animal communities” (Cal. Pub. Res. Code §21001c). Through this process impacts and mitigation to state and federally listed plant species are discussed.-

The California Native Plant Society (CNPS) has developed and maintains an inventory of rare, threatened and endangered plants of California. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. The inventory presents a ranking system for rare plants within the state known as California Rare Plant Ranks. The CNPS inventory is endorsed by the CDFW and effectively serves as its list of “candidate” plant species. The following identifies the definitions of the California Rare Plant Ranks:

- Rank 1A: Plants presumed to be extinct in California;
- Rank 1B: Plants that are rare, Threatened, or Endangered in California and elsewhere;
- Rank 2: Plants that are rare, Threatened, or Endangered in California, but are more numerous elsewhere;
- Rank 3: Plants about which more information is needed (a review list): and
- Rank 4: Plants of limited distribution (a watch list).

Rank 1B and 2 species are considered eligible for state listing as Endangered or Threatened pursuant to the California Fish and Game Code. As part of the CEQA process, such species should be fully considered, as they meet the definition of Threatened or Endangered under the NPPA and Sections 2062 and 2067 of the California Fish and Game Code. Rank 3 and 4 species are considered to be either plants about which more information is needed or are uncommon enough that their status should be regularly monitored. Such plants may be eligible or may become eligible for state listing, and CNPS and CDFW recommend that these species be evaluated for consideration during the preparation of CEQA documents (CNPS 2001), as some of these species may meet NPPA and CESA criteria as threatened or endangered.

In addition, CEQA requires that impacts to “resources that are rare or unique to that region” be evaluated [CEQA Guidelines 15125(c)]. This includes botanical resources that are, but not limited to, peripheral populations and disjunct subpopulations. These are informal terms that refer to those species that might be declining or be in need of concentrated conservation actions to prevent decline, but have no legal protection of their own. Also, CEQA Guidelines Section 15380 states “a species not included in any listing...shall nevertheless be considered to be rare or Endangered if the species is likely to become Endangered within the foreseeable future throughout all or a significant portion of its range and may be considered Threatened as that term is used in the ESA.”

APPENDIX C SPECIAL-STATUS PLANT SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
FEDERAL/STATE ENDANGERED OR THREATENED AND CALIFORNIA RARE SPECIES					
<i>Amsinckia grandiflora</i> Large-flowered fiddleneck	FE SE 1B.1 No Take	Occurs in cismontane woodland and valley and foothill grassland in the foothills of the Diablo Range. Known from fewer than five natural occurrences between 275-550 meters, however reintroductions have also occurred, but those populations are declining. Known from Alameda, Contra Costa and San Joaquin counties.	April-May annual herb	Suitable vegetation associations present, however study area is outside of elevation range for this taxon and the study area does not include the preferred Altamont soil type of this species. Nearest recorded CNDDDB occurrence is a non-specific occurrence 4.15 miles to the southwest in Black Diamond Mines Regional Preserve (EONDX #9687).	Not Expected
<i>Chloropyron molle</i> ssp. <i>molle</i> Soft bird's-beak	FE SR 1B.2	Coastal salt marshes and swamps. Known from fewer than 20 locations in CCA, NAP, and SOL counties from between 0-3 meters. Presumed extirpated in MRN, SAC, and SON counties.	July-November annual herb (hemiparasitic)	Suitable vegetation associations and saltwater hydrology present. The nearest recorded CNDDDB occurrence is a non-specific location 4 miles east on the San Joaquin River (EONDX #6420).	Not Observed Would have been detectable during 2013 surveys.
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i> Suisun thistle	FE CEQA 1B.1	Occurs in saltwater marshes and swamps. Known only from SOL County between 0-1 meter.	June- September perennial herb	Suitable vegetation associations and saltwater hydrology present, however this species has is a Grizzly Bay/ Suisun Marsh endemic and has never been recorded in CCA. Nearest recorded CNDDDB occurrence is a non-specific occurrence 16.0 miles to the northwest near Grizzly Island Road (EONDX #6761). This species has a very restricted distribution.	Not Expected
<i>Cordylanthus nidularis</i> Mt. Diablo bird's-beak	None SR 1B.1	Occurs in chaparral on serpentinite. Know only from CCA between 600-800 meters.	July-August annual herb (hemiparasitic)	No suitable vegetation associations or appropriate geology present. The nearest recorded CNDDDB occurrence is a specific location 10 miles southwest on Mount Diablo (EONDX #8720).	None
<i>Erysimum capitatum</i> var. <i>angustatum</i> Contra Costa wallflower	FE SE 1B.1	Occurs on inland dunes at an elevation of 3-20 meters. Known only from Antioch Dunes in CCA County.	March-July perennial herb	No suitable dune habitat present. This taxon is only known from the Antioch Dunes which are 1.70 miles north (EONDX #5848).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Lasthenia conjugens</i> Contra Costa goldfields	FE CEQA 1B.1 No Take	Occurs in cismontane woodland, alkaline playas, valley and foothill grassland, and vernal pools. Occurs on mesic sites. Known from ALA, CCA, MNT, NAP, and SOL counties from between 0-470 meters. Presumed extirpated from MEN, SBA, and SCL counties.	March-June annual herb	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses which this species prefers. Nearest recorded CNDDDB occurrence is an extirpated non-specific location 1.25 miles to the southeast (EONDX #42501).	Not Expected
<i>Lilaeopsis masonii</i> Mason's lilaeopsis	None SR 1B.1	Occurs in brackish or freshwater marshes and swamps, riparian scrub. Known from ALA, CCA, NAP, SAC, SJQ, and SOL counties from between 0-10 meters.	April- November perennial herb (rhizomatous)	Suitable vegetation associations and appropriate tidal hydrologic characteristics are present. Nearest recorded CNDDDB occurrence is specific occurrence 0.30 mile east growing along the shore in tidally influenced marsh (EONDX# 7638). All known occurrences within the vicinity are on brackish channels and sloughs (<i>i.e.</i> the San Joaquin River, Dutch Slough, Sandmound Slough, and Old River).	Not Observed Would have been detectable during 2013 surveys.
<i>Neostapfia colusana</i> Colusa grass	FE ST 1B.1	Occurs in large adobe vernal pools. Known from GLE, MER, SOL, STA, an YOL counties between 5-200 meters. Presumed extirpated from COL County.	May-August annual herb	No suitable vegetation associations or vernal hydrology present. The nearest recorded CNDDDB occurrence is a specific record 17 miles north near Olcott Lake (EONDX #6311).	None
<i>Oenothera deltoides</i> ssp. <i>howellii</i> Antioch Dunes evening-primrose	FE SE 1B.1	Occurs on inland dunes at an elevation of 3-20 meters. Known only from three native occurrences in CCA County. An occurrence in SAC County is introduced.	March- September perennial herb	No suitable dune habitat present. At a minimum, vegetative material of this taxon would have been detectable during the March 2013 site visit. The nearest recorded CNDDDB occurrence is a non-specific occurrence 1.65 miles northeast (EONDX #13828).	None
<i>Sanicula saxatilis</i> Rock sanicle	None SR 1B.2	Occurs on rocky substrates in broadleaved upland forest, chaparral, and valley and foothill grassland. Known from fewer than fifteen occurrences from CCA and SCL between 620-1,175 meters.	April-May perennial herb	Although suitable vegetation associations are present, the study area does not include the preferred rocky substrate and is outside of elevation range for this taxon. The nearest recorded CNDDDB occurrence is a specific occurrence 9.00 miles southwest at Mount Diablo (EONDX #4530).	Not Expected
<i>Sidalcea keckii</i> Keck's checkerbloom	FE CEQA 1B.1	Occurs in cismontane woodland and valley and foothill grassland on serpentinite or clay substrates. Known from FRE, MER, and TUL counties from 75-650 meters. Possibly known from COL, NAP, SOL, and YOL counties.	April-June annual herb	Although suitable vegetation associations are present within the study area this species is found at higher elevations than those within the study area. This taxon has also never been recorded from CCA. Nearest recorded CNDDDB occurrence (EONDX #75788) is a non-specific location approximately 8 miles north in the Montezuma Hills based on an historic collection.	Not Expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
CALIFORNIA RARE PLANT RANK SPECIES					
<i>Androsace elongata</i> ssp. <i>acuta</i> California androsace	None CEQA 4.2	Chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland. Species is highly localized and often overlooked. Known from ALA, CCA, COL, FRE, GLE, KRN, LAX, MER, SBD, SBT, SCL, SDG, SIS, SJQ, SLO, SMT, STA, and TEH from 150-1,200 meters.	March-June annual herb	No suitable vegetation associations present. Nearest recorded herbarium collections are from Mt. Diablo State Park, 10 miles southwest.	Not Expected
<i>Anomobryum julaceum</i> Slender silver moss	None CEQA 2.2	Occurs in broadleaved upland forest, lower montane coniferous forest, North Coast coniferous forest on damp rock and soil on outcrops, often on road cuts. Known from BUT, CCA, HUM, LAX, MPA, SBA, SCR, SHA, and SON counties at an elevation of 100-1000 meters.	Wet Season moss	No suitable vegetation associations present. The nearest recorded CNDDB occurrence is a non-specific occurrence in Mt. Diablo State Park, 10.15 miles to the southwest (EONDX #65107).	None
<i>Arabis blepharophylla</i> Coast rock cress	None CEQA 4.3	Occurs in broadleaved upland forest, coastal bluff scrub, coastal prairie, and coastal scrub. Known from CCA, MNT, MRN, SCR, SFO, SMT, and SON counties between 3-1,100 meters.	February-May perennial herb	No suitable vegetation associations present. Nearest recorded herbarium collection is from the summit of Mt. Diablo State Park, 10 miles southwest (Accession # CAS531563).	None
<i>Arctostaphylos auriculata</i> Mt. Diablo manzanita	None CEQA 1B.3 Covered	Occurs in chaparral on sandstone substrate, and in cismontane woodland. Known only from Contra Costa County at elevations from 135-600 meters. Known from fewer than 20 occurrences.	January-March shrub (evergreen)	No suitable vegetation associations or substrate present. Would have been detectable during the March 2013 site visit. Nearest CNDDB occurrence is a specific location 4.50 miles to the southwest in Black Diamond Mines Regional park (EONDX #41704).	Absent
<i>Arctostaphylos manzanita</i> ssp. <i>laevigata</i> Contra Costa manzanita	None CEQA 1B.2	Occurs in chaparral on rocky substrates. Known only from Contra Costa County at elevations from 500-1,100 meters.	January-February shrub (evergreen)	No suitable vegetation associations or substrate present. Would have been detectable during the March 2013 site visit. Nearest CNDDB occurrence is a specific location 5.30 miles to the southwest at Black Diamond Mines Regional Preserve (EONDX #42177).	Absent
<i>Astragalus tener</i> var. <i>tener</i> Alkali milk-vetch	None CEQA 1B.2 No Take	Occurs on alkaline substrates in playas, valley and foothill grassland on adobe clay, and vernal pools. Known from ALA, MER, NAP, SOL and YOL counties between 1-60 meters. Presumed extirpated from CCA, MNT, SBT, SCL, SFO, SJQ, SON, and STA counties.	March-June annual herb	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses which this species prefers. Nearest recorded CNDDB occurrence is a specific location 6.30 miles northwest in the Montezuma Hills (EONDX #4693).	Not Expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Atriplex cordulata</i> var. <i>cordulata</i> Heartscale	None CEQA 1B.2	Occurs in chenopod scrub, meadows and seeps, valley and foothill grassland on sandy, saline or alkaline substrates from 1-375 meters elevation. Known from ALA, CCA, BUT, FRE, GLE, KRN, MAD, MER, SLO, SOL, and TUL counties between 1-375. Presumed extirpated from SJQ, STA, and YOL counties.	April-October annual herb	Suitable vegetation associations are present. The nearest herbarium record (Accession #CHSC98937) is from Briones Valley.	Not Observed Would have been detectable during August 2013 survey.
<i>Atriplex depressa</i> Brittlescale	None CEQA 1B.2 Covered	Occurs in chenopod scrub, meadows and seeps, playas, valley and foothill grassland, and vernal pools on alkaline clay substrates. Known from ALA, CCA, COL, FRE, GLE, MER, SOL, STA, TUL, and YOL counties at an elevation of 1-320 meters.	May-October annual herb	Suitable vegetation associations are present. Nearest recorded CNDDDB occurrence is a non-specific location 5.6 miles to south adjacent to Sand Creek (EONDX #60527).	Not Observed Would have been detectable during August 2013 survey.
<i>Atriplex joaquiniana</i> San Joaquin spearscale	None CEQA 1B.2 Covered	Occurs in chenopod scrub, meadows and seeps, playas, and valley and foothill grassland on alkaline substrates from 1-835 meters elevation. Known from ALA, CCA, COL, FRE, GLE, MER, MNT, NAP, SBT, SOL, YOL, and possibly SLO counties. Presumed extirpated from SCL, SJQ, and TUL counties.	April-October annual herb	Suitable vegetation associations are present. Nearest recorded CNDDDB occurrence is a specific location 5.6 miles south near Antioch (EONDX #9591).	Not Observed Would have been detectable during August 2013 survey.
<i>Blepharizonia plumosa</i> Big tarplant	None CEQA 1B.1 Covered	Occurs in valley and foothill grassland. Known from ALA and CCA, KRN, MNT, SBT, SJQ, SLO, and STA counties between 30-505 meters. Presumed extirpated in SOL county. Recognized as <i>Blepharizonia plumosa</i> ssp. <i>plumosa</i> in TJM.	July-October annual herb	Suitable vegetation associations present, however study area is outside of elevation range for this taxon and the study area does not include the preferred Altamont soil type of this species. Nearest recorded CNDDDB occurrences is a non-specific historic location 1.25 miles to the east near Antioch (EONDX #67189).	Not Expected
<i>Calandrinia breweri</i> Brewer's calandrinia	None CEQA 4.2	Occurs in sandy or loamy, disturbed sites and burns in chaparral and coastal scrub. Known from CCA, LAX, MEN, MNT, MPA, MRN, NAP, ORA, RIV, SBA, SBD, SCL, SCR, SCZ, SDG, SHA, SLO, SMT, SON, SRO, and VEN counties from 10 - 1220 meters in elevation.	March-June annual herb	No suitable vegetation associations present. Nearest known herbarium collection is in Markley Canyon approximately 3 miles southwest (Accession #UC765774).	None
<i>California macrophylla</i> Round-leaved filaree	None CEQA 1B.1 Covered	Occurs in cismontane woodland, valley and foothill grassland on clay soils. Known from ALA, CCA, COL, FRE, GLE, KNG, KRN, LAK, LAS, LAX, MER, MNT, NAP, RIV, SBA, SBT, SDG, SJQ, SLO, SMT, SOL, STA, THE, VEN, and YOL counties between 15-1,200 meters. Presumed extirpated from SCZ Island. Recognized as <i>Erodium macrophyllum</i> in TJM.	March-May annual Herb	Although suitable vegetation associations are present, the study area lacks heavy clay soils that support this species. Nearest known CNDDDB occurrence is a non-specific historic occurrence 1.25 miles east near Antioch (EONDX #45828).	Not Expected

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<i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	None CEQA 1B.2 Covered	Occurs in chaparral, cismontane woodland, riparian woodland, and valley and foothill grassland. Known from ALA, CCA, and SOL counties between 30-840 meters.	April-June perennial herb (bulbiferous)	Although suitable vegetation associations are present, this taxon occurs on the ecotone of listed associations. Study area is outside of elevation range for this taxon which is restricted to Mount Diablo and its foothills. Nearest recorded CNDDDB occurrence is a specific location 8.15 miles southwest near North Peak (EONDX #29946).	Not Expected
<i>Campanula exigua</i> Chaparral harebell	None CEQA 1B.2	Occurs on rocky sites, usually on serpentinite, in chaparral. Known from ALA, CCA, SBT, SCL, and STA counties between 275-1,250 meters.	May-June annual herb	No suitable vegetation associations or preferred substrate present. Study area is also outside of elevation range for this taxon. Nearest CNDDDB occurrence is a non-specific location 9.0 miles to the southwest in Mt. Diablo State Park (EONDX #56428).	None
<i>Centromadia parryi</i> subsp. <i>congonii</i> Congdon's tarplant	None CEQA 1B.2	Occurs in alkaline valley and foothill grassland. Known from ALA, CCA, MNT, SCL, SLO, and SMT counties between 1-230 meters. Presumed extirpated from SCR and SOL counties. Recognized as <i>Hemizonia parryi</i> subsp. <i>congonii</i> in TJM	June- November annual herb	Suitable vegetation associations are present. Nearest recorded CNDDDB occurrence (EONDX #84658) is 10 miles east near Oakley where plants were present in non-native grassland along an irrigation canal.	Not Observed Would have been detectable during August 2013 survey.
<i>Centromadia parryi</i> ssp. <i>parryi</i> Pappose tarplant	None CEQA 1B.2	Occurs most often on alkaline substrates in chaparral, coastal prairie, coastal salt marshes and swamps, and mesic valley and foothill grassland. Known from BUT, COL, GLE, LAK, NAP, SMT, SOL, and SON counties between 2-420 meters. Recognized as <i>Hemizonia parryi</i> ssp. <i>parryi</i> in TJM.	May- November annual herb	Suitable vegetation associations are present. Nearest CNDDDB occurrence is a non-specific location 10.30 miles to the north near Birds Landing (EONDX #71416).	Not Observed Would have been detectable during August 2013 survey.
<i>Chloropyron molle</i> ssp. <i>hispidum</i> Hispid bird's-beak	None CEQA 1B.1	Occurs on alkaline substrates in meadows and seeps, playas, and valley and foothill grassland. Known from ALA, FRE, KRN, MER, PLA, and SOL counties from between 1-155 meters. Apparently extirpated from much of the lower San Joaquin Valley.	June- September annual herb (hemiparasitic)	Suitable vegetation associations are present. The nearest CNDDDB occurrence is a specific location 16.5 miles north near Denverton (EONDX #17844).	Not Observed Would have been detectable during 2013 survey.
<i>Cicuta maculata</i> var. <i>bolanderi</i> Bolander's water hemlock	None CEQA 2.1	Occurs in coastal, fresh or brackish water marshes and swamps. Known from CCA, MRN, SAC, and SOL counties and from Arizona, New Mexico, and Washington from 0-200 meters. Presumed extirpated in LAX, SBA, and SLO counties.	July-September perennial herb	Suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a non-specific location 2.5 miles northwest on Brown's Island (EONDX #75858).	Not Observed Would have been detectable during 2013 surveys.

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<i>Cryptantha hooveri</i> Hoover's cryptantha	None CEQA 1A	Occurs on inland dunes and sandy valley and foothill grassland between 9-150 meters. Known from KRN County. Presumed extirpated in CCA, MAD, and STA counties. Last seen in 1939.	April-May annual herb	No suitable dune habitat or sandy valley and foothill grassland habitat present. Nearest recorded CNDDDB occurrence is presumed extirpated and is 1.25 miles east near Antioch (EONDX #57196).	None
<i>Delphinium californicum</i> var. <i>interius</i> Hospital Canyon larkspur	None CEQA 1B.2	Occurs in openings in chaparral and mesic cismontane woodland. Known from ALA, CCA, MER, SBT, SCL, SJQ, and STA counties from between 230-1,095 meters.	April-June perennial	No suitable vegetation associations present. The nearest CNDDDB location is a non-specific location 9.0 miles southwest in Donner Canyon (EONDX #15178).	None
<i>Didymodon norrisii</i> Norris' beard moss	None CEQA 2.2	Occurs on intermittently mesic rock in cismontane woodland and lower montane coniferous forest. Known from BUT, CCA, COL, HUM, LAK, MAD, MNT, MPA, NEV, PLU, SBT, SCR, SIE, TEH, TUL, and TUO counties between 600-1,973 meters.	Moss wet season	No suitable vegetation associations present. The nearest recorded CNDDDB occurrence is a non-specific location 12.5 miles to the southwest in Mt. Diablo State Park (EONDX #65401).	None
<i>Downingia pusilla</i> Dwarf downingia	None CEQA 2.2	Occurs in mesic sites in valley and foothill grassland and vernal pools. Known from FRE, MER, NAP, PLA, SAC, SJQ, SOL, SON, STA, TEH, and YUB counties from between 0-10 meters.	March-May annual herb	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a specific location 6.30 miles northwest in vernal pools in Solano County (EONDX #4990).	None
<i>Eriastrum brandegeae</i> Brandegee's eriastrum	None CEQA 1B.2	Occurs on volcanic or sandy substrates in chaparral and cismontane woodland. Known from COL, GLE, LAK, SCL, SHA, SMT, THE, and TRI counties between 305-1,030 meters. Identity of CCA occurrence needs confirmation.	April-August annual herb	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a non-specific location 10.30 miles at Lime Ridge (EONDX #57209).	None
<i>Eriogonum nudum</i> var. <i>psychicola</i> Antioch Dunes buckwheat	None CEQA 1B.1	Occurs on inland dunes. Known from only a single occurrence in the Antioch Dunes in CCA County between 0-20 meters.	July-October perennial herb	No suitable vegetation associations or appropriate substrate are present. This taxon is only known from the Antioch Dunes which are 1.5 miles east (EONDX #82562).	None
<i>Eriogonum truncatum</i> Mt. Diablo buckwheat	None CEQA 1B.1 No Take	Occurs on sandy sites in chaparral, coastal scrub, and valley and foothill grassland. Known from ALA and CCA counties between 3-350 meters. Presumed extirpated from SOL County. Rediscovered in May 2005, now known from one extant natural occurrence.	April- September annual herb	Although suitable vegetation associations are present, this taxon occurs on the ecotone of listed associations and at higher elevations locally. Nearest recorded CNDDDB occurrence is an historic collection 1.25 miles east near Antioch (EONDX #60625).	Not Expected
<i>Eschscholzia rhombipetala</i> Diamond-petaled California poppy	None CEQA 1B.1 No Take	Occurs on alkaline and clayey valley and foothill grassland between 0-975 meters. Known from ALA, SJQ, and SLO counties. Presumed extirpated from CCA, COL, and STA counties.	March-April annual herb	Although suitable vegetation associations are present, study Alkali grassland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers. The nearest CNDDDB occurrence is a non-specific occurrence 1.25 miles east near Antioch (EONDX #21507).	Not Expected

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<i>Fritillaria agrestis</i> Stinkbells	None CEQA 4.2	Chaparral, cismontane woodland, piñon and juniper woodland and valley and foothill grassland, on clay or sometimes serpentinite. Known from ALA, CCA, FRE, KRN, MEN, MER, MNT, MPA, PLA, SAC, SBA, SBT, SCL, SLO, STA, TUO, VEN, and YUB counties between 10-1,555 meters. Presumed extirpated from SCR and SMT counties.	March-June perennial herb (bulbiferous)	Suitable vegetation associations present. Would have been detectable during the March 2013 site visit. The nearest recorded CNDDDB occurrence is a specific location 4.75 miles south in north Livermore Valley (EONDX #9391).	Absent
<i>Fritillaria liliacea</i> Fragrant fritillary	None CEQA 1B.2	Occurs in cismontane woodland, coastal prairie, coastal scrub, valley and foothill grassland near the coast, on clay or serpentinite. Known from ALA, CCA, MNT, MRN, SBT, SCL, SFO, SMT, SOL and SON counties between 3-410 meters.	February-April perennial herb (bulbiferous)	Suitable vegetation associations present. Would have been detectable during the March 2013 site visit. Nearest recorded CNDDDB occurrence is a specific location 6.80 miles northwest in Solano County (EONDX #5849).	Absent
<i>Galium andrewsii</i> subsp. <i>gatense</i> Phlox-leaf serpentine bedstraw	None CEQA 1B.2	Occurs in serpentinite, rocky soils in chaparral, cismontane woodland, and lower montane coniferous forest. Known from ALA, CCA, COL, FRE, LAX, MNT, SBT, SCL, and SLO counties between 150 - 1450 meters.	April-July perennial herb	No suitable vegetation associations are present. Study area is also outside of elevation range for this taxon.	None
<i>Helianthella castanea</i> Diablo helianthella	None CEQA 1B.2 Covered	Occurs in broadleaved upland forest, chaparral cismontane woodland, coastal scrub, riparian woodland, and valley and foothill grassland. Known from ALA, CCA, SDG, and SMT counties. Presumed extirpated from MRN and SFO counties. Recorded from between 60-1,300.	March-June perennial herb	Although suitable vegetation associations are present, this taxon occurs on the ecotone of listed associations. Study area is also outside of elevation range for this taxon. Nearest recorded CNDDDB occurrence is specific location 4.4 miles southwest within Black Diamond Mines Regional Preserve (# 1769).	Not Expected
<i>Hesperovax caulescens</i> Hogwallow starfish	None CEQA List 4.2	Occurs in clayey and mesic valley and foothill grassland and shallow vernal pools between 0-505 meters. Known from ALA, AMA, BUT, CCA, COL, FRE, GLE, KRN, MER, MNT, SAC, SJQ, SLO, SOL, STA, SUT, TEH, and YOL counties. Presumed extirpated from NAP and SDG counties.	March-June annual herb	Although suitable vegetation associations are present, study area lacks suitable alkaline characteristics and vernal hydrology in non-riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers. Nearest herbarium collection is from Antioch, with no other details listed (Accession # JEPS29512).	Not Observed Would have been detectable during August 2013 survey.
<i>Hesperolinon breweri</i> Brewer's western flax	None CEQA 1B.2 Covered	Occurs in chaparral, cismontane woodland, and valley and foothill grassland, usually on serpentinite, at elevations from 30 to 900 meters. Known from CCA, NAP, and SOL counties.	May-July annual herb	Although suitable vegetation associations are present, this taxon occurs on the ecotone of listed associations. Study area is also outside of elevation range for this taxon. Nearest recorded CNDDDB occurrence is a non-specific historic location 1.25 miles east near Antioch (# 32216).	Not Expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Hibiscus lasiocarpus</i> var. <i>occidentalis</i> Woolly rose-mallow	None CEQA 2.2	Occurs in marshes and swamps. Known from BUT, CCA, COL, GLE, SAC, SJQ, SOL, SUT, and YOL counties from between 0-120 meters.	June- September perennial rhizomatous herb aquatic, emergent	Suitable vegetation associations and appropriate hydrologic characteristics present. Nearest recorded CNDDDB occurrence is a specific location 8.9 miles east on an island in Dutch Slough west of Jersey Island Slough (EONDX #6299). 25-50 plants were observed in 1992.	Not Observed Would have been detectable during 2013 surveys.
<i>Isocoma arguta</i> Carquinez goldenbush	None CEQA 1B.1	Occurs in valley and foothill grassland, often on alkaline soils. Known only from SOL County from between 1-20 meters elevation.	August- December perennial shrub	Although suitable vegetation associations are present, study area lacks suitable upland alkaline characteristics. At a minimum, vegetative material would have been detectable during the March 2013 site visit. Nearest recorded CNDDDB occurrence is a non-specific location 8.0 miles north in Solano County, in the Montezuma Hills (EONDX #42728). Has not been recorded from Contra Costa County.	Absent
<i>Juglans hindsii</i> Northern California black walnut	None CEQA 1B.1	Occurs in riparian forest and riparian woodland. Known from CCA from NAP counties between 0-440 meters. Only one confirmed, native occurrence appears viable as of 2003. Possibly occurs in LAK County. Presumed extirpated from SAC, SOL, and YOL counties. Recognized as <i>Juglans californica</i> var. <i>hindsii</i> in TJM.	April-May deciduous tree	Suitable vegetation associations are present, however would have been detectable during the March 2013 site visit. Nearest recorded CNDDDB occurrence is a non-specific location 17.75 miles southwest in Lafayette (EONDX #12147).	Absent
<i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	None CEQA 1B.2	Occurs in freshwater and brackish marshes. Known from ALA, CCA, NAP, SAC, SJQ, and SOL counties from 0-4 meters. Presumed extirpated from SCL county.	May- September perennial herb	Suitable vegetation associations and appropriate hydrologic characteristics present. Nearest recorded CNDDDB occurrence is a specific location 0.3 miles north near Antioch Point on the south side of the San Joaquin River (EONDX #84279).	Not Observed Would have been detectable during 2013 surveys.
<i>Legenere limosa</i> Legenere	None CEQA 1B.1	Occurs in vernal pools. Known from ALA, LAK, NAP, PLA, SAC, SCL, SHA, SJQ, SMT, SOL, SON, THE, and YUB counties from between 1-880 meters. Presumed extirpated from STA County.	April-June annual herb	No suitable vegetation associations or vernal hydrology present. The nearest CNDDDB location is a specific location 14.5 miles north near Denverton (EONDX #17381).	None
<i>Lessingia hololeuca</i> Woolly-headed lessingia	None CEQA 3	Occurs in clay or serpentine substrates in broadleafed upland forest, coastal scrub, lower montane coniferous forest, and valley and foothill grassland. Known from ALA, MNT, MRN, NAP, SCL, SMT, SOL, SON, and YOL counties between 15-305 meters.	June-October annual herb	Although suitable vegetation associations are present, the preferred substrate is absent. Study area is also outside of elevation range for this taxon. The nearest herbarium collection is recorded from near Rio Vista (Accession # POM179721).	Not Expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Limosella australis</i> Delta mudwort	None CEQA 2.1	Occurs in marshes and swamps and riparian scrub, usually on mud banks, between 0-3 meters. Known from CCA, SAC, SJQ, and SOL counties. Native status in California is inconclusive; definitive study needed.	May-August perennial herb (stoloniferous)	Suitable vegetation associations and appropriate hydrologic characteristics typical of Delta waters are present. Nearest recorded CNDDDB occurrence is a non-specific location 0.7 miles northwest near the Los Medanos wasteway outfall (EONDX #50169).	Not Observed Would have been detectable during 2013 surveys.
<i>Madia radiata</i> Showy madia	None CEQA 1B.1 Covered	Occurs in cismontane woodland and valley and foothill grassland between 25-900 meters. Known from FRE, KRN, SBT, SLO, and STA counties. Presumed extirpated from CCA, KNG, MNT, SBA, and SJQ counties.	March-May annual herb	Suitable vegetation associations present, however study area is outside of elevation range for this taxon. Nearest recorded CNDDDB occurrence is a non-specific location 4.80 miles southeast near Lone Tree Valley (EONDX #6753).	Not Expected
<i>Malacothamnus hallii</i> Hall's bush mallow	None CEQA 1B.2	Occurs in chaparral and coastal scrub at elevations between 10-760 meters. Known from CCA, MEN, MER, SCL, SMT, and STA counties.	May-October perennial shrub (evergreen)	No suitable vegetation associations present. At a minimum, vegetative material would have been detectable during the March 2013 site visit. Nearest recorded CNDDDB occurrence is a non-specific location 9.4 miles southwest in Mt. Diablo State Park (EONDX #63281).	Absent
<i>Monolopia gracilens</i> Woodland woollythreads	None CEQA 1B.2	Occurs on serpentinitic sites in openings of broadleafed upland forest, chaparral, cismontane woodland, North Coast coniferous forest, and valley and foothill grassland. Known from ALA, CCA, MNT, SCL, SCR, SLO, and SMT counties between 100-1,200 meters.	March-July annual herb	Although suitable vegetation associations are present the preferred substrate is absent. Nearest recorded CNDDDB occurrence is a non-specific location 9.4 miles southwest in Mt. Diablo State Park (EONDX #80193).	Not Expected
<i>Myosurus minimus</i> ssp. <i>apus</i> Little mousetail	None CEQA 3.1	Occurs in valley and foothill grassland and vernal pools on alkaline substrates. Known from ALA, CCA, COL, LAK, MER, RIV, SBD, SDG, SOL, TUL, and YOL counties, Baja California and Oregon from 20-640 meters elevation.	March-June annual herb	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses and open soil which this species prefers. The nearest recorded occurrence is a non-specific location from the CNPS Inventory on the Clifton Court Forebay quad (463D).	Not Expected
<i>Navarretia gowenii</i> Lime Ridge navarretia	None CEQA 1B.1	Occurs on chaparral. Known only from four occurrences in CCA and STA counties between 180-305 meters.	May-June annual herb	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a specific location 10.75 miles southwest at Lime Ridge (EONDX #72962).	None
<i>Navarretia nigelliformis</i> subsp. <i>nigelliformis</i> Adobe navarretia	None CEQA 4.2 Covered	Occurs in vernal mesic valley and foothill grassland and vernal pools, on serpentine or clay substrates at elevations between 100-1,000 meters. Known from ALA, BUT, CCA, COL, FRE, KRN, MER, MNT, PLA, SUT, and TUL counties.	April-June annual herb	Although suitable vegetation associations are present the study area lacks the preferred substrates and is outside of elevation range for this taxon. Nearest recorded herbarium record (Accession # UC126029) is a historic collection from near Antioch.	Not Expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Navarretia nigelliformis</i> subsp. <i>radians</i> Shining navarretia	None CEQA 1B.2	Occurs in valley and foothill grassland, cismontane woodland, and vernal pools, sometimes on clay substrates at elevations between 76-1000 meters. Known from ALA, CCA, COL, FRE, MAD, MER, MNT, SBT, SJQ, and SLO counties.	April-June annual herb	Although suitable vegetation associations are present the study area is outside the elevation range for this taxon. Nearest recorded CNNDDB occurrence is a non-specific location 12 miles southwest near Curry Point on Mt. Diablo (EONDX #84667).	Not Expected
<i>Phacelia phacelioides</i> Mt. Diablo phacelia	None CEQA 1B.2	Occurs on rocky substrates in chaparral and cismontane woodland. Known from CCA, SBT, SCL, and STA counties between 500-1,370 meters.	April-May annual herb	No suitable vegetation associations present. Study area is also outside of elevation range for this taxon. Nearest recorded CNNDDB occurrence is a non-specific location 9.30 miles southwest in Mt. Diablo State Park (EONDX #24015).	None
<i>Plagiobothrys hystriculus</i> Bearded popcorn-flower	None CEQA 1B.1	Occurs in valley and foothill grassland (often mesic), vernal pool margins, often vernal swales. Known only from SOL County from between 0-52 meters elevation.	April-May annual herb	Although suitable vegetation associations are present, appropriate vernal hydrology is absent. This taxon has also never been recorded from CCA County. Nearest recorded CNNDDB occurrence is in the Montezuma Hills (EONDX #41667).	Not Expected
<i>Potamogeton zosteriformis</i> Eel-grass pondweed	None CEQA 2.2	Occurs in freshwater marshes and swamps. Known from CCA, LAK, LAS, MOD, and SHA counties and Idaho, Oregon, Utah, and Washington from 0-1,860 meters elevation.	June-July annual herb (aquatic)	Although suitable vegetation associations are present, appropriate hydrologic characteristics, such as still, open water are not present. Nearest recorded CNDDDB occurrence is a non-specific location 12.5 northeast on Webb Island in the Sacramento Delta, based on a 1949 collection (EONDX #50796).	Not Expected
<i>Sagittaria sanfordii</i> Sanford's arrowhead	None CEQA 1B.2	Occurs in freshwater marshes and swamps (shallow freshwater). Known from BUT, DNT, ELD, FRE, MER, MPA, PLA, SAC, SBD, SHA, SJQ, SOL, and THE counties from 0 to 650 meters in elevation. Presumed extirpated from ORA and VEN counties.	May-October perennial herb (rhizomatous)	Although suitable vegetation associations are present, appropriate hydrologic characteristics, such as still, open water are not present. Nearest recorded CNDDDB occurrence is a non-specific location 14 miles northeast on the south side of the Sacramento River near Ida Island (EONDX #84309).	Not Expected
<i>Scutellaria lateriflora</i> Side-flowering skullcap	None CEQA 2.2	Occurs in mesic meadows and seeps and marshes and swamps. Known from INY, SAC, and SJQ counties between 0-500 meters.	July-September perennial herb (rhizomatous)	Suitable vegetation associations and appropriate hydrologic characteristics typical of Delta waters are present. Taxon has not been recorded from CCA County. Nearest recorded CNDDDB occurrence is a non-specific location 17 miles northeast near Bouldin Island (EONDX #32121).	Not Observed Would have been detectable during 2013 surveys.
<i>Senecio aphanactis</i> Rayless ragwort	None CEQA 2.2	Occurs on coastal scrub, chaparral, and cismontane woodland on alkaline soils. Known from ALA, CCA, FRE, LAX, MER, MNT, ORA, RIV, SBA, SCL, SCT, SCZ, SDG, SLO, SOL, SRO, and VEN counties between 15-800 meters.	January-April annual herb	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a non-specific historic location 5.2 miles southwest in Black Diamond Mines Regional Preserve (EONDX #264).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Streptanthus albidus</i> ssp. <i>peramoenus</i> Most-beautiful jewel flower	None CEQA 1B.2	Occurs on serpentinite in chaparral, cismontane woodland, and valley and foothill grassland. Known from ALA, CCA, MNT, SCL, and SLO between 94-1,000 meters.	March-October annual herb	Although suitable vegetation associations are present, suitable substrate is absent. Study area is also outside of elevation range for this taxon. Nearest recorded CNDDDB occurrence is a non-specific location 9.70 miles southwest near Perkins Canyon (EONDX #63269).	Not Expected
<i>Streptanthus hispidus</i> Mt. Diablo jewel-flower	None CEQA 1B.3	Occurs on rocky sites in chaparral and valley and foothill grassland. Known from fewer than 15 occurrences only in CCA from between 365-1,200.	March-June annual herb	Although suitable vegetation associations are present, suitable substrate is absent. Study area is also outside of elevation range for this taxon. Nearest recorded CNDDDB occurrence is a specific location 8.75 miles southwest in Mt. Diablo State Park (EONDX #4877).	Not Expected
<i>Stuckenia filiformis</i> Slender-leaved pondweed	None CEQA 2.2	Occurs in assorted shallow freshwater marshes and swamps. Known from ALA, BUT, CCA, ELD, LAS, MER, MNO, MOD, MPA, PLA, SHA, SIE, SMT, SOL, and SON between 300-2,150 meters. Possibly occurs in SCL.	May-July rhizomatous herb (aquatic)	Although suitable vegetation associations are present, appropriate hydrologic characteristics, such as still, open freshwater, are absent. Nearest recorded CNDDDB occurrence is a non-specific location 12.40 southwest near Pine Creek (EONDX #74339).	Not Expected
<i>Symphyotrichum lentum</i> Suisun Marsh aster	None CEQA 1B.2	Occurs in brackish and freshwater marshes and swamps. Known from CCA, MRN, NAP, SAC, SJQ, SOL, and SON counties between 0-3 meters. Recognized as <i>Aster lentus</i> in TJM. Intergrades into <i>A. chilensis</i> . USFWS uses the name <i>A. chilensis</i> var. <i>lentus</i> .	May- November perennial herb (rhizomatous)	Suitable vegetation associations and appropriate hydrologic characteristics typical of Delta waters are present. Nearest recorded CNDDDB occurrence is a specific location 0.5 miles northwest between Pittsburg and Antioch points (EONDX #7640).	Not Observed Would have been detectable during 2013 surveys.
<i>Trifolium hydrophilum</i> Saline clover	None CEQA 1B.2	Occurs on mesic and alkaline sites in marshes and swamps and valley and foothill grassland and vernal pools. Known from ALA, MNT, NAP, SBT, SCL, SCR, SLO, SMT, SOL and SON counties between 0-300 meters. Possibly occurs in COL County.	April-June annual herb	Although suitable vegetation associations are present, this species does not occur in riverine habitat. Alkali grassland and alkali wetland on site are dominated by dense saltgrass instead of a mosaic of annual grasses which this species prefers. Nearest recorded CNDDDB occurrence is a non-specific location 17 miles northwest near Benicis based on an historic collection (EONDX #84590).	Not Expected
<i>Triquetrella californica</i> Coastal triquetrella	None CEQA 1B.2	Occurs on soil in coastal bluff scrub and coastal scrub. Known from CA, DNT, MEN, MRN, SDG, SFO, SMT, and SON counties between 10-100 meters.	Moss wet season	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a non-specific location 10.15 miles southwest near Mt. Diablo (EONDX #45728).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT PREFERENCES, DISTRIBUTION INFORMATION, & ADDITIONAL NOTES*	FLOWERING PHENOLOGY/ LIFE FORM	HABITAT SUITABILITY & LOCAL DISTRIBUTION	POTENTIAL FOR OCCURRENCE
<i>Tropidocarpum capparideum</i> Caper-fruited tropidocarpum	None CEQA 1B.1 No Take	Occurs in valley and foothill grassland, often alkaline hills. Known from FRE, MNT, and SLO counties. Presumed extirpated from ALA, CCA, GLE, SCL, and SJQ counties between 1-455 meters. Rediscovered in 2000 on Ft. Hunter Liggett.	March-April annual herb	Although suitable vegetation associations are present, alkali grassland on site is dominated by dense saltgrass instead of a mosaic of annual grasses which this species prefers. Nearest recorded CNDDDB occurrence is a historic non-specific location 7.70 miles southwest near Clayton (EONDX #20435).	Not Expected
<i>Viburnum ellipticum</i> Oval-leaved viburnum	None CEQA 2.3	Occurs on chaparral, cismontane woodland, and lower montane coniferous forest. Known from CCA, FRE, ELD, GLE, HUM, MEN, NAP, SHA, and SON counties between 215-1,400 meters.	May-June shrub (deciduous)	No suitable vegetation associations present. Nearest recorded CNDDDB occurrence is a non-specific location 9.6 miles southwest near Curry Canyon (EONDX #74275). Would have been detectable during March 2013 site visit.	Absent

¹Explanation of State and Federal Listing Codes and HCP/NCCP Coverage

Federal listing codes:

FE	Federally listed as Endangered
FT	Federally listed as Threatened
FPE	Federally proposed for listing as Endangered
FPT	Federally proposed for listing as Threatened
FPD	Federally proposed for delisting
FC	Federal candidate species (former Category 1 candidates)
SC	Species of Concern – No longer maintained by USFWS
SLC	Species of local concern or conservation importance – No longer maintained by USFWS

California listing codes:

SE	State listed as Endangered
ST	State listed as Threatened
SR	State listed as Rare
SCE	State candidate for listing as Endangered
SCT	State candidate for listing as Threatened

California Native Plant Society codes:

1A	Presumed extinct in California
1B	Rare or Endangered in California and elsewhere
2	Rare or Endangered in California, more common elsewhere
3	Plants for which we need more information - Review list
4	Plants of limited distribution - Watch list

California Native Plant Society Threat Codes:

- .1 Seriously Endangered in California (over 80% of occurrences Threatened / high degree and immediacy of threat)
- .2 Fairly Endangered in California (20-80% occurrences Threatened)
- .3 Not very Endangered in California (<20% of occurrences Threatened or no current threats known)

Notes: CNPS List 1A and some List 3 plant species lacking any threat information receive no threat code extension.

CNPS R-E-D Codes have been discontinued

Survey Recommendation Determinations Based On

- Observed phenology at the time of reconnaissance
- Seasonal weather patterns
- Collection dates of herbarium specimens
- Blooming times given by the CNPS Inventory

East Contra Costa County Habitat Conservation Plan/Natural Community Conservation Plan (ECCCCHCP?NCCP) includes special-status species designated as Covered or No-Take. To be a Covered Species, a species had to meet certain criteria about range, status, impact, and data. Certain species were considered extremely rare and fully protected and are designated No-Take Species.

EONDX is the CNDDDB Element Occurrence Index number which corresponds to unique records in the California Natural Diversity Database.

Abbreviations:

AMA Amador	HUM Humboldt	MPA Mariposa	SBT San Benito
BUT Butte	KRN Kern	MRN Marin	SCL Santa Clara
CAL Calaveras	LAK Lake	NAP Napa	SCR Santa Cruz
CCA Contra Costa	LAS Lassen	NEV Nevada	SCT Santa Catalina Island
CNDDDB CA Natural Diversity Database	LAX Los Angeles	ORA Orange	SCZ Santa Cruz Island
CNPS CA Native Plant Society	LCP Local Coastal Plan	PLA Placer	SDG San Diego
COL Colusa	MAD Madera	PLU Plumas	SFO San Francisco
DNT Del Norte	MOD Modoc	RIV Riverside	SHA Shasta
ELD El Dorado	MEN Mendocino	SAC Sacramento	SIE Sierra
FRE Fresno	MER Merced	SBA Santa Barbara	SIS Siskiyou
GLE Glenn	MNT Monterey	SBD San Bernardino	SJQ San Joaquin

SMI San Miguel Island
SMT San Mateo
SNI San Nicolas Island
SOL Solano

SON Sonoma
SRO Santa Rosa Island
TEH Tehama
TJM The Jepson Manual

TJMII The Jepson Manual, 2nd. Ed.
TRI Trinity
TUL Tulare
VEN Ventura

YOL Yolo
YUB Yuba

APPENDIX D SPECIAL-STATUS FISH AND WILDLIFE SPECIES KNOWN TO OCCUR OR POTENTIALLY OCCURRING IN THE PROJECT VICINITY

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
FEDERAL/STATE LISTED, PROPOSED, CANDIDATE AND/OR FULLY PROTECTED SPECIES				
<u>INVERTEBRATES:</u>				
<i>Apodemia mormo langei</i> Lange's metalmark butterfly	Fed: FE CA: SA Xerces-CI	Inhabits stabilized dunes along the San Joaquin River; current distribution is restricted to the Antioch Dunes National Wildlife Refuge. Primary host plant for larvae and adults is the naked buckwheat (<i>Eriogonum nudum</i> var. <i>auriculatum</i>). Adult flight season is August through September.	No suitable habitat present. Host plant absent from the study area. The project is located outside of the species' known range. Species is restricted to the Antioch Dunes National Wildlife Refuge.	None
<i>Branchinecta conservatio</i> Conservancy fairy shrimp	Fed: FE, CH CA: SA	Endemic to relatively large, highly turbid vernal pools, playas, lakes, and grassy swales in the Central Valley from 16 to 5,577 feet (5-1,700 meters) in elevation (59 FR 48136). Six disjunct populations reported from Vina Plains in Tehama and Butte counties; greater Jepson Prairie in Solano County; Sacramento NWR in Sacramento County; Tule Ranch portion of Yolo Basin Wildlife Area in Yolo County; Grasslands Ecological Area, Flying M Ranch, Ichord Ranch, and Virginia Smith Trust lands in Merced County, single location in Stanislaus County; and two locations in the Los Padres National Forest in Ventura County (59 FR 48136). Designated critical habitat encompasses 8 units totaling 161,786 acres in Butte, Colusa, Mariposa, Merced, Solano, Stanislaus, Tehama, and Ventura counties (71 FR 7118).	No suitable habitat present. Study area lacks vernal pools, playas, lakes, or grassy swales. Project is not located within critical habitat.	None
<i>Branchinecta longiantenna</i> Longhorn fairy shrimp	Fed: FE, CH CA: SA	Species is extremely rare and endemic to small disjunct areas within Contra Costa, Alameda, Merced and San Luis Obispo counties. In the Livermore Vernal Pool Region of Alameda and Contra Costa counties, inhabits small, clear, sandstone outcrop vernal pools, but will inhabit seasonal pools with loam or sandy loam soils or shallow, alkaline pools (USFWS 2005). Inhabits larger and warmer grassland pools with clear to turbid water in the San Joaquin and Carrizo Vernal Pool Regions from 75-2,887 feet (23-880 meters) (USFWS 2005).	No suitable habitat present. Study area lacks vernal pools. Project is not located within critical habitat.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Branchinecta lynchi</i> Vernal pool fairy shrimp	Fed: FT, CH CA: SA	Inhabit clear to tea-colored freshwater vernal pools in grass or mud bottomed swales, or basalt flow depression pools in unplowed grasslands (59 FR 48136, Eriksen and Belk 1999). Thirty-two known populations in the Central Valley from Shasta to Tulare counties, and along the Central and South Coast Ranges from Solano to San Benito counties (59 FR 48136). Often occur in low densities and rarely co-occurs with other branchiopod species (Eng <i>et al.</i> 1990, Simovich <i>et al.</i> 1992). Designated critical habitat encompasses 35 units totaling 597,821 acres in Jackson County in Oregon, and Alameda, Amador, Butte, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, Napa, Placer, Sacramento, San Benito, San Joaquin, Alameda, Amador, Butte, Contra Costa, Fresno, Kings, Madera, Mariposa, Merced, Monterey, Napa, Placer, Sacramento, San Benito, San Joaquin counties in California (71 FR 7118).	Study area lacks vernal pools and playa pools. Species reported approximately 1 mile west along access road by railroad tracks in 1999 (EONDX #41660). Project is not located within critical habitat.	Not expected
<i>Callophrys mossii bayensis</i> San Bruno elfin butterfly	Fed: FE CA: SA Xerces CI	A small brownish butterfly that occurs in the vicinity of its larval host plant, stonecrop (<i>Sedum spathulifolium</i>). Flight period is late February to April. Range is restricted to small populations on north facing slopes in the fog belt in the coastal hills of the northern San Francisco Peninsula.	No suitable habitat present within the study area. Host plant absent from the study area. The project is located outside of the species' known range.	None
<i>Desmocerus californicus dimorphus</i> Valley elderberry longhorn beetle	Fed: FT, CH CA: SA	An elongate, red & black bodied beetle with long antenna measuring ½ to 1 inch in length. Endemic to the Central Valley of California in association with elderberry (<i>Sambucus</i> spp.). Eggs are laid in hollow stems measuring 2-8 inches in diameter at the base of the shrub; larva may stay in this stage for up to 2 years before transforming into adults. Active period for adults occurs from March to June. Adults and larvae feed exclusively on <i>Sambucus</i> spp. And exhibit preference for "stressed" elderberries. Presence often inferred based on oval exit holes created when individuals leave the inner shrub to mate and feed.	Suitable habitat present; several <i>Sambucus</i> spp. host plants observed within the study area with exit holes. Species presumed to be the California elderberry longhorn beetle (<i>Desmocerus californicus californicus</i>) based on location. The project is located outside of the species' known range. Project is not located within critical habitat.	None
<i>Elaphrus viridis</i> Delta green ground beetle	Fed: FT, CH CA: SA	A small brightly metallic green and bronze colored beetle measuring 0.25-inch. Inhabits grassland-playa-pool complexes in and around the Jepson Prairie in south-central Solano County. Active from February to mid-May.	No suitable habitat present within the study area. The project is located outside of the species' known range. Project is not located within critical habitat.	None
<i>Lepidurus packardii</i> Vernal pool tadpole shrimp	Fed: FE, CH CA: SA	A large, distinctive crustacean with an oval carapace and single, long pair of cercopods (59 FR 48136). Inhabits vernal pools and swales in the Sacramento Valley containing clear to highly turbid water; such pools are commonly found in grass bottomed swales of unplowed grasslands and are occasionally mud-bottomed and highly turbid (59 FR 48136). Designated critical habitat encompasses 18 units totaling 228,785 acres in Alameda, Amador, Butte, Colusa, Fresno, Kings, Madera, Mariposa, Merced, Sacramento, Shasta, Solano, Stanislaus, Tehama, Tulare, Yolo, and Yuba counties (71 FR 7118).	Study area lacks vernal pools and playa pools. Nearest reported occurrence (EONDX 52749) located ~4 mi south in claypan vernal pool with vernal pool fairy shrimp in 2003 (CDFW 2013a). Project is not located within critical habitat.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Speyeria callippe callippe</i> Callippe silverspot butterfly	Fed: FE CA: SA Xerces-CI	A medium-sized butterfly that is endemic to native grasslands with the host plant Johnny jump-up (<i>Viola pedunculata</i>). Violas typically grow on hilltops. The active adult period occurs between May and July. Current distribution is restricted to seven locals in San Mateo, Sonoma and Alameda counties.	No suitable habitat present within the study area. <i>Viola pedunculata</i> host plant absent from the study area. Not reported from Contra Costa County (CDFW 2013a).	None
<i>Syncaris pacifica</i> California freshwater shrimp	Fed: FE CA: SE	Inhabits low elevation, <i>i.e.</i> less than 380 feet (116 meters), perennial and intermittent freshwater streams with structurally diverse pools and streambanks in Marin, Napa and Sonoma Counties. Requires high water quality with minimal pollution and high oxygen content.	Outside species known range. Not reported from Contra Costa County (CDFW 2013a).	None
<u>FISH:</u>				
<i>Acipenser medirostris</i> Green sturgeon (southern DPS)	Fed: FT, CH CA: SSC AFS-V	The green sturgeon, southern DPS, is an anadromous fish that is found in marine waters from the Bering Sea to Ensenada, Mexico. The southern DPS includes all spawning populations south of the Eel River (exclusive), principally including the Sacramento River population; NMFS "Special Concern" designation refers to the northern DPS which includes spawning populations north of the Eel River (inclusive) (71 FR 17757). Locally, green sturgeon inhabit Suisun, San Pablo, and San Francisco bays, and coastal bays and estuaries from Monterey Bay north to Puget Sound. Spawning occurs in the Sacramento River between March and June; it may extend slightly longer, into July, in the Klamath River. Critical habitat includes coastal California waters from Monterey Bay, California, North to Cape Flattery, Washington; San Francisco Bay; Sacramento River and lower Feather River; Eastern reaches of the Sacramento-San Joaquin Delta; specified bays and estuaries in California, Oregon and Washington (74 FR 52300). Critical habitat does not include any freshwater tributaries feeding into these water bodies (74 FR 52300).	No suitable habitat present within the study area. Study area is not located within southern DPS. Project is not located within critical habitat.	None
<i>Eucyclogobius newberryi</i> Tidewater goby	Fed: FE, CH CA: SSC AFS-E	A California endemic fish that inhabits brackish coastal lagoons, estuaries and marshes. Range extends from the Smith River in Del Norte County to Agua Hedionda Lagoon in San Diego County. Species is typically an annual species. The Greater Bay Area recovery unit extends from north of Bodega Head in Sonoma County to the Salinas River Valley in Monterey County (USFWS 2005e). Critical habitat is limited to Humboldt, Mendocino, Sonoma, Marin, San Mateo, Santa Cruz, Monterey, San Luis Obispo, Santa Barbara, Ventura and Los Angeles Counties in California (73 FR 5920).	No brackish coastal lagoon, estuary and marsh habitat present within the study area. Project is not located within critical habitat.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Hypomesus transpacificus</i> Delta smelt	Fed: FT, CH CA: ST AFS-T	Inhabits brackish water in the Sacramento-San Joaquin Delta. Known from Sacramento/San Joaquin Delta, Sacramento River as high as the confluence with the Feather River, Mokelumne River, Cache Slough, Montezuma Slough, San Pablo Bay, Suisun Bay, Suisun Marsh, Carquinez Strait, and Napa River and Marsh. Spawns in freshwater habitat from February to August in shallow water areas with submersed aquatic plants, suitable substrates and refugia. Important spawning habitat include Barker, Lindsey, Cache, Prospect, Georgiana, Beaver, Hog, and Sycamore sloughs and the Sacramento River in the Delta, and tributaries of northern Suisun Bay. Critical habitat includes: areas of all water and all submerged lands below ordinary high water and the entire water column bounded by and contained in Suisun Bay (including Grizzly and Honker Bays); Goodyear, Suisun, Cutoff, First Mallard and Montezuma sloughs; and the existing contiguous waters contained within the Delta (59 FR 65256).	Suitable spawning and rearing habitat present within the study area especially the northernmost project area where West Antioch Creek enters the tidally influenced freshwater marsh. Project is within critical habitat and contains all four PCE's: spawning habitat (PCE-1), larval and juvenile transport (PCE-2), rearing habitat (PCE-3), and adult migration (PCE-4).	Possible
<i>Oncorhynchus kisutch</i> Coho salmon Central California Coast ESU	Fed: FE, CH CA: SE AFS-E	An anadromous fish that typically spends 2 years in the ocean before returning to perennial freshwater streams to spawn. ESU includes all naturally spawned populations from Punta Gorda in northern California south to and including the San Lorenzo River in central California, as well as populations in tributaries to San Francisco Bay including Corte Madera and Mill Valley Creeks, excluding the Sacramento-San Joaquin River system, as well as four artificial propagation programs: the Don Clausen Fish Hatchery Captive Broodstock Program, Scott Creek/King Fisher Flats Conservation Program, Scott Creek Captive Broodstock Program, and the Noyo River Fish Station egg-take Program coho hatchery programs (70 FR 37160). Designated critical habitat includes all river reaches accessible to coho including water, substrate, and adjacent riparian zone of estuarine and riverine reaches from Punta Gorda south to San Lorenzo River in central California, including Arroyo Corte Madera Del Presidio and Corte Madera Creek, tributaries to San Francisco Bay (64 FR 24049). Critical habitat includes Mendocino, Marin, Napa, Sonoma, San Mateo, and Santa Cruz counties (64 FR 24049).	Project is outside the designated Central California Coast ESU. Project is not located within critical habitat.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Oncorhynchus mykiss irideus</i> Steelhead Central California Coast ESU	Fed: FT, CH CA: AFS-T	An anadromous fish that spend several years in the ocean; returning to freshwater rivers and tributaries to spawn and rear. Listing includes all naturally spawned anadromous steelhead populations below natural and manmade impassable barriers in California streams from the Russian River (inclusive) to Aptos Creek (inclusive), and the drainages of San Francisco, San Pablo, and Suisun Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers (70 FR 37160). Tributary streams to Suisun Marsh including Suisun Creek, Green Valley Creek, and an unnamed tributary to Cordelia Slough (commonly referred to as Red Top Creek), excluding the Sacramento-San Joaquin River Basin, as well as two artificial propagation programs: the Don Clausen Fish Hatchery, and Kingfisher Flat Hatchery/ Scott Creek (Monterey Bay Salmon and Trout Project) steelhead hatchery programs (70 FR 37160). Designated critical habitat encompasses 1,465 miles streams, 386 square miles estuary habitat in Lake, Mendocino, Sonoma, Napa, Marin, San Francisco, San Mateo, Santa Clara, Santa Cruz, Alameda, Contra Costa, and San Joaquin counties (70 FR 52488). The Laguna de Santa Rosa, Santa Rosa, Berkeley, San Mateo Bayside, East Bay cities, Guadalupe River, Novato, Pinole, Suisun Creek, Benicia, Pittsburg, and Martinez watersheds, and Suisun Bay entire unit were excluded from the designation based on their potential economic impact (70 FR 52488). Primary constituent elements include: (1) freshwater spawning sites, (2) freshwater rearing sites, (3) freshwater migration corridors free of obstructions, (4) estuarine areas free of obstructions, and (5) nearshore marine areas free of obstructions (70 FR 52488).	Project is outside the designated Central California Coast ESU. Project is not located within critical habitat.	None
<i>Oncorhynchus mykiss irideus</i> Steelhead California Central Valley DPS	Fed: FT, CH CA: AFS-T	An anadromous fish that spend several years in the ocean; returning to freshwater rivers to spawn and rear. Listing includes all naturally spawned anadromous steelhead populations (and their progeny) below natural and manmade impassable barriers in the Sacramento and San Joaquin Rivers and their tributaries, excluding steelhead from San Francisco and San Pablo Bays and their tributaries, as well as two artificial propagation programs: the Coleman NFH, and Feather River Hatchery steelhead hatchery programs (70 FR 37160). Designated critical habitat encompasses 2,308 miles streams, 254 square miles estuary habitat in Tehama, Butte, Glenn, Shasta, Yolo, Sacramento, Solano, Yuba, Sutter, Placer, Calaveras, San Joaquin, Stanislaus, Tuolumne, Merced, Alameda, Contra Costa counties (70 FR 52488). The North Diablo Range watershed and South San Francisco Bay entire unit were excluded from the designation based on their potential economic impact (70 FR 52488). Primary constituent elements include: (1) freshwater spawning sites, (2) freshwater rearing sites, (3) freshwater migration corridors free of obstructions, (4) estuarine areas free of obstructions, and (5) nearshore marine areas free of obstructions (70 FR 52488).	Project is within the designated California Central Valley DPS. Suitable habitat present within the study area; however, species not reported from West Antioch Creek (Leidy 2007). Project is located within critical habitat.	Not expected

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Oncorhynchus tshawytscha</i> Chinook salmon Central Valley spring-run ESU	Fed: FT, CH CA: ST AFS-T	An anadromous fish that spends 1-3 years in the ocean and returns to perennial freshwater streams during the spring to spawn. ESU includes all naturally spawned populations of spring-run Chinook salmon in the Sacramento River and its tributaries to the Carquinez Strait, including the Feather River, as well as the Feather River Hatchery spring-run Chinook program (70 FR 37160). Juveniles rear in the Sacramento and San Joaquin Rivers and tributaries throughout the year. Designated critical habitat encompasses 1,158 miles streams, 254 square miles estuary habitat in Tehama, Butte, Glenn, Shasta, Yolo, Sacramento, Solano, Colusa, Yuba, Sutter, Trinity, Alameda, San Joaquin, and Contra Costa counties (70 FR 52488). The North Diablo Range and San Joaquin Delta watersheds and South San Francisco Bay entire unit were excluded from the designation based on their potential economic impact (70 FR 52488). Primary constituent elements include: (1) freshwater spawning sites, (2) freshwater rearing sites, (3) freshwater migration corridors free of obstructions, (4) estuarine areas free of obstructions, and (5) nearshore marine areas free of obstructions (70 FR 52488).	Project is outside the designated Central Valley spring-run ESU. Project is not located within critical habitat.	None
<i>Oncorhynchus tshawytscha</i> Chinook salmon Sacramento River winter-run ESU	Fed: FE, CH CA: SE AFS-E	An anadromous fish that spends 1-3 years in the ocean and returns to perennial freshwater streams during the winter to spawn. ESU includes all naturally spawned populations of winter-run Chinook salmon in the Sacramento River and its tributaries downstream to the Carquinez Strait, as well as two artificial propagation programs: winter-run Chinook from the Livingston Stone National Fish Hatchery (NFH), and winter run Chinook in a captive broodstock program maintained at Livingston Stone NFH and the University of California Bodega Marine Laboratory (70 FR 37160). Migrates up Sacramento River to spawn primarily upstream of Red Bluff. Juveniles rear in the Sacramento River throughout the year. Designated critical habitat includes the waterways, bottom and water of the waterways and adjacent riparian zones of the: (1) the Sacramento River from Keswick Dam in Shasta County to Chipps Island in the Sacramento-San Joaquin Delta; (2) all waters from Chipps Island west to Carquinez Bridge, including Honker Bay, Grizzly Bay, Suisun Bay and Carquinez Strait; (3) all waters of San Pablo Bay west of Carquinez Bridge; and (4) all waters of San Francisco Bay north of the San Francisco/Oakland Bay Bridge from San Pablo Bay to the Golden Gate Bridge (58 FR 33212).	Project is outside the designated Sacramento River winter-run ESU. Project is not located within critical habitat.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<u>AMPHIBIANS:</u>				
<i>Ambystoma californiense</i> California tiger salamander Central California DPS	Fed: FT, CH CA: ST	A large terrestrial salamander that inhabits seasonal/semi-permanent water sources (3-4 months in duration) and adjacent upland habitat with small fossorial mammal activity in lowland grasslands, oak savannah and mixed woodlands. Range includes the Central Valley and Central Coast ranges from Colusa County south to San Luis Obispo and Kern counties from sea level to 3,460 feet (1,054 meters) in elevation with two disjunct populations within Sonoma County and Santa Barbara County. Species have been documented traveling distances up to 1 mile (1.6 km) (Austin and Shaffer 1992). Designated critical habitat encompasses 199,109 acres in 20 counties and is grouped into 4 regions: Central Valley, Southern San Joaquin, East Bay and Central Coast (70 FR 49380). The East Bay Region includes Alameda County, south to Santa Benito and Santa Clara counties, and west to the eastern portions of San Joaquin and Merced counties (70 FR 49380). Primary constituent elements include: (1) standing bodies of fresh water that support inundation during winter rains and hold water for a minimum of 12 weeks in a year of average rainfall; (2) upland habitats adjacent and accessible to breeding ponds that contain small mammal burrows or other underground habitat; and (3) accessible upland dispersal habitat between occupied locations that allow for movement between such sites (70 FR 49380).	No suitable habitat present within the study area. Species not reported north of State Route 4; nearest reported occurrence 1.3 miles to the southeast (EONDX #45811). Project is not located within designated critical habitat.	None
<i>Rana draytonii</i> California red-legged frog	Fed: FT, CH CA: SSC	A medium-sized frog that inhabits lowlands & foothills in or near permanent sources of deep water with dense, shrubby or emergent riparian vegetation up to 4,921 feet (1,500 meters) in elevation (Jennings and Hayes 1994, Bulger et al. 2003, Stebbins 2003). Range extends from Redding to Baja California, Mexico with hybridization occurring with the California red-legged frog from the Oregon border to Marin County. Breeding occurs between November and April in standing or slow moving water with emergent vegetation, such as cattails (<i>Typha</i> spp.), tules (<i>Scirpus</i> spp.) or overhanging willows (<i>Salix</i> spp.) (Hayes and Jennings 1988). Larvae undergo metamorphosis 3 ½ to 7 months following hatching (Jennings and Hayes 1984, 1994). Designated critical habitat encompasses 1,636,609 acres in 20 counties and is grouped into 4 regions: Central Valley, Southern San Joaquin, East Bay and Central Coast (75 FR 12816). The East Bay Region includes Alameda County, south to Santa Benito and Santa Clara counties, and west to the eastern portions of San Joaquin and Merced counties (75 FR 12816). Primary constituent elements include: (1) aquatic breeding habitat; (2) non-breeding aquatic and riparian habitat; (3) Upland habitats associated with riparian and aquatic habitat; and (4) dispersal habitat that comprising accessible upland or riparian habitat within and between occupied or previously occupied sites that are located within 1 mi (1.6 km) of each other, and that support movement between such sites (75 FR 12816).	Suitable breeding and non-breeding aquatic habitat within study area in West Antioch Creek. Suitable upland and dispersal habitat within riparian corridor and adjacent ruderal grassland habitat types. Nearest reported occurrence located 1.8 to the southeast in Markley Canyon Creek in 2002 (EONDX #48404). No occurrences reported north of State Route 4; species unlikely to be present within study area. Project not located within critical habitat; approximately 1.6 miles north of the East San Francisco Bay core area and in the South and East San Francisco Bay recovery unit (USFWS 2002, 2006).	Possible

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
REPTILES:				
<i>Masticophis lateralis euryxanthus</i> Alameda whipsnake	Fed: FT, CH CA: ST	The Alameda whipsnake is a subspecies of the California whipsnake, <i>Masticophis lateralis</i> , which inhabits the foothills and mixed deciduous and pine forests of the Sierra Nevada and Coast Range mountains from Siskiyou County in northern California to the flatland desert in Cañon de Los Reyes in southern Baja California (Stebbins 2003). The Alameda whipsnake inhabits the inner Coast Ranges in western and central Contra Costa and Alameda counties (Jennings 1983, McGinnis 1992, Swaim 1994). Habitat fragmentation has restricted its range into five recognized subpopulations: Tilden-Briones population, Oakland-Las Trampas population, Hayward-Pleasanton Ridge population, Mount Diablo-Black Hills population, and Sunol-Cedar Mountain population. Designated critical habitat encompasses 154,834 acres in Alameda, Contra Costa and Santa Clara counties (71 FR 58176). Primary constituent elements include: (1) scrub/shrub communities with a mosaic of open and closed canopy; (2) woodland or annual grassland plant communities contiguous to lands containing PCE 1; and (3) lands containing rock outcrops, talus, and small mammal burrows within or adjacent to PCE 1 and or PCE 2 (71 FR 58176).	No suitable habitat present. The study area is located outside of the species' known range. Project is not located within designated critical habitat.	None
<i>Thamnophis gigas</i> Giant garter snake	Fed: FT, CH CA: ST	The most aquatic of California garter snakes, this species prefers freshwater marsh and low-gradient streams, and has adapted to drainage canals and irrigation ditches predominantly in the Central Valley.	The project is located outside the species' known range. Project is not located within designated critical habitat.	None
BIRDS:				
<i>Aquila chrysaetos</i> Golden eagle (nesting, wintering)	Fed: none CA: WL, FP BCC	A large diurnal raptor that nests on cliffs and in large trees in open areas. Forages in open terrain including grasslands, deserts, savannahs and early successional stages of forest and shrub habitats (Kochert et al. 2002). A year-round resident in the greater Bay Area. Breeding begins in February to late May; single-brooded (Baicich & Harrison 2005)	No suitable habitat present within the study area. The species is known to breed in western, central and southern Contra Costa County including the Antioch South quad (CCCBBA 2002, CDFW 2013a).	None
<i>Buteo swainsoni</i> Swainson's hawk (nesting)	Fed: none CA: ST ABC, BCC	A gregarious summer resident that inhabits open grasslands, shrublands, woodlands, and agricultural areas throughout the Central Valley and the valleys of the Sierra Nevada in Inyo and Mono counties (England et al. 1997). Nests are built in a variety of trees and shrubs; breeding occurs from March to August and are single brooded (Baicich & Harrison 2005).	The project is located outside of the species' known range. Confirmed nester in eastern Contra Costa County east of Antioch (CCCBBA 2002, CDFW 2013a).	None
<i>Charadrius alexandrinus nivosus</i> Western snowy plover (nesting)	Fed: FT, CH CA: SSC ABC, BCC	Inhabits beaches, mud flats, estuaries, salt evaporation ponds and inland river channels with banks for foraging. Breeds on sandy beaches, dunes, levees, river banks and dry salt evaporation beds along the California coastline typically in areas with minimal human disturbance. San Francisco Bay is within USFWS Recovery Unit 3 (USFWS 2007). Breeding begins in March; double-brooded (Baicich & Harrison 2005). Federal listing applies only to the Pacific coastal population that nests within 50 miles of the Pacific Ocean on the mainland coast, peninsulas, offshore islands, bays, estuaries, or rivers of the U.S. and Baja, CA; "Species of Special Concern" designation refers to both the coastal & interior populations (CDFG 2011, USFWS 2007).	No suitable nesting habitat present within the study area. Not located within designated critical habitat. Not known to breed in Contra Costa County (CCCBBA 2002).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Elanus leucurus</i> White-tailed kite (nesting)	Fed: none CA: FP	Inhabits grasslands, agriculture fields, oak woodlands, savannah and riparian habitats in rural and urban areas. Feeds primarily on California voles. Year-round resident of Central and Coastal California. Breeding begins in February; sometimes double-brooded (Baicich & Harrison 2005).	Suitable nesting habitat among mature trees in study area. A nesting pair was reported approximately 0.5 mile to the west in a willow adjacent to a pond in 1985 (EONDX #6395). The species is known to breed throughout all of Contra Costa County (CCCBBA 2002).	Possible
<i>Falco peregrinus anatum</i> American peregrine falcon (nesting)	Fed: Delisted CA: Delisted FP BCC	Typically a year-round resident in California and most common along the coast. Nests on cliffs, but frequently uses man-made structures such as bridges and buildings. Nests are generally located close to water bodies with abundant avian prey. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	No suitable nesting habitat present within the study area. No reported occurrences within 20 miles of the study area (CDFW 2013a). Confirmed breeder in central Contra Costa County (CCCBBA 2002, CDFW 2013a).	None
<i>Laterallus jamaicensis coturniculus</i> California black rail	Fed: none CA: ST, FP ABC, BCC	Smallest of the rails; inhabits tidal marshes, freshwater wetlands and marshes. Wintering habitat similar to breeding habitat. A year-round resident of the San Francisco Bay Area. Breeding begins in March; sometimes double-brooded (Baicich & Harrison 2005).	Suitable tidally influenced marshland habitat present within the study area. Species reported approximately 2.3 miles to the northwest (EONDX #69045). Reported as a possible breeder in northern Contra Costa County (CCCBBA 2002).	Possible
<i>Pelecanus occidentalis californicus</i> California brown pelican (nesting colony & communal roosts)	Fed: Delisted CA: Delisted FP	One of six recognized subspecies. Inhabits coastal waters and shoreline along the California Coast and San Francisco Bay. Nests on small isolated coastal islands in colonies off the shore of Southern California south to Baja California, Mexico. Non-breeding distribution extends north along the coast to British Columbia, Canada. Breeding occurs between February and July; single-brooded (Baicich & Harrison 2005).	No shoreline nesting habitat present within the study area. Not known to breed in Contra Costa County (CCCBBA 2002).	None
<i>Rallus longirostris obsoletus</i> California clapper rail	Fed: FE CA: SE, FP ABC	One of four subspecies from the obsoletus group, restricted to the San Francisco Bay Area. Inhabits coastal wetlands dominated by pickleweed (<i>Salicornia</i> spp.) and cordgrass (<i>Spartina</i> spp.). Wintering habitat similar to breeding habitat. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Suitable tidally influenced marshland habitat present within the study area. Nearest occurrence located 9.3 miles to the west (CDFW 2013a). Species not reported west of Bay Point in northern Contra Costa County. Not known to breed in northern Contra Costa County (CCCBBA 2002).	Not expected
<i>Riparia riparia</i> Bank swallow (nesting)	Fed: none CA: ST	Nests in colonies in vertical banks with friable soils. Breeds from April to August. Most of California's nesting colonies occur along the upper Sacramento River. Breeding begins in April; double-brooded (Baicich & Harrison 2005).	No suitable habitat present within the study area. Not reported in the project vicinity (CDFW 2013a). Not known to breed in Contra Costa County (CCCBBA 2002).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Sternula antillarum brownii</i> California least tern (nesting colony)	Fed: FE CA: SE, FP ABC	Breeds in colonies on bare soil, sand and mudflats along the California coast and the San Francisco Bay Area. Winters south to Mexico. Breeding begins in May; single-brooded (Baicich & Harrison 2005).	No suitable habitat present within the study area. Nearest occurrence located 5 miles to the west in Pittsburg (CDFW 2013a). Confirmed breeding in westernmost Contra Costa County (CCCBBA 2002).	None
<i>Strix occidentalis caurina</i> Northern spotted owl	Fed: FT CA: SSC ABC	Inhabits coniferous forests from western British Columbia to the San Francisco Bay. In California owls inhabit Douglas fir mixed conifer and coastal redwood forests. Requires moderate to high canopy cover with sufficient large dead or dying trees/snags and abundant arboreal or semiarboreal prey base. Breeding begins in April; single-brooded.	No suitable habitat present within the study area. Outside of species known range. No suitable habitat present within the study area. Not known to breed in Contra Costa County (CCCBBA 2002).	None
<u>MAMMALS:</u>				
<i>Reithrodontomys raviventris</i> Salt-marsh harvest mouse	Fed: FE CA: SE, FP	A small endemic, pickleweed (<i>Salicornia</i> spp.) obligate species of tidal marshes of the San Francisco Bay Area. Requires adjacent upland tidal zones for escape cover during floods. Two recognized subspecies, <i>R. r. halicoetes</i> that inhabits San Pablo and Suisun bays and <i>R. r. raviventris</i> that inhabits the South San Francisco Bay including Corte Madera and Richmond marshes.	No suitable tidal marsh pickleweed habitat with within the study area. Tidal marsh habitat is dominated by tules and cattails, unsuitable for species. Species reported from pickleweed dominated marsh habitat 1,600 feet west of the study area in 1985 (EONDX #23862).	Not expected
<i>Vulpes macrotis mutica</i> San Joaquin kit fox	Fed: FE CA: ST	The smallest North American canid, the kit fox inhabits valley bottom and foothills from southern Kern County north to Contra Costa, Alameda, and San Joaquin Counties on the west, and near La Grange, Stanislaus County on the east side of the Central Valley and some of the larger scattered islands of natural land on the Valley floor in Kern, Tulare, Kings, Fresno, Madera, and Merced Counties (USFWS 1998). Species occupies habitats with open or low vegetation with loose soils. In the northern portion of their range, they occupy grazed grasslands and to a lesser extent valley oak woodlands (USFWS 1998). Kit fox are also found in grazed grasslands including areas adjacent to tilled or fallow fields, and suburban settings (USFWS 1998). Requires loose-textured sandy soils for burrowing, and a suitable prey base.	No suitable habitat present within the study area. Outside of species known range.	None
<u>SENSITIVE AND LOCALLY RARE SPECIES</u>				
<u>INVERTEBRATES:</u>				
<i>Andrena blennospermatis</i> Blennospermatis vernal pool Andrenid bee	Fed: None CA: SA	A native solitary bee that specializes in pollinating yellow carpet (<i>Blennosperma</i> spp.) within vernal pools. These bees inhabit the soils in adjacent uplands surrounding vernal pools.	No suitable habitat present within the study area. Study area lacks vernal pools; <i>Blennosperma</i> spp. host plant absent.	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Anthicus antiochensis</i> Antioch Dunes anthicid beetle	Fed: None CA: SA	Inhabits stabilized riverine sand dunes. Reported from Contra Costa, Solano, Glenn, Tehama, Sutter, and Shasta counties. Antioch Dunes local reported in 1953 is considered extirpated.	No stabilized riverine sand dune habitat within the study area. One reported occurrence (EONDX 6190) from Antioch Dunes dating back to 1953; thought to be extirpated (CDFW 2013a).	None
<i>Anthicus sacramento</i> Sacramento anthicid beetle	Fed: None CA: SA	A beetle measuring 3.18-3.63 mm in length that resembles ants in appearance. Interior sand dunes and sand bars. Species has also been reported from sandy dredge spoil heaps. Distributed along the Sacramento and San Joaquin rivers, from Shasta to San Joaquin counties. Feeds primarily on dead insects; larvae are scavenger feeders and fungivores.	Suitable sandy riverine habitat along West Antioch Creek. Species not reported from Contra Costa County; occurrence data is limited (CDFW 2013a).	Not expected
<i>Branchinecta mesovallensis</i> Midvalley fairy shrimp	Fed: None CA: SA	Endemic to the Central Valley vernal pools and artificial habitats such as roadside ditches and railroad toe-drains. Restricted to the Southeastern Sacramento, Southern Sierra Foothill, San Joaquin, and Solano-Colusa Vernal Pool regions (USFWS 2005). Inhabits vernal pools and grassy swales; species tolerant of warm water and extremely short-lived pools/swales (USFWS 2005). Reported from Jepson Prairie, Travis Air Force Base, Mather Field, Byron Airport, Haystack Mountain, Arena Plains National Wildlife Reserve in Solano, Sacramento, Contra Costa, San Joaquin, Merced, Madera and Fresno counties. May co-occur with vernal pool fairy shrimp (USFWS 2005).	No suitable vernal pool/vernal swale habitat present within the study area. Nearest reported occurrence (EONDX 48372) ~12 miles to the southeast near Marsh Creek Road on an unspecified date (CDFW 2013a).	None
<i>Coelus gracilis</i> San Joaquin dune beetle	Fed: None CA: SA	An endemic darkling beetle of California and Baja California, Mexico. This small nocturnal, flightless sand burrowing beetle inhabits coastal dune scrub with herbaceous plants and sandy soils. Primarily found under vegetation or vegetative debris in the fore-dunes and sand hummocks from Santa Cruz to San Diego counties.	No coastal dune scrub habitat within the study area. One reported occurrence (EONDX 22743) from Antioch Dunes dating back to 1974; thought to be extirpated (CDFW 2013a).	None
<i>Dumontia oregonensis</i> Hairy water flea	Fed: None CA: SA	A freshwater flea with primitive anomopod characteristics discovered in 1998 from the Agate Desert Preserve, Whetstone Savannah Preserve and Denman Wildlife Area in Oregon. Inhabits freshwater pools and vernal pools. Recorded from two locations in California: Mather Field in Sacramento County and Travis Air Force Base in Solano County.	No suitable freshwater pool or vernal pool habitat present within study area. Species not recorded from Contra Costa County.	None
<i>Efferia antiochi</i> Antioch efferian robberfly	Fed: None CA: SA	Inhabits sand dunes. Recorded from Contra Costa and Fresno counties.	No sand dune habitat within the study area. One reported occurrence (EONDX 6191) from Antioch Dunes dating back to 1981; presumed extant (CDFW 2013a).	None
<i>Eucerceris ruficeps</i> Redheaded sphecid wasp	Fed: None CA: SA	Inhabits interior sand dunes. Recorded from Contra Costa, Stanislaus, and Fresno counties.	No sand dune habitat within the study area. One reported occurrence (EONDX 60286) from Antioch Dunes in 1979; presumed extant (CDFW 2013a).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Helminthoglypta nickliniana bridgesi</i> Bridges' coast range shoulderband (snail)	Fed: None CA: SA	Inhabits open hillsides in Alameda and Contra Costa counties and lowland grassland areas with thistles, weeds and rock piles. The Bridges' Coast Range shoulderband snail range include Contra Costa County and northern Alameda Counties, as well as on the west slope of the Berkeley Hills, Marsh Creek Canyon, Tilden Park and Point Isabel (Roth 1999).	Suitable habitat present within ruderal grassland areas in the study area. Observed from Oakley-Trembath Flood Detention Basin 2.5 miles to the east (Nomad 2010).	Possible
<i>Hygrotus curvipes</i> Curved-foot hygrotus diving beetle	Fed: None CA: SA	Inhabits small ponds, roadside ditches, vernal wetlands, and pools in intermittent streams, most of which support alkali-tolerant vegetation and dry up during the summer. Known from western margin of San Joaquin Valley, from Oakley in Contra Costa County south through Alameda County	No suitable habitat within study area. Nearest reported occurrence (EONDX 7180) 6 miles to the east comprising four individuals collected and stored at California Academy of Sciences (CDFW 2013a).	None
<i>Idiostatus middlekauffi</i> Middlekauff's shieldback katydid	Fed: None CA: SA	Only reported from one location in California, the Antioch Dunes in 1965. Although none have been reported since then, the species is considered to be extant.	No suitable interior dunes habitat present within the study area. Nearest reported occurrence (EONDX 6192) from Antioch Dunes in 1965; presumed extant (CDFW 2013a).	None
<i>Linderiella occidentalis</i> California linderiella	Fed: None CA: SA	An aquatic crustacean in the Anostroca family smaller than the vernal pool fairy shrimp with distinctive red eyes. Inhabit clear large vernal pools and lakes, but are fairly tolerant of high water temperatures and turbidity. Most common fairy shrimp in the Central Valley.	Study area lacks vernal pools and playa pools. Species reported approximately 1 mile west along access road by railroad tracks in 1999 (EONDX #41661).	Not expected
<i>Lytta molesta</i> Molestan blister beetle	Fed: None CA: SA	Inhabits dry vernal pools from host plants including <i>Lupinus</i> spp. (Halstead and Haines 1992), <i>Trifolium wormskioldii</i> (Holstein 1980), and <i>Eriodium</i> spp. (Selander 1960). Size varies from 11-22 mm in length. Identified by black coloration with orange markings on the thorax. The larvae are nest parasites of solitary bees. Recorded from Tulare, Kern, Yolo, Contra Costa, Fresno, Merced, and Madera counties.	No dry vernal pool habitat present within the study area. Nearest reported occurrence (EONDX 12876) from Brentwood in 1945; presumed extant (CDFW 2013a).	None
<i>Metapogon hurdi</i> Hurd's metapogon robberfly	Fed: None CA: SA	Predaceous fly that feeds on other insects. Type locality from Antioch; paratypes collected from unspecified location near Fresno in 1922.	Habitat and prey species requirements unknown. Habitat suitability within study area unknown. Species not reported since 1975 (CDFW 2013a).	Not expected
<i>Myrmosula pacifica</i> Antioch multilid wasp	Fed: None CA: SA	Inhabits sandy areas. Recorded from Yolo, Contra Costa and Inyo counties.	No sand dune habitat within the study area. Nearest reported occurrence (EONDX 6186) from Antioch Dunes in 1952; presumed extant (CDFW 2013a).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Perdita scitula antiochensis</i> Antioch andrenid bee	Fed: None CA: SA	Inhabits sand dunes associated with buckwheat (<i>Eriogonum</i> spp.), snakeweed (<i>Gutierrezia</i> spp.), Lessingia (<i>Lessingia glandulifera</i>), and golden-aster (<i>Heterotheca</i> spp.). Recorded from only two locations in eastern Contra Costa County.	No sand dune habitat within the study area. Nearest reported occurrence (EONDX 6187) from Antioch Dunes in 1977; presumed extant (CDFW 2013a).	None
<i>Philanthus nasalis</i> Antioch spicid wasp	Fed: None CA: SA	Inhabits sand dunes. Species has been extirpated from the only known location in Contra Costa County, but has been recorded more recently in Santa Cruz County in association with cudweed [<i>Pseudognaphalium</i> (= <i>Gnaphalium</i>) <i>beneolens</i>], <i>Gnaphalium</i> "zayanteense" and Ben Lomond buckwheat (<i>Eriogonum nudum decurrens</i>) species.	No sand dune habitat within the study area. One reported occurrence (EONDX 6188) from Antioch Dunes in 1959; extirpated (CDFW 2013a).	None
<i>Sphecodogastra antiochensis</i> Antioch Dunes halcetid bee	Fed: None CA: None Xerces-CI	Only reported from one location in California, the Antioch Dunes in 1982. Species is considered to be extant.	No sand dune habitat within the study area. Nearest reported occurrence (EONDX 59332) from Antioch Dunes in 1982; presumed extant (CDFW 2013a).	None
FISH:				
<i>Archoplites interruptus</i> Sacramento perch (within native range only)	Fed: none CA: SSC AFS-T	Historically found in the sloughs, slow-moving waters, and lakes of the Central Valley; prefers warm water, aquatic vegetation is essential for young. Extant native populations restricted to the Sacramento-San Joaquin Delta, Pajaro and Salinas River drainages, and Clear Lake.	Study area is outside the species' native range. Species not known to occur in Marsh Creek or its tributaries. Species reported as extinct in the March, Walnut and San Ramon creeks watersheds (Leidy 2007).	None
<i>Oncorhynchus tshawytscha</i> Chinook salmon Central Valley fall/late fall-run ESU	Fed: SC CA: SSC AFS-V	An anadromous fish that spends 1-3 years in the ocean and returns to perennial freshwater streams during the winter to spawn. The ESU includes all naturally spawned populations of fall-run Chinook salmon in the Sacramento and San Joaquin River Basins and their tributaries, east of Carquinez Strait, California (69 FR 19975). The Central Valley fall/late fall-run ESU refers to populations spawning in the Sacramento & San Joaquin Rivers and their tributaries; "Species of Special Concern" designation refers only to the fall-run (69 FR 19975).	Project is within the designated ESU. Suitable habitat present within the study area; however, species not reported from West Antioch Creek (Leidy 2007).	Not expected
<i>Pogonichthys macrolepidotus</i> Sacramento splittail	Fed: none CA: SSC AFS-V	Endemic to the lakes and rivers of the Central Valley, but now confined to the Delta, Suisun Bay, lower Napa River, lower Petaluma River, the San Francisco Estuary and associated marshes (Moyle 2002). Inhabits slow-moving river sections, dead-end sloughs; requires flooded vegetation for spawning and foraging for young. Spawning occurs from late February to early July; peaking March through April (Moyle 2002). Yolo and Sutter bypasses are important spawning grounds for this species (Moyle 2002).	Suitable habitat present within study area. Species reported from Delta, Marsh Creek and Walnut/San Ramon Creek; not reported from West Antioch Creek (Leidy 2007). No in-stream barriers to movement between study area and San Joaquin River.	Possible

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<u>AMPHIBIANS:</u>				
<i>Rana boylei</i> Foothill yellow-legged frog	Fed: none CA: SSC	A medium-sized frog that inhabits rocky, cascading streams in woodland, chaparral and coniferous forests from the Oregon border to San Luis Obispo County and the western foothills of the Sierra Nevada below 6000 feet.	No suitable habitat present within the study area. Species does not inhabit low-grade streams with silty substrates.	None
<u>REPTILES:</u>				
<i>Anniella pulchra pulchra</i> Silvery legless lizard	Fed: none CA: SSC	A small legless lizard measuring up to 7 inches in length with shovel-shaped nose and blunt tail. Displays distinct coloration: a bright silver dorsal surface with a yellowish underbelly and a single black dorsal stripe. Feeds on a variety of insects, beetles, and arachnids. Inhabits sandy or loose loamy soils and leaf litter from Contra Costa County to northwestern Baja.	Areas of sandy soils present in floodplain within the study area; area subject to annual flooding. Nearest reported occurrence (EONDX 74654) from Antioch Dunes in 1966; presumed extant (CDFW 2013a).	Not expected
<i>Emys marmorata</i> Western pond turtle	Fed: none CA: SSC	A moderate sized freshwater turtle that inhabits permanent or nearly permanent bodies of water and low gradient slow moving streams below 6,000 feet elevation. Range extends from Washington to the northern Bay Area counties along the Pacific slope drainages. Two recognized subspecies the northwestern pond turtle (<i>E. m. marmorata</i>) which ranges north of the American River and the southwestern pond turtle (<i>E. m. pallida</i>) which ranges from the coastal areas south of San Francisco. Subspecies interbreed within the gradation zone that defines the two subspecies.	Suitable habitat present within study area. Two individuals observed during April 23, 2009 site visit. Suitable aquatic and basking habitat present.	Possible
<i>Phrynosoma blainvillii</i> Coast horned lizard	Fed: none CA: SSC	A dorsoventrally flattened lizard with several spiny dorsal scales and backward projecting spines on the head. Inhabits a variety of habitats including scrub, chaparral, grasslands and woodlands with sandy to gravelly substrate from Shasta County to Los Angeles County within the Sacramento and San Joaquin Valleys and neighboring foothills. Active from April-October, peaking in April/May. Diet consists of native ants and beetles, but may also feed on other insects that are seasonally abundant.	No suitable habitat present within the study area. Two reported occurrences (EONDX 48126, 66137) from Mt. Diablo in 2002 and 2005 (CDFW 2013a).	None
<u>BIRDS:</u>				
<i>Accipiter cooperii</i> Cooper's hawk (nesting)	Fed: none CA: WL	Inhabits dense stands of oak woodlands, riparian deciduous forests, or other forest habitats often near water & suburban areas. Hunts in broken woodlands & along forest edges. Breeding begins in April; single-brooded (Baicich & Harrison 2005).	Juvenile observed in dead Willow in the study area during April 23, 2013 site visit. Suitable nesting habitat is present among mature trees in study area (CDFW 2013a). Confirmed breeder in western and central Contra Costa County (CCCBBA 2002).	Possible

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Accipiter striatus</i> Sharp-shinned hawk (nesting)	Fed: none CA: WL	Inhabits north-facing slopes in conifers, including ponderosa pine, black oak, & Jeffrey pines, preferably in riparian areas. Forages primarily for small birds along woodland edges & openings, hedgerows, brushy pastures, & shorelines. Breeding begins in April; single-brooded (Baicich & Harrison 2005).	Suitable nesting habitat is present among mature trees in study area (CDFW 2013a). Confirmed breeder in western and southern Contra Costa County, but not reported to nest in northern portion of the county (CCCBBA 2002).	Not expected
<i>Agelaius tricolor</i> Tricolored blackbird (nesting colony)	Fed: none CA: SSC ABC, BCC	Highly colonial species, most numerous in central valley & vicinity. Largely endemic to California. Nest in emergent vegetation within aquatic and riparian habitats. Breeds from mid-March through early August; double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Suitable habitat present in permanent wetland in study area. Confirmed breeder in southern Contra Costa County; no breeding records in northern Contra Costa County (CCCBBA 2002, CDFW 2013a).	Possible
<i>Ammodramus savannarum</i> Grasshopper sparrow (nesting)	Fed: none CA: SSC	An inconspicuous sparrow that inhabits moderately open grasslands and prairies with patchy bare ground, cultivated fields and forest clearings with short to moderately tall grasses and scattered shrubs (Vickery 1996, Baicich & Harrison 2005, Shuford and Gardali 2008). Areas with native bunchgrasses are important features in southern California (Shuford and Gardali 2008). Breeds from mid-March through August; double or treble-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Marginal nesting habitat in ruderal grassland within the study area. No reported occurrences within 20 miles of the study area (CDFW 2013a). Confirmed breeder in western Contra Costa County (CCCBBA 2002, CDFW 2013a).	Not expected
<i>Ardea herodias</i> Great blue heron (rookery site)	Fed: none CA: SA	A large wading bird that inhabits a variety of aquatic habitats including shores, tideflats, marshes, swamps, ponds, lakes, rivers and streams. Nests colonially in large trees near water bodies. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Marginally suitable rookery habitat present among mature trees within the study area. No nest structures observed in study area. Known to breed in western, northern and eastern Contra Costa County (CCCBBA 2002).	Not expected
<i>Asio flammeus</i> Short-eared owl (nesting)	Fed: none CA: SSC ABC	Inhabits open grasslands, prairies, marshes and agricultural fields with sufficient vegetative cover and abundant small mammal prey. Nests on the ground in a shallow depression. Breeds in Great Basin, Sacramento-San Joaquin Delta, San Joaquin Valley, and isolated areas along the southern California Coast (Shuford and Gardali 2008). Breeds from March through July; single-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Suitable nesting present in permanent wetland in study area. Reported as a possible breeder from one location along the Carquinez shoreline in northern Contra Costa County (CCCBBA 2002).	Possible
<i>Athene cunicularia</i> Burrowing owl (burrow sites & some wintering sites)	Fed: none CA: SSC BCC	Valley bottoms and foothills with low vegetation and fossorial mammal activity. Listing includes wintering observations with/without a burrow in San Francisco, Ventura, Sonoma, Marin, Napa and Santa Cruz counties. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Suitable habitat present within the study area. Ground squirrel activity in ruderal grassland lot in study area that could be used for nesting. Several occurrences reported within five miles (CDFW 2013a). Confirmed breeder in eastern Contra Costa County (CCCBBA 2002, CDFW 2013a).	Possible

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Baeolophus inornatus</i> Oak titmouse (nesting)	Fed: none CA: SA ABC	Primarily an oak obligate species, the oak titmouse inhabits oak woodlands, oak savannahs, piñon and juniper woodlands and occasionally suburban areas with oaks. Year-round resident throughout much of California. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Suitable nesting habitat among mature trees within study area. Confirmed breeder throughout all of Contra Costa County (CCCBBA 2002).	Possible
<i>Buteo regalis</i> Ferruginous hawk (wintering)	Fed: none CA: WL BCC	Breeds in the northern states and Canada; winters south from California and Texas to Mexico. Wintering habitat consists of open grasslands, deserts and cultivated fields. Breeding begins in April; single-brooded (Baicich & Harrison 2005).	No suitable wintering habitat within the study area. Known to winter in Contra Costa County (EONDX 66098, 72123, 72124) (CDFW 2013a).	None
<i>Charadrius montanus</i> Mountain plover	Fed: none CA: SA ABC, BCC	Breeds east of the Rocky Mountains in the high plains and winters in low elevation interior valleys and plains of the Sacramento and San Joaquin Valleys, inner portion of the San Francisco Bay region, and south to Imperial Valley (Shuford and Gardali 2008). Winters between September to mid-March in short grass prairies, alkali flats, heavily grazed grasslands, burned fields, and playa habitats with low to absent vegetation (Shuford and Gardali 2008).	No suitable habitat present in the study area. No occurrences within the study area (CDFW 2013a). No reported breeding occurrences in Contra Costa County (CCCBBA 2002).	None
<i>Circus cyaneus</i> Northern harrier (nesting)	Fed: none CA: SSC	Inhabits both freshwater and saltwater marshes and adjacent upland grasslands. Nests on the ground in tall grasses in grasslands and meadows. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Suitable nesting habitat present in permanent wetland. Species observed on site. Confirmed breeder in northern and eastern Contra Costa County (CCCBBA 2002, CDFW 2012).	Possible
<i>Dendroica petechia brewsteri</i> Yellow warbler (nesting)	Fed: none CA: SSC BCC	Nests in dense, shrubby thickets dominated by willows along water courses and wet meadows. Builds nests in a variety of riparian trees, most commonly willows (<i>Salix</i> spp.) and cottonwoods (<i>Populus</i> spp.). Occasionally breeds in mixed-conifer forests with shrubby understories (Shuford and Gardali 2008). Breeds from April to late July; sometimes double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	No suitable dense, shrubby nesting habitat present in the study area. Confirmed breeder in western, and possible breeder in eastern, Contra Costa County (CCCBBA 2002).	None
<i>Geothlypis trichas sinuosa</i> Saltmarsh common yellowthroat	Fed: none CA: SSC BCC	Year-round resident of the San Francisco Bay Area. Inhabits dense vegetation in wetlands, marshes, estuaries, prairies and riparian areas of San Francisco and San Pablo bays, and along the coastal areas of Marin, San Francisco, and San Mateo counties (Shuford and Gardali 2008). Breeds from mid-March to late July; double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Suitable nesting habitat present in permanent wetland. Confirmed breeder in northwestern Contra Costa County (CCCBBA 2002, CDFW 2013a). Four reported occurrences 2 miles to the northwest on Browns Island and Sherman Island in 2004 (CDFW 2013a).	Possible

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Icteria virens</i> Yellow-breasted chat (nesting)	Fed: none CA: SSC	A large, secretive wood warbler that inhabits early successional riparian area, pond margins, marshes, hedgerows, old pastures and edge habitats with dense shrub understories and an open canopy (Shuford and Gardali 2008). Occurs in forests especially regenerating burned and logged areas (Eckerle and Thompson 2001, Baicich & Harrison 2005). Distributed throughout northern California and the Central Valley. Nests in dense shrubs up to eight feet in height; breeds from late April through early August; double-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Suitable nesting habitat present in permanent wetland. Confirmed nester in northern Contra Costa County (CCCBBA 2002a).	Possible
<i>Lanius ludovicianus</i> Loggerhead shrike (nesting)	Fed: none CA: SSC BCC	Year-round resident in California. Inhabits shrublands and open woodlands associated with grasslands with areas bare ground and impaling sites such as thorny vegetation, multi-stemmed plants or barbed wire (Shuford and Gardali 2008). Breeds from early February through July; double- to triple-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	Suitable nesting habitat within the study area. Confirmed breeder in northern, eastern, central and southern Contra Costa County (CCCBBA 2002).	Possible
<i>Melospiza melodia maxillaris</i> Suisun song sparrow	Fed: none CA: SSC BCC	A medium-sized sparrow that inhabits marshes containing cattails, tules, and other sedges, and <i>Salicornia</i> ; also known to frequent tangles bordering sloughs. One of four subspecies in the San Francisco Bay Area. Endemic to the Suisun Marsh tidal marshlands from the Carquinez Strait to Sherman Island and Big Break (Shuford and Gardali 2008). Breeding begins in April; often treble-brooded (Baicich & Harrison 2005).	Suitable nesting habitat present in permanent wetland. Within subspecies known range (Shuford and Gardali 2008). Confirmed nester in the Suisun Bay tidal marshlands of northern Contra Costa County (CCCBBA 2002, CDFW 2013a).	Possible
<i>Phalacrocorax auritus</i> Double-crested cormorant (rookery site)	Fed: none CA: WL	Rookery sites are located near large water bodies and on small islands, shorelines, and cliff ledges. Nest consists of a structure of twigs and plant material in a tree or tall manmade structures. Breeding begins in early March to mid-June; single-brooded (Baicich & Harrison 2005).	No suitable rookery sites present within the study area. One recorded occurrence (EONDX 27030) of nests found on utility towers on Sherman Island in 1988; no other occurrences within a 10-mile radius of study area (CDFW 2013a).	None
<i>Picoides nuttallii</i> Nuttall's woodpecker (nesting)	Fed: none CA: ABC BCC	Inhabits oak woodland and mixed riparian woodlands. Forage along bark of trees for insects; also feeds on acorns. Cavity nester. Breeding begins in March; single-brooded (Baicich & Harrison 2005).	Suitable nesting habitat among mature trees within study area. Confirmed breeder in all of Contra Costa County (CCCBBA 2002).	Possible
<i>Progne subis</i> Purple martin (nesting)	Fed: none CA: SSC	Nests in tall, old trees near a body of water in open forests, woodlands, & riparian habitats. Forages in valley foothills, meadows, grasslands, montane hardwood, riparian habitats, closed-cone pine-cypress, ponderosa pine, Douglas fir, & redwood forests. Breeds from May to mid-August; primarily single-brooded (Baicich & Harrison 2005, Shuford and Gardali 2008).	No suitable nesting habitat is present within the study area. No reported occurrences within Contra Costa County (CDFW 2013a); species is not known to breed in Contra Costa County (CCCBBA 2002).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Selasphorus sasin</i> Allen's hummingbird (nesting)	Fed: none CA: BCC ABC	Inhabits a variety of woodland and scrub habitats. Breeds in a variety of habitats including moist coastal areas, scrub, chaparral and woodlands. Breeding begins in February; double-brooded (Baicich & Harrison 2005).	Suitable nesting habitat is present among trees and shrubs within the study area. Confirmed breeder in western and central Contra Costa County; not reported from northern portion of county (CCCBBA 2002).	Not expected
<u>MAMMALS:</u>				
<i>Antrozous pallidus</i> Pallid bat	Fed: none CA: SSC WBWG-H	Inhabits rocky terrain in open areas in lowlands, foothills and mountainous areas near water throughout California below 2,000 meters. Roost in caves, rock crevices, mines, hollow trees, buildings and bridges in arid regions in low numbers (<200). Active from March-November; migrates in some areas, but may hibernate locally.	Marginal roost habitat present in trees and snags within study area. Suitable foraging habitat in study area. Nearest reported occurrence (EONDX #66593) 9 miles to west (CDFW 2013a).	Not expected
<i>Bassariscus astutus</i> Ringtail	Fed: none CA: FP	A small, nocturnal carnivore that feeds on arthropods, mammals including <i>Neotoma</i> spp., and some fruits. Inhabits a variety of areas from riparian, montane and coniferous woodlands, chaparral, desert and tropical habitats with rocky outcroppings, canyons, or talus slopes near open water up to 1,400 meters (Poglayen-Neuwall and Toweill 1988). Breeding season occurs from February to May. Dens in rocky areas in crevices, tree hollows, dens made by other animals, and manmade structures in rural /suburban areas; relocates to new denning site every few days.	No suitable habitat within study area. No occurrences reported in the region (CDFW 2013a).	None
<i>Corynorhinus townsendi</i> Townsend's western big-eared bat	Fed: none CA: SSC WBWG-H	An obligate cave rooster and moth specialist. Inhabits caves and mines, but may also use bridges, buildings, rock crevices and tree hollows in coastal lowlands, cultivated valleys and nearby hills characterized by mixed vegetation throughout California below 3,300 meters. Exhibits high site fidelity and is highly sensitive to disturbance. Forages along edge habitats near water; may travel long distances during foraging bouts.	No suitable roost habitat present in study area. Known from Mt. Diablo (CDFW 2013a).	None
<i>Dipodomys heermanni berkeleyensis</i> Berkeley kangaroo rat	Fed: none CA: SA	Inhabits open grass hilltops and open spaces in chaparral and blue oak/digger pine woodlands; needs fine, deep, well-drained soils for burrowing. Past collections of the species have been made in the vicinity of Mount Diablo, the Berkeley Hills, Strawberry Canyon, Orinda Park Pool, Calaveras Reservoir, and Siesta Valley. More recent – and as-yet unconfirmed – kangaroo rat occurrences have been reported in the Sunol Valley Regional Wilderness well within the species recognized range. Populations in the vicinity of the Berkeley Hills are considered extirpated due to predation by domestic cats.	No suitable habitat within the study area. One reported occurrence (EONDX 24074) from Mt. Diablo dating back to 1936 (CDFW 2013a).	None
<i>Lasiurus blossevillii</i> Western red bat	Fed: none CA: SSC WBWG-H	Primarily associated with intact riparian habitat; species is ubiquitous throughout most of California except the northern Great Basin region. Roosts individually in foliage within trees along riparian areas, orchards and suburban areas. Favors cottonwoods, willows, sycamores, and walnut trees (Bolster 2005). Feeds primarily on moths, but will eat a variety of other insects.	No suitable intact riparian roosting habitat present within study area. One occurrence (EONDX #69704) reported from a non-specific location in Antioch (CDFW 2013a).	None

SPECIES NAME COMMON NAME	LISTING STATUS ¹	HABITAT REQUIREMENTS & ADDITIONAL NOTES	HABITAT SUITABILITY & LOCAL DISTRIBUTION	OCCURRENCE POTENTIAL
<i>Lasiurus cinereus</i> Hoary bat	Fed: none CA: SA WBWG-M	Ubiquitous throughout California. A solitary foliage rooster that prefers evergreens, but will use deciduous trees in forested habitats, particularly in edge habitat (Bolster 2005). May forage in small to large groups. Feeds primarily on moths, but will eat a variety of other insects. Migrates great distances.	No evergreen roosting habitat present within the study area. One recorded occurrence (EONDX 69700) in Brannan Island State Recreation Area, Sacramento County, 9 miles to the northeast in 1999 (CDFW 2013a).	None
<i>Myotis yumanensis</i> Yuma myotis bat	Fed: none CA: SA WBWG-LM	A riparian obligate species. Ubiquitous throughout California. Inhabits riparian areas near permanent water sources. Roosts in a variety of habitats including bridges, buildings, caves, mines, cliff crevices and trees. Forages above water and in riparian areas.	No suitable intact riparian roosting habitat present within study area. No occurrences reported from Contra Costa County (CDFW 2013a).	None
<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	Fed: none CA: SA	Endemic to California. Inhabits grasslands and blue oak woodlands with friable soils in the foothills and valley bottoms of the Central Valley from the Marysville Buttes to the Corrizo Plain. Eats insects and seeds of various grasses, forbs and shrub including <i>Artemisia</i> and <i>Atriplex</i> spp., has fur-lined cheek pouches, and experiences daily torpor. Breeding occurs from March to July; two litters are typical (Jameson and Peeters 2004).	No suitable habitat present within the study area. Three reported occurrences within 5 miles in foothills to the south (CDFW 2013a).	None
<i>Sorex ornatus sinuosus</i> Suisun shrew	Fed: none CA: SSC	Inhabits tidal marshes of the northern shores of San Pablo Bay, Suisun Bay, and Grizzly Island; requires dense low-lying cover and drift-weed and other litter above the mean high tide line for nesting and foraging. Breeding occurs from late February to early June; one to two litters annually (Jameson and Peeters 2004).	Outside species known range. Species does not occur on southern shores of the delta (CDFW 2013a).	None
<i>Taxidea taxus</i> American badger	Fed: none CA: SSC	A large mustelid that inhabits open areas with friable soils within woodland, grassland, savannah and desert habitats. A fossorial mammal that preys predominately on ground squirrels (<i>Ammospermophilus</i> and <i>Spermophilus</i> spp.) and pocket gophers (<i>Thomomys</i> spp.). Mating occurs in late summer; young are born in March and April (Jameson and Peeters 2004).	No suitable habitat present within the study area. Nearest reported occurrence is greater than 5 miles in the foothills to the south (CDFW 2013a).	None

¹ Explanation of State and Federal Listing Codes

Federal listing codes:

FE	Federally listed as Endangered
FT	Federally listed as Threatened
FPE	Federally proposed for listing as Endangered
FPT	Federally proposed for listing as Threatened
FPD	Federally proposed for delisting
FC	Federal candidate species (former Category 1 candidates)
SC	Species of Concern (NMFS regulated species only)
CH	Critical Habitat (Designated or Proposed)
SSC	Species of Special Concern designated by the Marine Mammal Commission
FSC	Federal Species of Concern – No longer maintained by USFWS Sacramento Regional Office
SLC	Species of local concern or conservation importance – No longer maintained by USFWS

California listing codes:

SE	State listed as Endangered
ST	State listed as Threatened
SCE	State candidate for listing as Endangered
SCT	State candidate for listing as Threatened
SCD	State candidate for delisting
SSC	California Species of Special Concern
FP	Fully Protected
WL	Watch List

Other status codes:

- ABC The American Bird Conservancy maintains a Green List of all the highest priority birds for conservation in the continental United States and Canada. Based off the species assessments prepared by Partners in Flight (PIF) and has been expanded to include shorebirds, waterbirds and waterfowl.
- AFS American Fisheries Society identifies marine, estuarine and diadromous fish species that are at risk of extinction in North America. The AFS has designated the following four classifications in order of conservation importance E – Endangered, T – Threatened, V – Vulnerable, and CD – Conservation Dependent.
- BCC U.S. Fish and Wildlife Service Birds of Conservation Concern. List of migratory and nonmigratory bird species (beyond those already designated as federally threatened or endangered) that represent the Service’s highest conservation priorities.
- SA “Special Animals” is a general term that refers to all of the taxa the CNDDDB is interested in tracking, regardless of their legal or protection status. This list is also referred to as the list of “species at risk” or “special status species”. The Department of Fish and Game considers the taxa on this list to be those of greatest conservation need.
- WBWG Western Bat Working Group: H – High Priority indicates species that are imperiled or are at high risk of imperilment based on available information on distribution, status, ecology and known threats; M – Medium Priority indicates a lack of information to assess the species’ status; L – Low Priority indicates relatively stable populations based on available data. The WBWG also uses intermediary designations including MH – Medium-High and LM – Low-Medium priorities.
- Xerces Xerces Society for Invertebrate Conservation. Red List identifies endangered, threatened or at-risk pollinator species. PE – Possibly Extinct indicates species only known from historical occurrences; CI – Critically Imperiled indicates species at very high risk of extinction; I – Imperiled indicates species at high risk of extinction; V – Vulnerable indicates species at moderate risk of extinction; DD – Data Deficient indicates lack of information to sufficiently assess status.

APPENDIX E CALIFORNIA NATURAL DIVERSITY DATABASE SPECIES LIST

California Department of Fish and Game

Natural Diversity Database

West Antioch Creek Channel Improvements Project

USGS 7.5-minute quads for Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
1 <i>Agelaius tricolor</i> tricolored blackbird	ABPBXB0020			G2G3	S2	SC
2 <i>Alkali Meadow</i>	CTT45310CA			G3	S2.1	
3 <i>Alkali Seep</i>	CTT45320CA			G3	S2.1	
4 <i>Ambystoma californiense</i> California tiger salamander	AAAAA01180	Threatened	Threatened	G2G3	S2S3	SC
5 <i>Amsinckia grandiflora</i> large-flowered fiddleneck	PDBOR01050	Endangered	Endangered	G1	S1	1B.1
6 <i>Andrena blennospermatis</i> Blennosperma vernal pool andrenid bee	IIHYM35030			G2	S2	
7 <i>Anniella pulchra pulchra</i> silvery legless lizard	ARACC01012			G3G4T3T4 Q	S3	SC
8 <i>Anomobryum julaceum</i> slender silver moss	NBMUS80010			G4G5	S2	2.2
9 <i>Anthicus antiochensis</i> Antioch Dunes anthicid beetle	IIICOL49020			G1	S1	
10 <i>Anthicus sacramento</i> Sacramento anthicid beetle	IIICOL49010			G1	S1	
11 <i>Antrozous pallidus</i> pallid bat	AMACC10010			G5	S3	SC
12 <i>Apodemia mormo langei</i> Lange's metalmark butterfly	IILEPH7012	Endangered		G5T1	S1	
13 <i>Aquila chrysaetos</i> golden eagle	ABNKC22010			G5	S3	
14 <i>Archoplites interruptus</i> Sacramento perch	AFCOB07010			G3	S1	SC
15 <i>Arctostaphylos auriculata</i> Mt. Diablo manzanita	PDERI04040			G2	S2	1B.3
16 <i>Arctostaphylos manzanita ssp. laevigata</i> Contra Costa manzanita	PDERI04273			G5T2	S2	1B.2
17 <i>Ardea herodias</i> great blue heron	ABNGA04010			G5	S4	
18 <i>Asio flammeus</i> short-eared owl	ABNSB13040			G5	S3	SC
19 <i>Astragalus tener var. tener</i> alkali milk-vetch	PDFAB0F8R1			G2T2	S2	1B.2
20 <i>Athene cunicularia</i> burrowing owl	ABNSB10010			G4	S2	SC
21 <i>Atriplex cordulata var. cordulata</i> heartscale	PDCHE040B0			G3T2	S2.2?	1B.2
22 <i>Atriplex depressa</i> brittlescale	PDCHE042L0			G2Q	S2.2	1B.2
23 <i>Atriplex joaquinana</i> San Joaquin spearscale	PDCHE041F3			G2	S2	1B.2
24 <i>Blepharizonia plumosa</i> big tarplant	PDAST1C011			G1	S1	1B.1

California Department of Fish and Game

Natural Diversity Database

West Antioch Creek Channel Improvements Project

USGS 7.5-minute quads for Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
25 <i>Branchinecta conservatio</i> Conservancy fairy shrimp	ICBRA03010	Endangered		G1	S1	
26 <i>Branchinecta lynchi</i> vernal pool fairy shrimp	ICBRA03030	Threatened		G3	S2S3	
27 <i>Branchinecta mesoallensis</i> midvalley fairy shrimp	ICBRA03150			G2	S2	
28 <i>Buteo regalis</i> ferruginous hawk	ABNKC19120			G4	S3S4	
29 <i>Buteo swainsoni</i> Swainson's hawk	ABNKC19070		Threatened	G5	S2	
30 <i>California macrophylla</i> round-leaved filaree	PDGER01070			G2	S2	1B.1
31 <i>Callophrys mossii bayensis</i> San Bruno elfin butterfly	IILEPE2202	Endangered		G4T1	S1	
32 <i>Calochortus pulchellus</i> Mt. Diablo fairy-lantern	PMLIL0D160			G2	S2	1B.2
33 <i>Campanula exigua</i> chaparral harebell	PDCAM020A0			G2	S2.2	1B.2
34 <i>Centromadia parryi ssp. congdonii</i> Congdon's tarplant	PDAST4R0P1			G4T2	S2	1B.2
35 <i>Centromadia parryi ssp. parryi</i> pappose tarplant	PDAST4R0P2			G4T1	S1	1B.2
36 <i>Charadrius montanus</i> mountain plover	ABNNB03100	Proposed Threatened		G2	S2?	SC
37 <i>Chloropyron molle ssp. hispidum</i> hispid bird's-beak	PDSCR0J0D1			G2T2	S2.1	1B.1
38 <i>Chloropyron molle ssp. molle</i> soft bird's-beak	PDSCR0J0D2	Endangered	Rare	G2T1	S1	1B.2
39 <i>Cicuta maculata var. bolanderi</i> Bolander's water-hemlock	PDAP10M051			G5T3T4	S2	2.1
40 <i>Cirsium hydrophilum var. hydrophilum</i> Suisun thistle	PDAST2E1G1	Endangered		G2T1	S1	1B.1
41 <i>Cismontane Alkali Marsh</i>	CTT52310CA			G1	S1.1	
42 <i>Coastal Brackish Marsh</i>	CTT52200CA			G2	S2.1	
43 <i>Coastal and Valley Freshwater Marsh</i>	CTT52410CA			G3	S2.1	
44 <i>Coelus gracilis</i> San Joaquin dune beetle	IIICOL4A020			G1	S1	
45 <i>Cordylanthus nidularius</i> Mt. Diablo bird's-beak	PDSCR0J0F0		Rare	G1	S1	1B.1
46 <i>Cryptantha hooveri</i> Hoover's cryptantha	PDBOR0A190			GH	SH	1A
47 <i>Delphinium californicum ssp. interius</i> Hospital Canyon larkspur	PDRAN0B0A2			G3T2?	S2?	1B.2
48 <i>Didymodon norrisii</i> Norris' beard moss	NBMUS2C0H0			G3G4	S3S4	2.2

California Department of Fish and Game

Natural Diversity Database

West Antioch Creek Channel Improvements Project

USGS 7.5-minute quads for Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
49 <i>Dipodomys heermanni berkeleyensis</i> Berkeley kangaroo rat	AMAFD03061			G3G4T1	S1	
50 <i>Downingia pusilla</i> dwarf downingia	PDCAM060C0			G2	S2	2.2
51 <i>Dumontia oregonensis</i> hairy water flea	ICBRA23010			G1G3	S1	
52 <i>Efferia antiochi</i> Antioch efferian robberfly	IIDIP07010			G1G3	S1S3	
53 <i>Elanus leucurus</i> white-tailed kite	ABNKC06010			G5	S3	
54 <i>Elaphrus viridis</i> Delta green ground beetle	IICOL36010	Threatened		G1	S1	
55 <i>Emys marmorata</i> western pond turtle	ARAAD02030			G3G4	S3	SC
56 <i>Eriogonum nudum var. psychicola</i> Antioch Dunes buckwheat	PDPGN0849Q			G5T1	S1	1B.1
57 <i>Eriogonum truncatum</i> Mt. Diablo buckwheat	PDPGN085Z0			G2	S2	1B.1
58 <i>Erysimum capitatum var. angustatum</i> Contra Costa wallflower	PDBRA16052	Endangered	Endangered	G5T1	S1	1B.1
59 <i>Eschscholzia rhombipetala</i> diamond-petaled California poppy	PDPAP0A0D0			G1	S1	1B.1
60 <i>Eucerceris ruficeps</i> redheaded sphecid wasp	IHYM18010			G1G3	S1S2	
61 <i>Fritillaria agrestis</i> stinkbells	PMLIL0V010			G3	S3.2	4.2
62 <i>Fritillaria liliacea</i> fragrant fritillary	PMLIL0V0C0			G2	S2	1B.2
63 <i>Geothlypis trichas sinuosa</i> saltmarsh common yellowthroat	ABPBX1201A			G5T2	S2	SC
64 <i>Helianthella castanea</i> Diablo helianthella	PDAST4M020			G2	S2	1B.2
65 <i>Helminthoglypta nickliniana bridgesi</i> Bridges' coast range shoulderband	IMGASC2362			G2T1	S1	
66 <i>Hesperolinon breweri</i> Brewer's western flax	PDLIN01030			G2	S2	1B.2
67 <i>Hibiscus lasiocarpus var. occidentalis</i> woolly rose-mallow	PDMAL0H0R3			G4	S2.2	1B.2
68 <i>Hygrotus curvipes</i> curved-foot hygrotus diving beetle	IICOL38030			G1	S1	
69 <i>Hypomesus transpacificus</i> Delta smelt	AFCHB01040	Threatened	Endangered	G1	S1	
70 <i>Idiostatus middlekauffi</i> Middlekauff's shieldback katydid	IORT31010			G1G2	S1	
71 <i>Isocoma arguta</i> Carquinez goldenbush	PDAST57050			G1	S1	1B.1

California Department of Fish and Game
Natural Diversity Database

West Antioch Creek Channel Improvements Project

USGS 7.5-minute quads for Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and Rio Vista.

Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
72 <i>Juglans hindsii</i> Northern California black walnut	PDJUG02040			G1	S1.1	1B.1
73 <i>Lanius ludovicianus</i> loggerhead shrike	ABPBR01030			G4	S4	SC
74 <i>Lasiorus blossevillii</i> western red bat	AMACC05060			G5	S3?	SC
75 <i>Lasiorus cinereus</i> hoary bat	AMACC05030			G5	S4?	
76 <i>Lasthenia conjugens</i> Contra Costa goldfields	PDAST5L040	Endangered		G1	S1	1B.1
77 <i>Laterallus jamaicensis coturniculus</i> California black rail	ABNME03041		Threatened	G4T1	S1	
78 <i>Lathyrus jepsonii</i> var. <i>jepsonii</i> Delta tule pea	PDFAB250D2			G5T2	S2.2	1B.2
79 <i>Legenere limosa</i> legenere	PDCAM0C010			G2	S2.2	1B.1
80 <i>Lepidurus packardii</i> vernal pool tadpole shrimp	ICBRA10010	Endangered		G3	S2S3	
81 <i>Lilaeopsis masonii</i> Mason's lilaeopsis	PDAP119030		Rare	G2	S2	1B.1
82 <i>Limosella australis</i> Delta mudwort	PDSCR10050			G4G5	S2	2.1
83 <i>Lindieriella occidentalis</i> California lindieriella	ICBRA06010			G3	S2S3	
84 <i>Lytta molesta</i> molestan blister beetle	IIICOL4C030			G2	S2	
85 <i>Madia radiata</i> showy golden madia	PDAST650E0			G2	S2	1B.1
86 <i>Malacothamnus hallii</i> Hall's bush-mallow	PDMAL0Q0F0			G2Q	S2	1B.2
87 <i>Masticophis lateralis euryxanthus</i> Alameda whipsnake	ARADB21031	Threatened	Threatened	G4T2	S2	
88 <i>Melospiza melodia maxillaris</i> Suisun song sparrow	ABPBXA301K			G5T2	S2	SC
89 <i>Metapogon hurdi</i> Hurd's metapogon robberfly	IIDIP08010			G1G3	S1S3	
90 <i>Monolopia gracilens</i> woodland woollythreads	PDAST6G010			G2G3	S2S3	1B.2
91 <i>Myrmosula pacifica</i> Antioch multiid wasp	IIHYM15010			GH	SH	
92 <i>Navarretia gowenii</i> Lime Ridge navarretia	PDPLM0C120			G1	S1	1B.1
93 <i>Navarretia nigelliformis</i> ssp. <i>radians</i> shining navarretia	PDPLM0C0J2			G4T2	S2	1B.2
94 <i>Northern Claypan Vernal Pool</i>	CTT44120CA			G1	S1.1	
95 <i>Oenothera deltoides</i> ssp. <i>howellii</i> Antioch Dunes evening-primrose	PDONA0C0B4	Endangered	Endangered	G5T1	S1	1B.1

California Department of Fish and Game
 Natural Diversity Database
 West Antioch Creek Channel Improvements Project
 USGS 7.5-minute quads for Antioch North, Antioch South, Bird's Landing, Brentwood, Clayton, Denverton, Honker Bay, Jersey Island, and
 Rio Vista.

	Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
96	<i>Perdita scitula antiochensis</i> Antioch andrenid bee	IIHYM01031			G1T1	S1	
97	<i>Perognathus inornatus inornatus</i> San Joaquin pocket mouse	AMAFD01061			G4T2T3	S2S3	
98	<i>Phacelia phacelioides</i> Mt. Diablo phacelia	PDHYD0C3Q0			G1	S1.2	1B.2
99	<i>Phalacrocorax auritus</i> double-crested cormorant	ABNFD01020			G5	S3	
100	<i>Philanthus nasalis</i> Antioch spicid wasp	IIHYM20010			G1	S1	
101	<i>Phrynosoma blainvillii</i> coast horned lizard	ARACF12100			G4G5	S3S4	SC
102	<i>Plagiobothrys hystrix</i> bearded popcornflower	PDBOR0V0H0			G1G2	S1S2	1B.1
103	<i>Pogonichthys macrolepidotus</i> Sacramento splittail	AFCJB34020			G2	S2	SC
104	<i>Potamogeton zosteriformis</i> eel-grass pondweed	PMPOT03160			G5	S2.2?	2.2
105	<i>Rallus longirostris obsoletus</i> California clapper rail	ABNME05016	Endangered	Endangered	G5T1	S1	
106	<i>Rana draytonii</i> California red-legged frog	AAABH01022	Threatened		G4T2T3	S2S3	SC
107	<i>Reithrodontomys raviventris</i> salt-marsh harvest mouse	AMAFF02040	Endangered	Endangered	G1G2	S1S2	
108	<i>Riparia riparia</i> bank swallow	ABPAU08010		Threatened	G5	S2S3	
109	<i>Sagittaria sanfordii</i> Sanford's arrowhead	PMALI040Q0			G3	S3	1B.2
110	<i>Sanicula saxatilis</i> rock sanicle	PDAP11Z0H0		Rare	G2	S2	1B.2
111	<i>Scutellaria lateriflora</i> side-flowering skullcap	PDLAM1U0Q0			G5	S1	2.2
112	<i>Senecio aphanactis</i> chaparral ragwort	PDAST8H060			G3?	S1.2	2.2
113	<i>Serpentine Bunchgrass</i>	CTT42130CA			G2	S2.2	
114	<i>Sidalcea keckii</i> Keck's checkerbloom	PDMAL110D0	Endangered		G1	S1	1B.1
115	<i>Sorex ornatus sinuosus</i> Suisun shrew	AMABA01103			G5T1	S1	SC
116	<i>Sphecodogastra antiochensis</i> Antioch Dunes halictid bee	IIHYM78010			G1	S1	
117	<i>Stabilized Interior Dunes</i>	CTT23100CA			G1	S1.1	
118	<i>Sternula antillarum browni</i> California least tern	ABNNM08103	Endangered	Endangered	G4T2T3Q	S2S3	
119	<i>Streptanthus albidus ssp. peramoenus</i> most beautiful jewel-flower	PDBRA2G012			G2T2	S2.2	1B.2

California Department of Fish and Game
Natural Diversity Database

West Antioch Creek Channel Improvements Project

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Scientific Name/Common Name	Element Code	Federal Status	State Status	GRank	SRank	CDFG or CNPS
120 <i>Streptanthus hispidus</i> Mt. Diablo jewel-flower	PDBRA2G0M0			G1	S1.2	1B.3
121 <i>Stuckenia filiformis</i> slender-leaved pondweed	PMPOT03090			G5	S1S2	2.2
122 <i>Symphotrichum lentum</i> Suisun Marsh aster	PDASTE8470			G2	S2	1B.2
123 <i>Taxidea taxus</i> American badger	AMAJF04010			G5	S4	SC
124 <i>Thamnophis gigas</i> giant garter snake	ARADB36150	Threatened	Threatened	G2G3	S2S3	
125 <i>Triquetrella californica</i> coastal triquetrella	NBMUS7S010			G1	S1	1B.2
126 <i>Tropidocarpum cappardeum</i> caper-fruited tropidocarpum	PDBRA2R010			G1	S1.1	1B.1
127 <i>Valley Needlegrass Grassland</i>	CTT42110CA			G3	S3.1	
128 <i>Viburnum ellipticum</i> oval-leaved viburnum	PDCPR07080			G5	S2.3	2.3
129 <i>Vulpes macrotis mutica</i> San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2T3	S2S3	

**APPENDIX F U.S. FISH AND WILDLIFE SERVICE
SPECIES LIST**

4/16/13

Sacramento Fish & Wildlife Office Species List



**United States Department of the Interior
FISH AND WILDLIFE SERVICE**

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



April 16, 2013

Document Number: 130416053330

Jerry Roe
Nomad Ecology
832 Escobar Street
Martinez, CA 94553

Subject: Species List for West Antioch Creek Channel Improvements Project

Dear: Mr. Jerry D. Roe

We are sending this official species list in response to your April 16, 2013 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be July 15, 2013.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found [here](#).

Endangered Species Division



www.fws.gov/sacramento/es_species/Lists/es_species_lists_auto-letter.cfm

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Sacramento Fish & Wildlife Office Species List

U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office
Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested

Document Number: 130416053330

Database Last Updated: September 18, 2011

Quad Lists

Listed Species

Invertebrates

- Apodemia mormo langei*
Lange's metalmark butterfly (E)
- Branchinecta conservatio*
Conservancy fairy shrimp (E)
Critical habitat, Conservancy fairy shrimp (X)
- Branchinecta longiantenna*
longhorn fairy shrimp (E)
- Branchinecta lynchi*
Critical habitat, vernal pool fairy shrimp (X)
vernal pool fairy shrimp (T)
- Desmocerus californicus dimorphus*
valley elderberry longhorn beetle (T)
- Elaphrus viridis*
delta green ground beetle (T)
- Lepidurus packardii*
Critical habitat, vernal pool tadpole shrimp (X)
vernal pool tadpole shrimp (E)

Fish

- Acipenser medirostris*
green sturgeon (T) (NMFS)
- Hypomesus transpacificus*
Critical habitat, delta smelt (X)
delta smelt (T)
- Oncorhynchus mykiss*
Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)
- Oncorhynchus tshawytscha*
Central Valley spring-run chinook salmon (T) (NMFS)
Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

- Ambystoma californiense*
California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)
- Rana draytonii*
California red-legged frog (T)
Critical habitat, California red-legged frog (X)

www.fws.gov/sacramento/es_species/Lists/es_species_lists.cfm

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Sacramento Fish & Wildlife Office Species List

Reptiles

- Masticophis lateralis euryxanthus*
Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)
- Thamnophis gigas*
giant garter snake (T)

Birds

- Rallus longirostris obsoletus*
California clapper rail (E)
- Sternula antillarum* (=Sterna, =albifrons) browni
California least tern (E)

Mammals

- Reithrodontomys raviventris*
salt marsh harvest mouse (E)
- Vulpes macrotis mutica*
San Joaquin kit fox (E)

Plants

- Amsinckia grandiflora*
large-flowered fiddleneck (E)
- Cirsium hydrophilum* var. *hydrophilum*
Suisun thistle (E)
- Cordylanthus mollis* ssp. *mollis*
soft bird's-beak (E)
- Erysimum capitatum* ssp. *angustatum*
Contra Costa wallflower (E)
Critical Habitat, Contra Costa wallflower (X)
- Lasthenia conjugens*
Contra Costa goldfields (E)
Critical habitat, Contra Costa goldfields (X)
- Neostapfia colusana*
Colusa grass (T)
- Oenothera deltoides* ssp. *howellii*
Antioch Dunes evening-primrose (E)
Critical habitat, Antioch Dunes evening-primrose (X)
- Sidalcea keckii*
Keck's checker-mallow (=checkerbloom) (E)

Proposed Species

Plants

- Cirsium hydrophilum* var. *hydrophilum*
Critical habitat, Suisun thistle (PX)
- Cordylanthus mollis* ssp. *mollis*
Critical habitat, soft bird's-beak (PX)

Quads Containing Listed, Proposed or Candidate Species:

- BRENTWOOD (463B)
- ANTIOCH SOUTH (464A)
- CLAYTON (464B)
- RIO VISTA (480B)
- JERSEY ISLAND (480C)
- BIRDS LANDING (481A)
- DENVERTON (481B)
- HONKER BAY (481C)

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Sacramento Fish & Wildlife Office Species List

ANTIOCH NORTH (481D)

County Lists

Listed Species

Invertebrates

Apodemia mormo langei

Lange's metalmark butterfly (E)

S

Branchinecta conservatio

Conservancy fairy shrimp (E)

S

Branchinecta longiantenna

Critical habitat, longhorn fairy shrimp (X)

longhorn fairy shrimp (E)

S

Branchinecta lynchi

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

S

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

S

Elaphrus viridis

delta green ground beetle (T)

S

Lepidurus packardii

vernal pool tadpole shrimp (E)

S

Speyeria callippe callippe

callippe silverspot butterfly (E)

S

Syncaris pacifica

California freshwater shrimp (E)

S

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

S

Eucyclogobius newberryi

tidewater goby (E)

S

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Hypomesus transpacificus

Critical habitat, delta smelt (X)
delta smelt (T)

S

Oncorhynchus kisutch

coho salmon - central CA coast (E) (NMFS)
Critical habitat, coho salmon - central CA coast (X) (NMFS)

S

Oncorhynchus mykiss

Central California Coastal steelhead (T) (NMFS)
Central Valley steelhead (T) (NMFS)
Critical habitat, Central California coastal steelhead (X) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

S

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)
Critical Habitat, Central Valley spring-run chinook (X) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

S

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)
Critical habitat, CA tiger salamander, central population (X)

S

Rana draytonii

California red-legged frog (T)
Critical habitat, California red-legged frog (X)

S

Reptiles

Masticophis lateralis euryxanthus

Alameda whipsnake [=striped racer] (T)
Critical habitat, Alameda whipsnake (X)

S

Thamnophis gigas

giant garter snake (T)

S

Birds

Charadrius alexandrinus nivosus

western snowy plover (T)

S

Pelecanus occidentalis californicus

California brown pelican (E)

S

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Rallus longirostris obsoletus
California clapper rail (E)
S

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)
S

Strix occidentalis caurina
northern spotted owl (T)
S

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)
S

Vulpes macrotis mutica
San Joaquin kit fox (E)
S

Plants

Amsinckia grandiflora
large-flowered fiddleneck (E)
S

Arctostaphylos pallida
pallid manzanita (=Alameda or Oakland Hills manzanita) (T)
S

Calochortus tiburonensis
Tiburon mariposa lily (T)
S

Castilleja affinis ssp. neglecta
Tiburon paintbrush (E)
S

Chorizanthe robusta var. robusta
robust spheflower (E)
S

Clarkia franciscana
Presidio clarkia (E)
S

Cordylanthus mollis ssp. mollis
soft bird's-beak (E)
S

Cordylanthus palmatus
palmate-bracted bird's-beak (E)

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S

Erysimum capitatum ssp. angustatum

Contra Costa wallflower (E)

Critical Habitat, Contra Costa wallflower (X)

S

Hesperolinon congestum

Marin dwarf-flax (=western flax) (T)

S

Holocarpha macradenia

Critical habitat, Santa Cruz tarplant (X)

Santa Cruz tarplant (T)

S

Lasthenia conjugens

Contra Costa goldfields (E)

Critical habitat, Contra Costa goldfields (X)

S

Neostapfia colusana

Colusa grass (T)

S

Oenothera deltoides ssp. howellii

Antioch Dunes evening-primrose (E)

Critical habitat, Antioch Dunes evening-primrose (X)

S

Pentachaeta bellidiflora

white-rayed pentachaeta (E)

S

Sidalcea keckii

Keck's checker-mallow (=checkerbloom) (E)

S

Streptanthus niger

Tiburon jewelflower (E)

S

Suaeda californica

California sea blite (E)

S

Trifolium amoenum

showy Indian clover (E)

S

Proposed Species

Plants

Cordylanthus mollis ssp. mollis

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Sacramento Fish & Wildlife Office Species List

Critical habitat, soft bird's-beak (PX)

S

Key:

- (E) *Endangered* - Listed as being in danger of extinction.
- (T) *Threatened* - Listed as likely to become endangered within the foreseeable future.
- (P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.
- (NMFS) Species under the Jurisdiction of the [National Oceanic & Atmospheric Administration Fisheries Service](#). Consult with them directly about these species.
- Critical Habitat* - Area essential to the conservation of a species.
- (PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.
- (C) *Candidate* - Candidate to become a proposed species.
- (V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.
- (X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of

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a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts.

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Sacramento Fish & Wildlife Office Species List

[More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6520.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be July 15, 2013.

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APPENDIX F PROJECT PHOTOGRAPHS



Photo 1. View of West Antioch Creek looking downstream (north) up O Street, showing the earthen trapezoidal channel near the Contra Costa Fairgrounds and the culvert under 10th St. Photo taken February 27, 2009.



Photo 2. Looking upstream (south) at concrete lined ditch, covered with wooden planking. 10th St. is to the left of the photo, and the vacant car dealership is to the right. Photo taken February 27, 2009.



Photo 3 View of the open concrete channel, looking downstream (north). County-owned vacant lot and apartment carport is visible in the right of the photo. Photo taken March 25, 2009.



Photo 4. View of seasonal wetlands, facing northwest. Ruderal grassland vegetation on the berm and adjacent field is visible in the distance. Photo taken July 8, 2009.



Photo 5. View of West Antioch Creek in improved open earthen channel, looking downstream (north). Photo taken February 27, 2009.



Photo 6. View of low flow channel and adjacent seasonal wetlands on floodplain. Looking upstream. Photo taken March 12, 2013.



Photo 7. View of low flow channel and adjacent seasonal wetlands looking downstream toward the culvert crossing under West 4th St. Photo taken March 12, 2013.



Photo 8. View of low flow channel and adjacent permanent wetland looking downstream (north) toward the railroad tracks and the San Joaquin River. Photo taken March 12, 2013.

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

APPENDIX C

Cultural Resources Assessment



14 October 2013

Mindy Gentry, Senior Planner
City of Antioch
200 'H' Street
Antioch, CA 94531

RE: Confidential Cultural Resources Addendum for the West Antioch Creek Channel Improvement Project

Dear Mindy:

The City of Antioch, in conjunction with the Contra Costa County Public Works Department (CCCPWD), is preparing to make channel improvements to West Antioch Creek (Project Area) to reduce flood risk in the Project Area by increasing the capacity of the channel between West Tenth Street and West Eighth Street. The City will re-establish the 25-year flood protection capacity of the channel downstream of West Eighth Street to the BNSF railroad trestle (Figure 1). The Project Area was originally inventoried for cultural resources in 2010 (Attachment A); however, in 2012, the City opted to expand the Project Area in order to encompass the full extent of the channel improvements. This expansion includes approximately 3,000 linear feet of channel to be desilted.

Although the 2010 inventory included a records search, literature review, and field survey of the Project Area, since the Project boundaries have changed, an updated records search to include the newly proposed acreage and field survey of the additional acreage were required. This letter report serves to amend the original report and describes the results of the supplemental cultural resources inventory of the newly proposed additional acreage. All regulatory and historical contexts are hereby incorporated by reference from the original cultural resources inventory report; Sections 2.0 and 4.0 (Attachment A).

The former Al Eames Ford dealership buildings are located at 1400 West 10th Street in Antioch near the Project. An historic structure evaluation including an architectural evaluation to determine if the Ford dealership buildings qualify for the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR) was completed. The historic architectural evaluation report of the Ford dealership buildings is included as Attachment B.

Project Description

The Proposed Project will improve the flood capacity of the West Antioch Creek channel to a 25-year level of protection and reduce flooding in the Project Area within the City of Antioch. This project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West 10th Street to the 1993 Project limits (approximately West 8th Street). Project work in Reach B (desilting) would desilt the channel between the 1993 Project limits at approximately West 8th Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be conducted to realize improved levels of flood protection.

Area of Potential Effects

The Area of Potential Effects (APE) consists of the horizontal and vertical limits of the project, and includes the area within which significant impacts or adverse effects to Historical Resources or Historic

Properties could occur as a result of the project. The horizontal APE consists of all areas where activities associated with the project are proposed, and in the case of the current project, equals the project area subject to environmental review under CEQA. This includes areas proposed for construction, channel expansion, vegetation removal, sediment removal, trenching, staging, and other elements described in the official project description. The horizontal APE is illustrated in Figure 1 and also represents the survey coverage area (Figure 2). The horizontal APE is composed of a north-south waved alignment along West Antioch Creek between an area beginning approximately 200 feet north of the BNSF railroad tracks and ending at West 8th Street. The APE includes channel segments and associated areas totaling approximately 26.83 acres.

The vertical APE is described as the maximum depth below the surface to which excavations for project foundations and facilities will extend. Thus, the vertical APE includes all subsurface areas where archaeological deposits could be affected. The subsurface vertical APE varies across the project, depending on depth of foundation and digging for channel expansion and trenching. Ground disturbance of up to 20 feet below the surface may be necessary in order to make modifications and adjustments to the channel.

The vertical APE also is described as the maximum height of poles and equipment, which could impact the physical integrity and integrity of setting of cultural resources, including districts and traditional cultural properties. For the current project, the above-surface vertical APE is up to 20 feet above the surface, which may be the maximum height of the proposed construction activities.

Cultural Resources Inventory

The efforts to identify Historical Resources within the Project Area consisted of various literature reviews, a records search at the Northwestern Information Center, historic map and aerial research, and a pedestrian survey of the entire Project Area.

An updated records search was conducted on 20 May 2013 (NWIC search # 12-1408, Attachment C). The original records search for the property was completed at the Northwest Information Center (NWIC) on 26 May 2010 (NWIC search #09-1497; within Attachment A). The purpose of the supplemental records search was to expand the previous search area to include newly proposed project expansion and serve as an update to the previously conducted records search.

In addition to the official records and maps for archaeological sites and surveys in Contra Costa County, the following historic references were also reviewed: Historic Property Data File for Contra Costa County (Office of Historic Preservation (OHP) 2013a); *The National Register Information System website* (National Park Service 2013); *Office of Historic Preservation, California Historical Landmarks website* (OHP 2013b); *California Historical Landmarks* (OHP 1996 and updates); *Gold Districts of California* (Clark 2005); *California Gold Camps* (Gudde 1975); *1500 California Place Names* (Bright 1998); *Directory of Properties in the Historical Resources Inventory* (1999); *Caltrans Local Bridge Inventory* (Caltrans 2013b); *Caltrans State Bridge Inventory* (Caltrans 2013a); and *Historic Spots in California* (Kyle 2002).

Other references examined include a property search with the Contra Costa County Mapping Information website (Contra Costa County 2013), historic GLO land patent records (BLM 2013), and numerous aerial photographs taken between 1939 and 2010. Historic maps reviewed include:

- 1908 (reprinted in 1951) USGS Antioch Creek, CA (1:62,500 scale)
- 1953 USGS Antioch North, CA (1:24,000 scale)
- 1953 (Photorevised 1968) USGS Antioch North, CA (1:24,000 scale)
- 1978 USGS Antioch North, CA (1:24,000 scale)

Letters requesting historical information relevant to the Project Area were sent to the Antioch Historical Society and the Contra Costa County Historical Society during the original inventory in order to solicit comments or obtain historical information that either repository might have regarding events, people, or resources of historical significance in the area (in Attachment A).

The records search consisted of a review of previous research and literature, records on file with the NWIC for previously recorded resources, and historical aerial photographs and maps of the vicinity.

Previous Research

Nineteen previous cultural resource investigations have been conducted within one mile of the property, covering approximately 25 percent of the total area surrounding the property within the record search radius (Table 1). These studies revealed the presence of resources from the historical period including railroads, refuse dumps, residences, and school buildings. The previous studies were conducted between 1976 and 2010 and vary in size from 1.74 acres to 7,000 acres.

Table 1 – Previous Cultural Studies In or Within 1.0 Mile of the Project APE

Report Number	Author(s)	Report Title	Year	Area Covered	Within Project APE?
1418	Archaeological Resource Service	An Archaeological Reconnaissance of a Proposed Park Site Situated in Northwestern Antioch (ARs 78-138)	1978	30 Acres	No
4991	Wirth Associates, Inc.	Western Leg-Alaska Highway Pipeline Project	1980	Unspecified Linear Survey	No
5798	Banks, P.	An Investigation of the Cultural Resources Within the Antioch Marina Park, Antioch, Contra Costa County, California	1983	18 Acres	No
7386	David Chavez & Associates	Cultural Resources Evaluation for the Delta Landing EIR/EIS, Antioch, Contra Costa County, California	1985	483 Acres	Yes
11826	Theodoratus Cultural Research	Montezuma I & II Cultural Resources	1980	N/A	No
13256	Allan G. Bramlette, et al.	Archaeological Resources Inventory for Los Vaqueros Water Conveyance Alignments, Contra Costa County, California	1991	7,000 Acres	Yes
18352	Busby, Colin I.	Assessment of Archaeological Resources: East/Central Contra Costa County Wastewater Management Plan	1976	N/A	Yes
21181	Basin Research Associates	Cultural Resources Assessment- Proposed Housing Site Between West 7 th and 9 th Streets and I Street, City of Antioch, Contra Costa County, California	1997	1.74 Acres	No
22812	Basin Research Associates	Contra Costa County Water Multipurpose Pipeline Project, Environmental Documentation Study, Cultural Resources Review	1997	Unspecified Linear Survey	Yes

Report Number	Author(s)	Report Title	Year	Area Covered	Within Project APE?
25238	Pacific Legacy, Inc.	Archaeological Survey Report for the Highway 4/Somersville Cell Site, Antioch, Contra Costa County	2002	N/A	No
30387	CRM TECH	Historical Resources Compliance Report, Burlington Northern Santa Fe Railway Double Track Project (Segment 2)	2005	Unspecified Linear Survey	No
30579	Basin Research Associates	Cultural Resources Report, Delta Energy Center Site (DEC) and Associated Linears, Cities of Pittsburg and Antioch, Contra Costa County, California	2004	Unspecified Linear Survey	No
31405	William Self Associates, Inc.	Archaeological Survey and Cultural Resources Assessment for the City of Antioch's proposed Antioch Recycled Water Pipeline project	2006	Unspecified Linear Survey	Yes
33545	National Park Service (Western Regional Office)	Draft Comprehensive Management Plan, Environmental Impact Statement, Juan Bautista de Anza National Historic Trail, Arizona and California	1994	N/A	No
33821	Jones & Stokes	Cultural Resources Inventory Report for the Ironhouse Sanitary District, Wastewater Treatment Plant Expansion, Contra Costa and Sacramento Counties, California	2007	N/A	Yes
35196	William Self Associates, Inc.	Cultural Resource Assessment, Delta Diablo Sanitation District and the City of Antioch, Recycled Water Pipeline Extension Project, Antioch, Contra Costa County, California	2006	Unspecified Linear Survey	Yes
35861	Caltrans	Historic Property Survey Report, District 4, Contra Costa County, Route BNSF RR, Post Mile 1146.1 to MP 1164.4	2009	Unspecified Linear Survey	No
37097	William Self Associates, Inc.	Cultural Resources Assessment Report Supplement Delta Diablo Sanitation District and the City of Antioch Recycled Water Pipeline Extension Project, Antioch, Contra Costa County, California	2010	Unspecified Linear Survey	No
38226	LSA Associates, Inc.	Revised Cultural Resources Assessment of the Accidental Discovery at the Antioch Marina Boat Launch Facility Project, Antioch, Contra Costa County, California (Corps File No. SPK-2004-00520; LSA Project No. CAN1002)	2010	N/A	No

The results of the records search indicate that areas along the creek have been previously surveyed for cultural resources through several linear and block surveys. The records search also determined that ten previously recorded historic-era cultural resources are located within one mile of the Project Area, but none were recorded within the Project Area (Table 2).

Table 2 – Previously Recorded Cultural Resources Within 1.0 Mile of the Project APE?

Site Number CA-CCO-	Primary Number P-07-	Recorder and Year	Age/ Period	Site Description
718H	806	S. Ashkar 1998; J. Smallwood 2004; S. Atchley, G. Roark 1999	Historic	Atchison, Topeka, and Santa Fe Railroad Line
N/A	813	S. Baker 2006	Historic	Southern Pacific: Northern Contra Costa Route
N/A	2563	R. Harmon 2002	Historic	Antioch Marina spoils site
N/A	2779	M. Dobkin, W. Hill 2006	Historic	Sycamore Park Subdivision
N/A	2780	B. Larson, J. Cheney, M. Bunse 2002	Historic	Hawthorne Hill Subdivision
N/A	2784	B. Larson 2002	Historic	John Marsh Elementary School
N/A	2884	Site record missing from NWIC	Historic	Residence on 20th Street
N/A	2885	M. Dobkin, W. Hill 2006	Historic	329 West 20th Street
N/A	2886	M. Dobkin, W. Hill 2006	Historic	415 West 20th Street
N/A	2887	Site record missing from NWIC	Historic	Residence on 20th Street

Records

The *Office of Historic Preservation's Directory of Properties, Historic Property Data File* (OHP 2013a; dated 4/5/2012) did not include any properties within the Project Area; however, many properties were listed within the City of Antioch, primarily historic-era buildings and structures.

The National Register Information System (National Park Service 2013) failed to reveal any listed or eligible properties within the Project Area. However, several listed properties are located nearby, including the Riverview Union High School located adjacent to the northwest portion of the Project Area, the R. B. Hard building located 0.55 mile northeast of the Project Area, and the Williamson Ranch located south of the City of Antioch.

A review of *California Historical Landmarks* (OHP 1996) listed the nearest historical landmark as Number 932: Mount Diablo Coal Field, located 4.3 miles southwest of the Project Area. The OHP Website for California Historical Landmarks also lists the Mount Diablo Coal Field as the nearest landmark (OHP 2013).

A review of *Historic Spots in California* (Kyle 2002) notes that the City of Antioch is located within the Rancho Los Medanos, meaning "the sandbanks." The 8,859 acres of land was granted to Jose Noriega in 1835 and two years later he sold the land to John Marsh, a local doctor and scholar.

Kyle (2002) describes the City of Antioch as being established by twin brothers, William Wiggin and Joseph Horton Smith, in December 1849. Originally called Smith's Landing, the brothers established the first hotel and eating establishment, known as the New York House. When a group of settlers landed in San Francisco wishing to establish a colony, William Smith met them and convinced many of them to settle at Smith's Landing.

A review of *1500 California Place Names* (Bright 1998) mentions that the residents named the City of Antioch during a picnic in 1851. The name comes from a city in Syria mentioned in the Bible.

Historic federal government land patent records available on the BLM's General Land Office (GLO) website (BLM 2013) revealed that the Project Area in Township 2 N, Range 1 E was part of the 8,859-acre Rancho Los Medanos land grant patented to Ellen Fallon, Michael Murray, Jonathan D. Stevenson, and James Welch on October 8, 1872 (Table 3).

Table 3 – GLO Land Patent Records

Patentee	Patent Date	Serial Number	Patent Type/Authority	Location
Ellen Fallon, Michael Murray, Jonathan D. Stevenson, James Welch	10/8/1872	CACAAA 000476	March 3, 1851: Grant-Spanish/Mexican (9 Stat. 631)	8,859 Acres

The Project Area is parceled into multiple APNs with different sizes and land use descriptions. A search on the Contra Costa County Mapping Information website (Contra Costa County 2013) revealed that APN 074-130-060 consists of 83,800 square feet with a “commercial/auto agencies” land use description. APN 074-130-050 consists of 19,428 square feet with a “government owned/institutional” land use description. Database research for each APN was conducted, but not every parcel located within or adjacent to the Project Area is described here.

The Caltrans Structure, Maintenance & Investigations website for state (Caltrans 2013a) and local (Caltrans 2013b) bridges did not list any historic bridges in or within one mile of the Project Area.

The *Handbook of North American Indians* (Wilson and Towne 1978) lists the nearest Native American village as *Chupcan*, located approximately one mile east of the Project Area.

Map Review and Aerial Photographs

The review of historical aerial photographs and maps of the Project Area provide information on the past land uses of the property.

- The 1908 (reprinted in 1951) USGS Antioch Creek, CA (1:62,500 scale) map does not indicate the West Antioch Creek in the approximate location of the Project Area.
- Aerial photographs taken in 1939 show the Project Area as an undeveloped plot of land that appears to have been used for agricultural production. The portion of the West Antioch Creek within the Project Area is not clearly visible on the aerial photographs; however, a faint north/south line near the Project Area can be seen as connecting to the southern portion of the creek. The areas east of the Project Area appear to have been graded with east/west rows of unidentified objects.
- The 1953 USGS Antioch North, CA (1:24,000 scale) map shows a building west of the Project Area near the intersection of West 10th and O Streets. This map also shows the westward extension of West 10th Street, directly south of the Project Area. The West Antioch Creek does not appear on the map.
- Aerial photographs taken in 1958 show the Project Area primarily as open fields and the currently-standing Holiday Lodge. One building located directly east of the lodge facilities appears in the photos. The portion of West Antioch Creek within the Project Area appears on the photographs, heading north from the intersection of O and West 10th Streets, then curving northwest, and then heading straight north. The portion of the creek north of the Project Area continues to run straight north till it intersects West 4th Street (currently, the creek turns west between West 5th and West 6th streets, then north again to avoid commercial buildings along West 4th Street).
- Aerial photographs from 1965 show several objects (possibly automobiles) within a parking lot and a large building (Ford dealership) directly west of the Project Area. The building located east of the Holiday Lodge complex still appears, and is located west of the Ford dealership building. The photographs also reveal that the West Antioch Creek concrete channel (current configuration) had been constructed around the perimeter of the parking lot.

- The 1953 (Photorevised 1968) USGS Antioch North, CA (1:24,000 scale) map shows the addition of the creek alignment within the Project Area. Several additional buildings are located east and west of the Project Area.
- The 1978 USGS Antioch North, CA (1:24,000 scale) map shows the Project Area and surrounding areas in their current state, with the addition of the apartment buildings located directly east of the northern end of the Project Area.

In summary, the Project Area appears to have been originally used for agricultural purposes, which may have included crops or grazing, or both. Between 1939 and 1953, the portion of West 10th Street located directly south of the Project Area was constructed, as well as the Holiday Lodge complex on the western end of the Project Area. Between 1953 and 1958, West Antioch Creek appears to have been modified, creating a curve in a northwestern direction and moving the creek to the west. Between 1958 and 1965 the creek's concrete channel within the Project Area had been constructed. When more buildings were constructed, other portions of the creek north of the Project Area were offset and redirected.

The former Al Eames Ford dealership buildings located at 1400 West 10th Street in Antioch are in the Study Area. An historic structure evaluation including an architectural evaluation to determine if the Ford dealership buildings qualify for the National Register of Historic Places (NRHP) or the California Register of Historical Resources (CRHR) was completed. The Ford dealership buildings were evaluated as not eligible for the NRHP or the CRHR. The historic architectural evaluation report of the Ford dealership buildings is included as Attachment B.

Native American Heritage Commission

Native American consultation was initiated by contact with the California Native American Heritage Commission (NAHC) on 18 September 2013 to request a search of the Sacred Lands File for the Project Area. A response was received from the NAHC on 25 September 2013. Although the search failed to yield information on Native American cultural resources located within or adjacent to the project area, the NAHC provided a list of individuals and organizations in the Native American community that may be able to provide information about unrecorded sites in the project vicinity.

The documentation of the original Native American coordination is presented within the previous inventory report in Attachment A. The updated sacred lands search and list of contacts obtained from the NAHC in 2013 is presented in Attachment E.

Field Survey

A pedestrian survey of the new areas added to the Project Area was completed on 23 August 2013. All accessible areas were surveyed within the project footprint, including the West Antioch Creek channel and all other areas used for soil stockpiling and hauling operations.

The first area surveyed (APN-074-130-081) was an open grass field located in the southwestern portion of the project, proposed for soil stockpiling. This area consisted of a multi-leveled graded field with short, sparse grasses and weed vegetation. The ground surface was mostly visible with approximately 60 percent visibility. Due to the grading, the entire field has been disturbed and no cultural resources were identified. Several areas of modern refuse and transient camps were observed in the southern portions of the field.

An area in the northern end of the project area (APN-074-040-044) consisting of a wide channel of the creek, was not accessible due to enclosed fencing from adjacent buildings as well as the railroad right-of-way. This area consisted primarily of tall reeds and overgrown creek vegetation, which was observed as

impenetrable. An additional football-shaped soil stockpiling area (APN-074-040-036) located along the west side of O Street and south of the railroad right-of-way could not be accessed due to a chain-link fence surrounding the perimeter. This area was observed from the east side of the fence and appeared to be graded with a surface of pavement and gravel with a concrete ditch set around the perimeter.

Three other open fields proposed for soil stockpiling were surveyed at 15-meter transect intervals. These areas included parcels APN-074-130-076, APN-074-130-064, and a 200 by 200 foot parcel along the southwest intersection of 10th and O Streets. No newly identified cultural resources were observed within the surveyed areas.

Status of Cultural Resources in the Project Area

No archaeological sites were identified in the Project Area. The Project Area contains several buildings and structures that have been evaluated as not eligible. The West Antioch Creek Canal (EC-10-34) was evaluated as not eligible by ECORP (see Attachment A). The Eames Ford dealership buildings were also previously evaluated as not eligible by Mead & Hunt (see Attachment B).

There are no cultural resources evaluated as eligible for the CRHR or NRHP in the Project Area. Therefore, no known Historical Resources, as defined by CEQA, will be impacted by the Project, and no known Historic Properties, as defined in Section 106 NHPA, will be affected.

Unanticipated Discovery

There remains a possibility that unrecorded cultural resources are present beneath the ground surface, and that such resources could be exposed during project construction. Both CEQA and Section 106 of the National Historic Preservation Act require the lead agency to address any unanticipated cultural resource discoveries during project construction. Therefore, ECORP recommends the following mitigation measures be adopted and implemented by the lead agency to reduce potential adverse impacts to less than significant.

Mitigation Measure #1: Unanticipated Discovery: If subsurface deposits believed to be cultural or human in origin are discovered during construction, then all work must halt within a 100-foot radius of the discovery. A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeologist, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no-work radius as appropriate, using professional judgment. A Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission, may also be required.

Work cannot continue within the no-work radius until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the NRHP or CRHR.

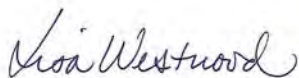
If a potentially-eligible resource is encountered, then the archaeologist, lead agency, and project proponent shall arrange for either 1) total avoidance of the resource, if possible; or 2) test excavations to evaluate eligibility and, if eligible, total data recovery as mitigation. The determination shall be formally documented in writing and submitted to the lead agency as verification that the provisions in CEQA/NEPA for managing unanticipated discoveries have been met.

In the event that evidence of human remains is discovered, construction activities within 100 feet of the discovery will be halted or diverted and the requirements of Mitigation Measure #1 will be implemented. In addition, the provisions of Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and Assembly Bill 2641 will be implemented. When human remains are discovered, state law requires that the discovery be reported to the County Coroner (Section 7050.5 of the Health and Safety Code) and that reasonable protection measures be taken during construction to protect the discovery from disturbance (AB 2641). If the Coroner determines the remains are Native American, the Coroner notifies the Native American Heritage Commission which then designates a Native American Most Likely Descendant (MLD) for the project (Section 5097.98 of the Public Resources Code). The designated MLD then has 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains (AB 2641). If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (Section 5097.94 of the Public Resources Code). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (Section 5097.98 of the Public Resources Code). This will also include either recording the site with the NAHC or the appropriate Information Center; using an open space or conservation zoning designation or easement; or recording a document with the county in which the property is located (AB 2641).

The Lead Agency is responsible for ensuring compliance with these mitigation measures because damage to significant cultural resources is in violation of CEQA and Section 106. Section 15097 of Title 14, Chapter 3, Article 7 of CEQA, *Mitigation Monitoring or Reporting*, "the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects. A public agency may delegate reporting or monitoring responsibilities to another public agency or to a private entity which accepts the delegation; however, until mitigation measures have been completed the lead agency remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program."

If you have any questions or comments about the cultural resources supplemental report, please contact me at lwestwood@ecorpcconsulting.com or by phone at (916) 782-9100. Questions regarding the Project may be directed to Chris Stabenfeldt at cstabenfeldt@ecorpcconsulting.com or (916) 782-9100.

Sincerely,



Lisa Westwood, RPA
Cultural Resources Manager

Enclosures:

- Attachment A: Confidential Cultural Resources Inventory Report West Antioch Creek Public Safety Improvement Project, 2010*
- Attachment B: Historic Architectural Evaluation of the Former Al Ford Dealership Buildings, 2013
- Attachment C: Updated Records Search Confirmation
- Attachment D: Updated Field Survey Photographs
- Attachment E: Updated Native American Coordination

* Westwood and Pappas, 2010, *Cultural Resources Inventory Report, West Antioch Creek Public Safety Improvement Project, City of Antioch, Contra Costa County, California, Project No. 2009-040*

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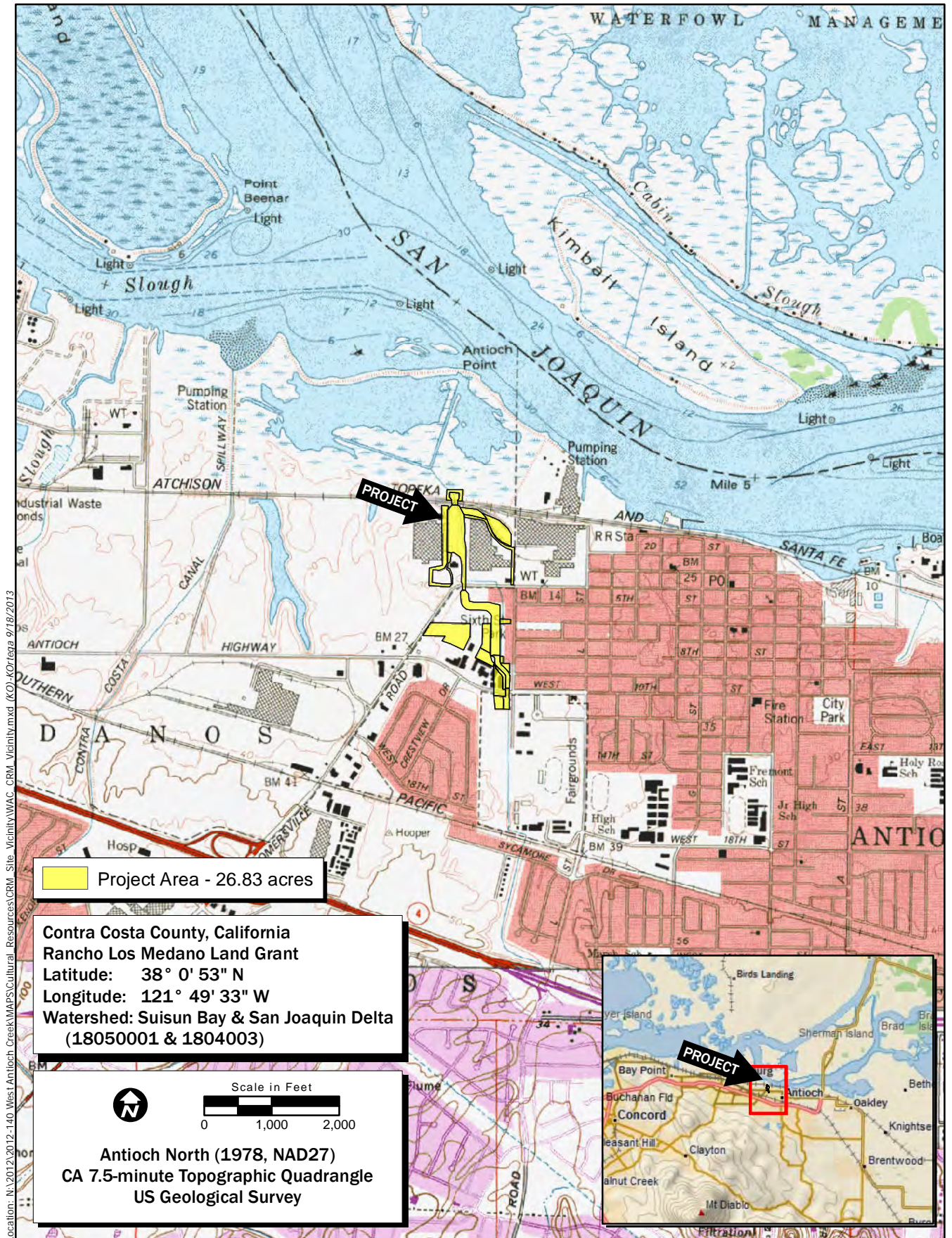
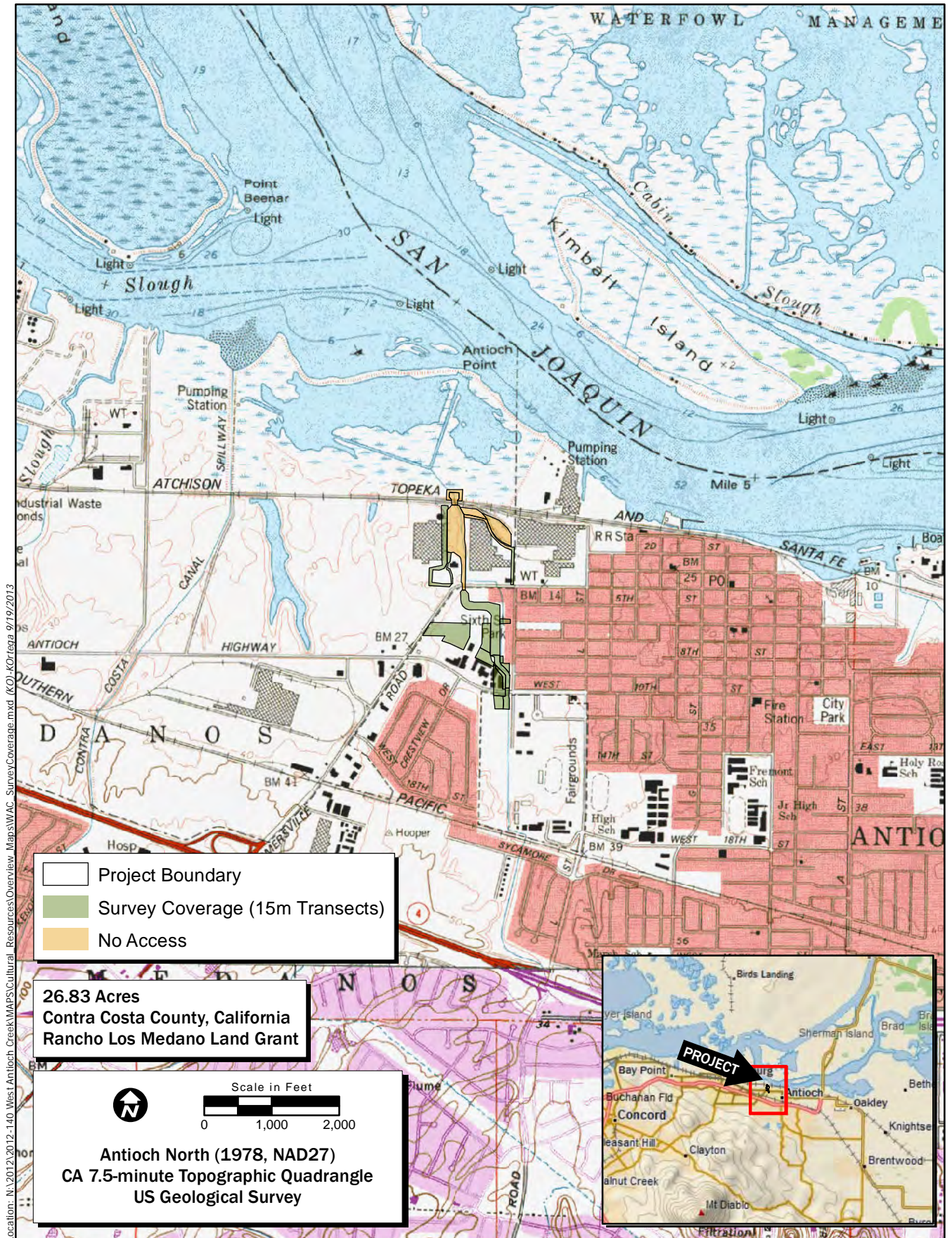


Figure 1. Project Location and Vicinity

2013-041 West Antioch Creek-Culvert



Map Date: 9/19/2013
 Service Layer Credits: Copyright © 2012 Delorme

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 ENVIRONMENTAL CONSULTANTS

Figure 2. Survey Coverage

2013-041 West Antioch Creek-Culvert

ATTACHMENT A

Confidential Cultural Resources Inventory Report
West Antioch Creek Public Safety Improvement Project, 2010

This Attachment contains information on the specific location of cultural resources. This information is not for publication or release to the general public. It is for planning, management and research purposes only. Information on the specific location of prehistoric and historic sites is exempt from the Freedom of Information Act and California Public Records Act.

DRAFT
CONFIDENTIAL

Cultural Resources Inventory Report
West Antioch Creek Public Safety Improvement Project
City of Antioch, Contra Costa County, California
Project No. 2009-040

Prepared For:
Contra Costa County Public Works Department
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July 2010



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Attachment B – Native American Consultation

Attachment C – Project Area Photographs

Attachment D – ***Confidential*** Cultural Resource Site Locations and Site Records

1.0 MANAGEMENT SUMMARY

In 2010, the Contra Costa County Public Works Department (CCCPWD) retained ECORP Consulting, Inc. (ECORP) to conduct a cultural resources inventory for the proposed West Antioch Creek Public Safety Improvements Project (Project). CCCPWD proposes to replace a culvert and concrete-lined ditch that conveys a portion of West Antioch Creek in the City of Antioch, Contra Costa County, California (Project Area). The purpose of the project is to alleviate flooding of the intersection of O Street and 10th Street, which is caused by an undersized ditch segment.

The cultural resources inventory included a records search, literature review, and field survey. The records search results indicated that nine previous cultural resources studies have been conducted within one mile of the Project Area. As a result of those studies, no sites have previously been recorded within the Project Area; however, ten cultural resources have been recorded within one mile of the Project Area.

As a result of the field survey, one cultural resource was recorded inside the Project Area: the West Antioch Creek Canal (EC-10-34). This resource has been evaluated at *not eligible* using the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) eligibility criteria. Recommendations for the selection of project alternatives and for the management of unanticipated discoveries are provided.

2.0 INTRODUCTION

In May 2010, ECORP was retained by the CCCPWD to conduct a cultural resources inventory of the proposed Project Area located in the City of Antioch, Contra Costa County, California. A cultural resources survey of the property was required to identify potentially eligible cultural resources (archaeological sites and historic buildings, structures, and objects) that could be affected by the project.

2.1 Project Location

The Project Area consists of approximately two acres of property located in an unsectioned portion (part of the Los Medanos land grant) of Township 2N, Range 1E, Mount Diablo Base and Meridian, as depicted on the 1978 Antioch North USGS 7.5' topographic quadrangle map (Figures 1 and 2). The Project Area is situated west of O Street and generally north of 10th Street in the northwestern portion of the City. It traverses two Assessor Parcel Numbers (APNs): 074-130-060 (former Ford dealership) and 074-130-050 (vacant parcel). Adjacent properties that may be impacted include the apartment complex (APNs 074-130-056, -057, and -058) and the Holiday Lodge hotel (APN 074-130-077).

2.2 Project Description

The Contra Costa County Flood Control and Water Conservation District (FC District) and the City of Antioch propose to replace the undersized culvert under 10th Street and a 650-foot long stretch of a concrete-lined ditch that both carry a segment of West Antioch Creek. The purpose

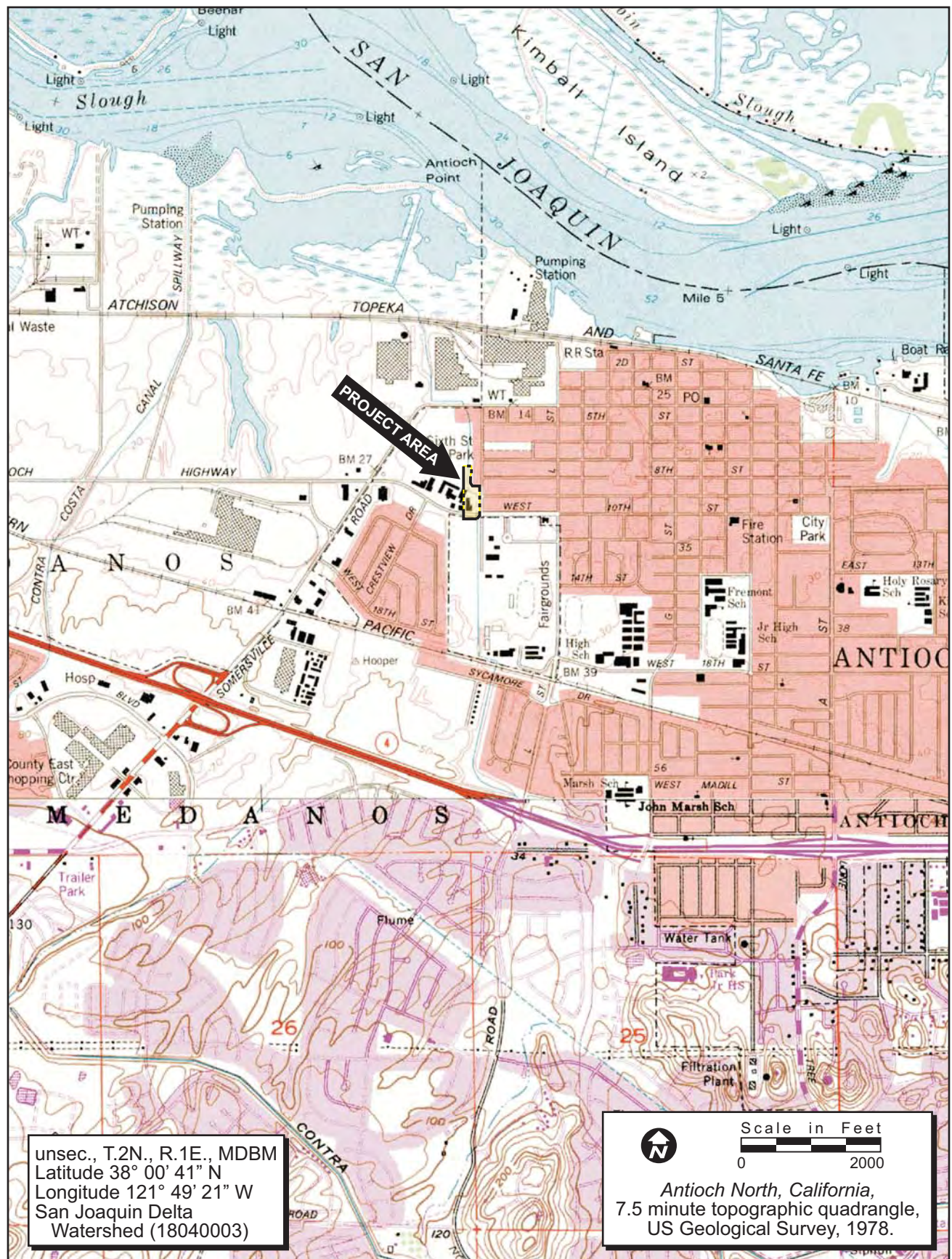


FIGURE 1. Project Site and Vicinity

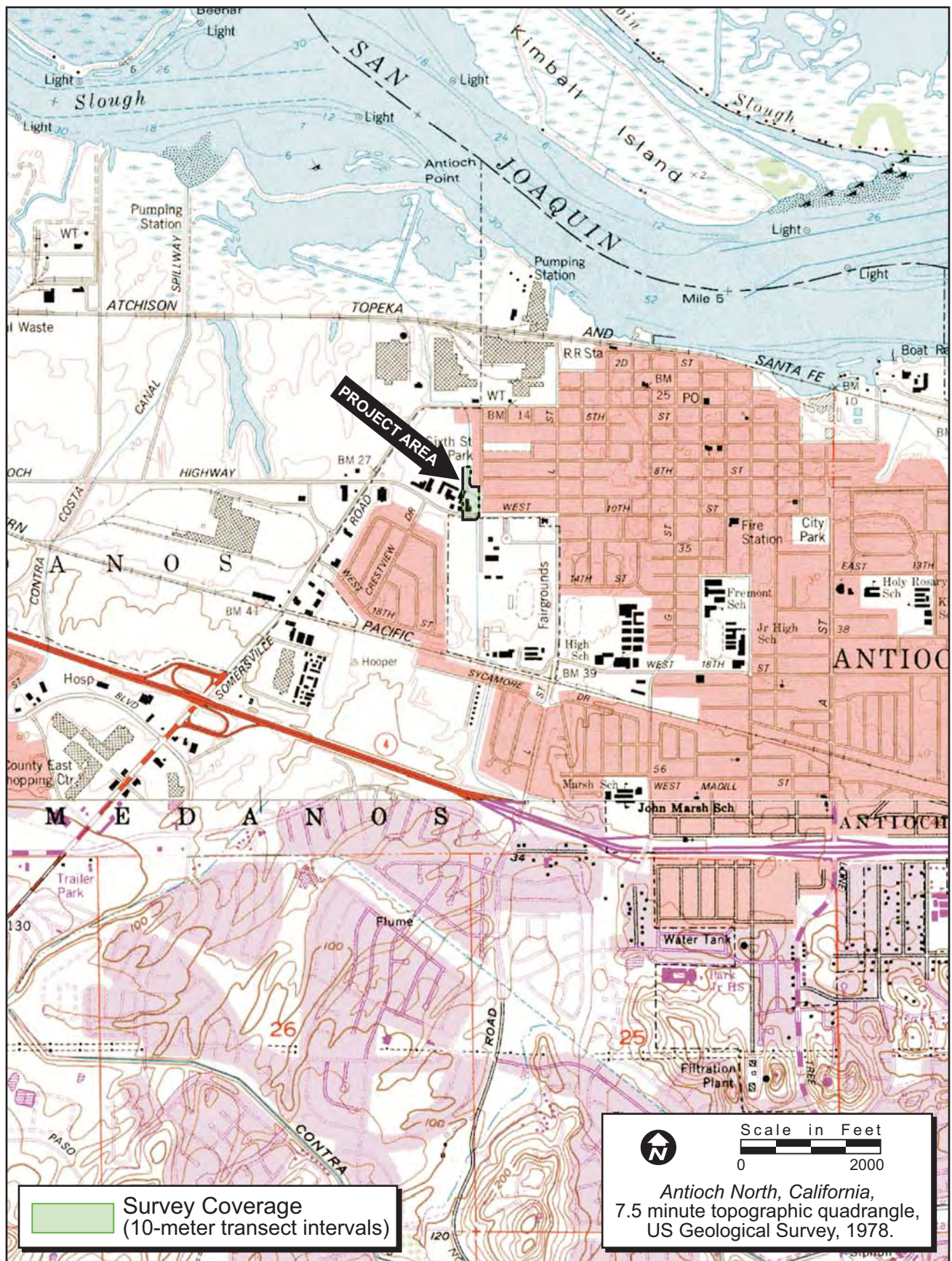


FIGURE 2. Area of Potential Effect and Coverage

2009-040 Contra Costa County On-Call: West Antioch Creek

of the project is to alleviate flooding of the intersection of O Street and 10th Street, which is caused by an undersized ditch segment. Three alternatives to replace these facilities have been proposed, as detailed in the written project description provided by CCCPWD (March 3, 2010) (Figure 3). In all three options, the existing concrete-lined ditch, culvert, and wood-plank decking will ultimately be removed or filled in, and the new alignment will eliminate the nearly 90-degree bends in the existing channel.

Alternative 1, the preferred alternative, involves the installation of a sub-grade box culvert that will preserve the most recent use of the former Ford dealership property. It will require the removal of the carport at the apartment complex, but there will be no impacts to the apartment buildings.

Alternative 2 would include the installation of multiple box culverts and an open concrete-lined channel along the approximate path of Alternative 1. The use of an open channel through the former Ford dealership parking lot would eliminate future use in that capacity. No structures or buildings would be removed as a result of this alternative.

Alternative 3 would use a combination of a multiple box culvert and an earthen channel that would be constructed west of the proposed alignments for Alternative 1 and 2. This alternative would require demolition of two buildings - the two former Ford dealership buildings and one of the Holiday Lodge hotel buildings.

2.3 Area of Potential Effect

The Area of Potential Effects (APE) is illustrated in Figures 1 and 2 and also represents the survey coverage area. It is composed of an S-shaped alignment that measures approximately 300 feet wide and 2,000 feet long. The vertical APE depends upon the alternative selected; however, it is expected to extend no deeper than 15 feet below the surface.

2.4 Regulatory Context

To meet the regulatory requirements of this project, this cultural resources investigation was conducted pursuant to the provisions for the treatment of cultural resources contained within Section 106 of the National Historic Preservation Act (NHPA) and in the California Environmental Quality Act (CEQA; Pub. Res. Code § 21000 *et seq.*). The goal of NHPA and CEQA is to develop and maintain a high-quality environment that serves to identify the significant environmental effects of the actions of a proposed project and to either avoid or mitigate those significant effects where feasible. CEQA pertains to all proposed projects that require state or local government agency approval, including the enactment of zoning ordinances, the issuance of conditional use permits, and the approval of development project maps. NHPA pertains to projects that entail some degree of federal funding or permit approval.



Figure 3. Project Alternatives.

NHPA and CEQA (Title 14, CCR, Article 5, Section 15064.5) apply to cultural resources of the historical and prehistoric periods. Any project with an effect that may cause a substantial adverse change in the significance of a cultural resource, either directly or indirectly, is a project that may have a significant effect on the environment. As a result, such a project would require avoidance or mitigation of impacts to those affected resources. Significant cultural resources must meet at least one of four criteria that define eligibility for listing on either the California Register of Historical Resources (CRHR) (Pub. Res. Code § 5024.1, Title 14 CCR, Section 4852) or the National Register of Historic Places (NRHP) (36 CFR 60.4). Cultural resources eligible for listing on the NRHP are automatically eligible for the CRHR.

In anticipation of the possibility that the project may affect waters of the United States (U.S.), thereby requiring the project proponent to meet the requirements of Section 404 of the Clean Water Act and obtain a permit from the U.S. Army Corps of Engineers' Sacramento District Regulatory Branch, this report is also in compliance with the 2007 *Sacramento District Regulatory Branch Guidelines for Compliance with Section 106 of the National Historic Preservation Act of 1966, as amended*. Moreover, because this project qualifies as a federal undertaking, regulations (36 CFR Part 800) implementing Section 106 of the National Historic Preservation Act (NHPA) require that cultural resources be identified and then evaluated using NRHP eligibility criteria.

2.5 Report Organization

The following report documents the study and its findings and was prepared in conformance with the California Office of Historic Preservation's *Archaeological Resource Management Reports: Recommended Contents and Format*. Attachment A includes a confirmation of the records search with the California Historical Resources Information System. Attachment B contains documentation of Native American Consultation. Attachment C presents photographs of the Project Area, and Attachment D includes confidential cultural resource site locations and site records.

Sections 6253, 6254, and 6254.10 of the California Code authorize state agencies to exclude archaeological site information from public disclosure under the Public Records Act. In addition, the California Public Records Act (Government Code §6250 *et seq.*) and California's open meeting laws (The Brown Act, Government Code §54950 *et seq.*) protect the confidentiality of Native American cultural place information. Likewise, the Information Centers of the California Historical Resources Information System maintained by the Office of Historic Preservation prohibit public dissemination of records search information. In compliance with these requirements, and those of the Code of Ethics of the Society for California Archaeology and the Register of Professional Archaeologists, the results of this cultural resource investigation were prepared as a confidential document, which is not intended for public distribution in either paper or electronic format.

3.0 SETTING

3.1 Environmental Setting

The Project Area is located within the built environment of the City of Antioch, California. It is bounded to the east by residential development, and to the west by commercial development. Portions of the Project Area are paved. Apartment buildings and vacant lots are present on the northern and southern ends of the Project Area. The County Fairgrounds are also located directly south of the Project Area.

The Project Area includes a channelized section of West Antioch Creek, which flows into the San Joaquin River, located approximately 0.5 mile north of the Project Area. Elevations range from 20 to 30 feet above mean sea level.

3.2 Geology and Soils

The Natural Resources Conservation Service of the US Department of Agriculture lists two soil types present inside the Project Area: Brentwood Clay Loam and Sycamore Silty Clay Loam. Brentwood Clay Loam, which is present in the southern two thirds of the Project Area, is characterized as a well-drained alluvium that is derived from sedimentary rock. Sycamore Silty Clay Loam, which is mapped in the northern third of the Project Area, is described as a poorly-drained alluvium, also derived from sedimentary rock (United States Department of Agriculture (USDA) 2010). Interestingly, both soil types are characterized as having no flooding or ponding potential, which suggests that the flooding problems observed in the Project Area are related to increased runoff from paved surfaces upstream along West Antioch Creek.

Given the presence of alluvium and the proximity to the San Joaquin River, there is a potential for buried subsurface cultural deposits. In addition, the location of any such deposits may not be predictable by the course of West Antioch Creek, as its channel was previously modified during earlier flood control efforts.

3.3 Vegetation and Wildlife

The plant species found in this area include non-native weedy herbaceous species, such as wild oats (*Avena* sp.), ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), prickly lettuce (*Lactuca serriola*), curly dock (*Rumex crispus*), tall white-top (*Lepidium latifolium*), dallis grass (*Paspalum* sp.), and mustard (*Brassica* sp.). Woody vegetation is limited to scattered ornamental species, such as fan palm (*Washingtonia robusta*).

Wildlife species that may occur in this area include a variety of urban generalist species, such as American crow (*Corvus brachyrhynchos*), house finch (*Carpodacus mexicanus*), Brewer's blackbird (*Euphagus cyanocephalus*), striped skunk (*Mephitis mephitis*), and house mouse (*Mus musculus*).

4.0 CULTURAL CONTEXT

4.1 Regional Prehistory

It is generally believed that human occupation of California began at least 10,000 years before present (B.P.). The archaeological record indicates that between approximately 10,000 and 8,000 years B.P., a predominantly hunting economy existed, characterized by archaeological sites containing numerous projectile points and butchered large animal bones. Animals that were hunted probably consisted mostly of large species still alive today. Bones of extinct species have been found, but cannot definitely be associated with human artifacts. Although small animal bones and plant grinding tools are rarely found within archaeological sites of this period, small game and floral foods were probably exploited on a limited basis. A lack of deep cultural deposits from this period suggests that groups included only small numbers of individuals who did not often stay in one place for extended periods (Wallace 1978).

Around 8,000 years BP, there was a shift in focus from hunting towards a greater reliance on plant resources, with a slight reduction in mobility. Archaeological evidence of this trend consists of a much greater number of milling tools (e.g., metates and manos) for processing seeds and other vegetable matter. The period from 10,000 B.P. to 5,500 years B.P. (8,000 to 3,500 B.C.) is referred to as the Early Holocene (Shell Bead Period Scheme D) or Lower Archaic (Economic Period) (Milliken *et al.* 2007). Sites associated with the later part of this time period, such as the Metcalf Creek Site (CA-SCL-178), Duncan's Landing Site (CA-SON-348/H), and a burial at CA-CCO-637, have numerous millingstones and handstones, along with a variety of wide-stemmed and leaf-shaped projectile points, characteristic of a diverse and mobile forager economic pattern (Fredrickson 1989a, cited in Milliken *et al.* 2007).

The Early Period (Middle Archaic), between about 3,500 and 500 B.C. (5,500 and 2,450 years B.P.) showed the first indicators of decreased mobility and regional trade networks (Milliken *et al.* 2007). *Olivella* and *Haliotis* shell beads, sometimes associated with red ochre, began to appear in burials dating to this time period, such that rectangular *Haliotis* and *Olivella* beads are the markers of the Early Period bead horizon until 2,800 years ago (Ingram 1998; Wallace and Lathrop 1975; Gerow 1968; Milliken *et al.* 2007). Obsidian trade - particularly distribution of obsidian from the Clear Lake and Napa sources - began during this time period.

The Lower Middle Period (Initial Upper Archaic) between 500 B.C. and A.D. 430 (2,450 and 1,520 years B.P.) is signaled by the virtual disappearance of the rectangular shell beads, which had been in use for the previous three millennia. They were replaced by split-beveled and tiny saucer *Olivella* beads, which have been interpreted as decorative and religious in function. The indicators for increasing sedentism that had begun in the Early Period continued during the Lower Middle Period, by which time thick, rich, black midden soils had accumulated at habitation sites, possibly indicating use of multi-seasonal residential bases. Bone and shell tools and ornaments began to appear as well (Milliken *et al.* 2007).

The Upper Middle Period (Late Upper Archaic) between A.D. 430 and 1050 (1,520 and 900 years B.P.) was marked by a dramatic cultural disruption. The *Olivella* saucer bead network completely collapsed, and half of the sites were abandoned. The shell bead assemblages and burial patterns of this time period reflect a new cultural tradition emerging in the Bay Area,

referred to as the Meganos complex. The new cultural expressions that accompanied the Meganos complex may be associated with the arrival of a new group of people - one that preferred sea otter pelts for cloaks or vests and dorsal extended burials (Milliken *et al.* 2007).

The Initial Late Period (Lower Emergent) and Terminal Late Period (Protohistoric) occurred between A.D. 1050 and 1550 (900 and 400 years B.P.) and between A.D. 1550 and 1776, respectively. These periods are characterized by fully shaped mortars, new *Olivella* and *Haliotis* bead types and ornaments, effigies, arrow-sized projectile points, and social elite control of obsidian, which point towards an increase in social stratification. The Terminal Late Period was characterized by the emergence of clam shell disk beads, which abruptly replaced the signature *Olivella* bead types. Some suggest that the change in shell bead types, mortuary wealth distribution, and technology shifts was a result of populations exceeding the environment's carrying capacity, or forced migrations due to conflict, or both (Milliken *et al.* 2007).

4.2 Ethnography

Ethnographically, the Project Area lies in the Bay Miwok portion of Eastern Miwok territory, a narrow band of land that stretches between present-day Walnut Creek and Mount Diablo on the west and up the Consumnes and Mokelumne rivers southeast of Sacramento, California. The Eastern Miwok have been divided into two areas: the Bay Miwok and the Plains Miwok. The territory of the Bay Miwok extended eastwards from Walnut Creek in the eastern portion of Contra Costa County to the Sacramento-San Joaquin delta. The Plains Miwok inhabited the southern drainages of the Mokelumne and Consumnes rivers and both banks of the Sacramento River from Rio Vista to Freeport (Levy 1978).

Plains and Bay Miwok are each part of a distinct language group which covered a large geographic area. However, politically the Miwok were divided into much smaller groups known as tribelets. Each tribelet, containing 100 to 500 inhabitants, was an independent polity that controlled all natural resources within a defined boundary. The Settlements within a tribelet included semi-permanent settlements and a larger number of seasonally occupied campsites, used for hunting, fishing, and gathering when away from the permanent settlement. One tribelet near Antioch, *Chupcan*, is documented as having been occupied during the early Historic period (1804 to 1812) (Levy 1978).

Tribelets were composed of several settlements. The capital of the tribelet was the principal settlement where the chief of the tribelet resided. The capital contained a subterranean assembly house and a mourning/ceremonial house. Residential structures were typically conical and covered with bark or thatched tule with a central pole support. Tule balsa boats and nets made from hemp and milkweed were used for fishing. The bow and arrow was common for hunting land mammals. Hunted animals included deer, elk, antelope, bear, and a variety of small mammals. Fish, mussels, clams, and snails were common staples. Seeds, oats, acorns, pine nuts, mushrooms, greens, roots, and berries were gathered. Some burning of meadows was practiced to increase the harvest of seeds and to lure deer to new growth (Levy 1978).

The Eastern Miwok first encountered Spanish exploratory groups in the second half of the eighteenth century. Towards the end of the 1700s, Spanish missions near the coast attempted to bring Eastern Miwok to the coastal missions to replenish the declining native populations at

the missions. The first half of the nineteenth century marks a period of decline in the native population as a result of missionization and the spread of epidemics of European diseases. As a way of resisting Spanish incursions, the Eastern Miwok seemed to have formed groups consisting of multiple tribelets in order to assemble larger fighting forces against the Spanish. During this period, the Eastern Miwok diet was supplemented by beef and horse meat obtained during raids on Spanish herds. During the 1840s, an influx of settlers made up of Euro-Americans brought with them a new wave of diseases. Plains Miwok in the Central Valley became involved in agricultural work on the big land-grant ranchos and in gold mining at the start of the gold rush. The population of the Eastern Miwok drastically dwindled during the 19th Century. The population was estimated at nearly 20,000 in 1805. By 1950, only approximately 100 Eastern Miwok were known to remain, mostly on reservations (Levy 1978).

4.3 Regional History

The first significant European settlement of California began during the Spanish Period (1769 to 1821) when 21 missions and four presidios were established between San Diego and Sonoma. Although located primarily along the coast, the missions dominated the majority of the California region during this period. The purpose of the missions and presidios was to establish Spanish economic, military, political, and religious control over the Alta California territory. This included the forced movement of much of the native population to the missions, followed by conversion to Catholicism and instruction in Spanish crafts and agriculture (Castillo 1978; Cleland 1941).

During the Spanish period several Spanish exploratory expeditions led by Fages, Portolá, Crespi, Anza, Rivera, and Moraga passed through the Project vicinity to explore the Central Valley (Levy 1978:486). The initial Spanish exploration of the San Ramon, Amador, and Livermore Valleys took place between 1769 and 1810 (Levy 1978).

The Mexican Period (1822 to 1848) began with the success of the Mexican Revolution in 1821, but the Spanish mission system continued until the 1830s when the Mexican government secularized the missions. The vast land holdings of the missions in California were divided into large land grants called *ranchos*. The Mexican government granted ranchos along the coast and in the Central Valley to Mexican soldiers and settlers (Castillo 1978).

Following the secularization of the missions in 1833, the Project area became part of the land included in the Rancho los Medanos ("The Sand Hills"), granted to Jose Noriega on July 24, 1835. The Rancho los Meganos consisted of four leagues between Mt. Diablo and Brentwood (Cowan 1956). In 1837, Noriega sold Los Maganos to John Marsh for \$500 (Emanuels 1993; Bramlette *et al.* 1991). Marsh built what became known as the "Stone House" on the rancho in 1856 (Emanuels 1993).

John Sutter, a European immigrant, built a fort at the confluence of the Sacramento and American Rivers in 1839 and petitioned the Mexican governor of Alta (Upper) California for a land grant which he received in 1841. Sutter built a flour mill and grew wheat near the fort (Bidwell 1971). Gold was discovered in the flume of Sutter's lumber mill at Coloma on the South Fork of the American River in January 1848 (Marshall 1971). That same year, the Treaty of Guadalupe Hidalgo ended the Mexican-American War and marked the beginning of the

American Period (1848 to present). California became a U. S. territory in 1848 and a state in 1850. The discovery of gold initiated the 1849 California Gold Rush, bringing thousands of miners and settlers to California, most of whom settled in the north.

4.5 Local History

Contra Costa County is one of the original 27 California counties that were created upon statehood in 1850, with roots in grazing, agriculture, and coal mining, the latter of which took place at the same time as the Gold Rush. In 1848, coal was discovered on the northern slopes of Mount Diablo, attracting immigrants from all over the world, who settled in boomtowns. By 1880, the coal boom had collapsed, leaving many of those towns abandoned. However, the population centers of Pittsburgh, Antioch, and Brentwood, as well as the railroads and road networks that were built to transport coal and passengers, remained and were utilized in subsequent industries, such as sand mining and orchard crops (Estes *et al.* 2006; Kyle 2002).

Although the coal industry was largely replaced with agriculture by 1880, grazing and crop raising had always been an important part of the county's economy. In 1852, S. Hastings, the Contra Costa County Assessor, reported an "estimate of the aggregate quantity of tillable land in this county is 132,500 acres. Grazing land, 53,000 acres. The amount of Government land is probably 4,000 acres." Cattle and barley, along with broom corn, were the dominant livestock and crops raised in the county (Hastings 1852 in Eddy 1852).

In 1857, possibly driven by the demand for beef created by the Gold Rush (Bramlette *et al.* 1991), nearly 80 percent of the land within Contra Costa County was cultivated, primarily with wheat and barley, and was one of the leading egg producers in the state. It is, therefore, no coincidence that cattle and chickens were also the dominant animals raised (Higley 1858). According to J.J. White, County Assessor in 1861 (Higley 1861):

"The valleys in this county extend all the way from fifteen to twenty miles, and are well watered. Even on the hills and mountains innumerable springs are found affording excellent pasture the whole year round for stock of all kinds. Cattle and sheep have done very well; the prices for them are very low and discouraging. Considerable improvement is continually going on in all descriptions of stock-raising in this county-particularly in sheep and horses; the latter, as exhibited at our county Fair, showed that no little attention or pains were taken to improve the breed. In the business of sheep-raising it is certainly difficult to select a better locality, both as to climate and advantages of pasturage, and several persons have taken advantage of the same, as can be seen by the numerous herds that are grazing in the different valleys all over the county. Nor have I heard of any disease existing among them, other than what can be easily remedied by proper care and attention."

The City of Antioch was established by two twin brothers from Maine, William Wiggin Smith and Joseph Horton Smith, who arrived in California in July 1849. The twins were carpenters by trade, as well as ordained ministers. Seeking a new life out West, the two brought their families and began working as carpenters at the New York of the Pacific (now the City of Pittsburg,

approximately 4.5 miles west of Antioch). Dr. John Marsh offered the brothers two-quarter sections of land located on his Los Maganos Rancho (Kyle 2002).

The brothers continued to work at the New York of the Pacific while maintaining their newly acquired land, which they had named Smith's Landing. Eventually, the brothers established a restaurant and hotel called the New York House, primarily used by miners and other travelers heading east during the Gold Rush. In February of 1850, Joseph died of malaria, leaving his brother with both quarter sections of land (Kyle 2002).

In summer of 1851, William received word that a ship of New Englanders landing in San Francisco were looking to establish a colony on the west coast. Eager to attract people onto his land, William met the group of colonists in San Francisco and offered them parcels on which to build homes and create a community. Approximately half of the colonists accepted the offer, while several others headed east to strike it rich in the gold-bearing areas of the Sierra foothills. The name of Antioch was finally chosen at the 1851 Fourth of July picnic held at William's house (Kyle 2002). Over the years, Antioch slowly grew with the local grazing, agriculture, and mining industries and remained a key city within Contra Costa County.

4.5.1 Canals

The need to control the flow of water in Contra Costa County was realized in the early part of the 20th century. According to JRP and Caltrans (2000:76-77), the US Bureau of Reclamation (USBR) constructed the Central Valley Project's (CVP) first canal in 1937, a 46-mile long canal named the Contra Costa Canal, located west of the current Project Area:

This canal was designed primarily to provide water for industries threatened by salinity intrusions into Suisun Bay. It was included in the CVP at least in part as a concession to politically and economically powerful industries which might have otherwise opposed the CVP on the grounds that the project would have increased their salinity problems. These influential companies promoted the "Contra Costa County Conduit" concept, which was supported by the State Water Plan Authority (Jackson and Paterson 1977)

The USBR opened an office in Antioch in 1936 and began surveys of the proposed route. Over the next two years, studies settled on a canal design with a capacity of 350 cfs. As this volume exceeded the USBR's design, the Contra Costa Water District agreed to pay the extra \$500,000 to expand the canal.

Construction was underway even before the canal's final capacity had been set. By 1940, the facility had reached Pittsburg, and test pumping began that July (Jackson and Paterson 1977)

The canal had reached 38 miles west of the Rock Slough intake when the entire CVP was classified as a "limited defense activity," and in May 1942, work was suspended for the duration of World War II. Construction resumed after the War Production Board returned control of the CVP to the USBR in September 1945,

and the Contra Costa Canal system was completed in 1948 (Jackson and Paterson 1977).

Contra Costa Canal within the CVP was to deliver water to “an upland agricultural area, many industrial plants in the upper Bay region, and a number of Contra Costa County municipalities.” The Contra Costa County Water District purchased the water from the USBR and sold it to local retailers. It has continued to do so since the first “interim contract” with the Bureau between 1948 and 1951, and by a finalized agreement since that date (Jackson and Paterson 1977)

The Contra Costa Canal gradually diminishes in size as it wends its way west from its intake at Rock Slough in the Delta to its terminus in Martinez. It is predominantly open and concrete lined, with occasional piped segments laid underground. Siphons, like that on Kirker Creek, carry the canal across major drainages, while small or intermittent waterways pass beneath the canal in culverts. Wasteways and turnouts are provided at regular intervals to drop water to consuming industries along the margin of Suisun Bay. At Port Chicago, the canal swings south and passes through Concord and Pleasant Hill before swinging north to Pacheco and terminating in Martinez Reservoir (Robinson 1979).

4.6 Potential for Buried Resources

Based on the development within and surrounding the Project Area, the potential for buried resources is low. Prior to urban development, the Project Area was used for agricultural production. Both the agriculture and the urban development have altered the original landscape.

5.0 METHODS

5.1 Personnel Qualifications

All phases of the cultural resources investigation were conducted by Registered Professional Archaeologist Lisa Westwood, who meets the Secretary of the Interior’s Professional Qualifications Standards for prehistoric and historical archaeologist. Stephen Pappas co-authored the report, and Dr. Roger Mason, RPA provided technical report review and quality assurance. Resumes are available upon request.

Lisa Westwood is a Registered Professional Archaeologist who meets the Secretary of the Interior’s Professional Qualifications Standards for prehistoric and historical archaeologist with more than 15 years of cultural resource management, contract archaeology, museum curation, and teaching experience in northern and central California, southern Utah, New Mexico, and the Midwest. She holds a B.A. degree in Anthropology and an M.A. degree in Anthropology (Archaeology). She has participated in or supervised numerous survey, testing, and data recovery excavations, has recorded and mapped hundreds of prehistoric and historical sites, and has cataloged, identified, and curated hundreds of thousands of artifacts. She has

conducted evaluations of cultural resources for eligibility to the National Register of Historic Places and California Register of Historical Resources and is well versed in impact assessment and development of mitigation measures for CEQA and Section 106 (NHPA) projects. She has authored or co-authored more than 150 cultural resources management reports.

Stephen Pappas is a Staff Archaeologist and Field Director for ECORP and has six years of experience in cultural resources management, primarily in California and New Mexico. He holds a B.A. degree in Anthropology and has participated in all aspects of archaeological fieldwork, including survey, test excavation, data recovery, and construction monitoring. He has extensive familiarity in meeting the cultural resource requirements of the California Environmental Quality Act (CEQA) and Section 106 of the National Historic Preservation Act.

Roger Mason meets the Secretary of the Interior's Professional Qualifications Standards for prehistoric and historical archaeologist, holding a B.A. degree and a Ph.D. in Anthropology (Archaeology). He is the author of over 200 reports dealing with cultural resource surveys, evaluations, and mitigation programs in California. In addition to comprehensive knowledge of cultural resource management activities, he is adept in the management of many types of projects, supervision and coordination of subconsultants, supervision and training of employees, client relations, federal/state/tribal liaison activities, federal contracting, and proposal and bid preparation. In addition to the numerous technical and professional reports that he has prepared over the years, Dr. Mason has written published articles and monographs, presented professional papers, and provided public lectures. He is a certified member of the Register of Professional Archaeologists.

5.2 Records Search Methods

A records search for the property was completed at the Northwest Information Center (NWIC) on 26 May 2010 (NWIC search #09-1497; Attachment A). The purpose of the records search was to determine the extent of previous surveys within a one-mile (1,600-meter) radius of the proposed project location, and whether previously documented prehistoric or historic archaeological sites, architectural resources, or traditional cultural properties exist within this area.

In addition to the official records and maps for archaeological sites and surveys in Contra Costa County, the following historic references were also reviewed: Historic Property Data File for Contra Costa County (Office of Historic Preservation (OHP) 2010a); *The National Register Information System website* (National Park Service 2010); *Office of Historic Preservation, California Historical Landmarks website* (OHP 2010b); *California Historical Landmarks* (OHP 1996 and updates); *Gold Districts of California* (Clark 2005); *California Gold Camps* (Gudde 1975); *1500 California Place Names* (Bright 1998); *Directory of Properties in the Historical Resources Inventory* (1999); *Caltrans Local Bridge Inventory* (Caltrans 2010b); *Caltrans State Bridge Inventory* (Caltrans 2010a); and *Historic Spots in California* (Kyle 2002).

Other references examined include a property search with the Contra Costa County Mapping Information website (Contra Costa County 2010), historic GLO land patent records (BLM 2010), and numerous aerial photographs taken between 1939 and 2010. Historic maps reviewed include:

- 1908 (reprinted in 1951) USGS Antioch Creek, CA (1:62,500 scale)
- 1953 USGS Antioch North, CA (1:24,000 scale)
- 1953 (Photorevised 1968) USGS Antioch North, CA (1:24,000 scale)
- 1978 USGS Antioch North, CA (1:24,000 scale)

Letters requesting historical information relevant to the Project Area were sent to the Antioch Historical Society and the Contra Costa County Historical Society in order to solicit comments or obtain historical information that either repository might have regarding events, people, or resources of historical significance in the area (Attachment A).

5.3 Native American Consultation Methods

ECORP contacted the California Native American Heritage Commission (NAHC) on 14 May 2010 to request a search of the sacred land files for the Project Area.

ECORP contacted all persons or organizations recommended by the NAHC by letter on 25 May 2010 to request information on unrecorded cultural resources that may exist within the current Project Area, or to inquire about any concerns regarding sacred sites or traditional cultural properties in the vicinity that might be affected by the proposed action. Each individual was subsequently telephoned on 28 and 30 June 2010 to ensure that the materials had been received and to further solicit comments (Attachment B).

5.4 Field Methods

On 2 June 2010, the entire Project Area was subjected to an intensive pedestrian survey under the guidance of the *Secretary of the Interior's Standards for the Identification of Historic Properties* (National Park Service 1983) using transects spaced 10 meters apart. A total of one person-day was expended in the field. At that time, the ground surface was examined for indications of surface or subsurface cultural resources. The general morphological characteristics of the ground surface were inspected for indications of subsurface deposits that may be manifested on the surface, such as circular depressions or ditches. Whenever possible, the locations of subsurface exposures caused by such factors as rodent activity, water or soil erosion, or vegetation disturbances were examined for artifacts or for indications of buried deposits. No subsurface investigations or artifact collections were undertaken during the pedestrian survey.

All cultural resources encountered during the survey were recorded using Department of Parks and Recreation 523-series forms approved by the California Office of Historic Preservation. The resources were photographed, mapped, and sketched as necessary to document their presence. Isolates were to be recorded with a Primary Record and Location Map, while sites were to be recorded with a Primary Record, Archaeological Site Record, Location Map, Sketch Map, and any other pertinent forms. Any cultural resource that contained at least three artifacts in a ten square-meter area or consisted of one or more features was considered a site. Any indications of cultural presence in the Project Area that failed to meet the definition of a site were recorded as isolates or were noted on a location map.

6.0 RESULTS

6.1 Records Search

The records search consisted of a review of previous research and literature, records on file with the NWIC for previously recorded resources, and historical aerial photographs and maps of the vicinity.

6.1.1 Previous Research

Nine previous cultural resource investigations have been conducted within one mile of the property, covering approximately 15 percent of the total area surrounding the property within the record search radius (Table 1). These studies revealed the presence of historical sites including railroads, refuse dumps, residences, and school buildings. The previous studies were conducted between 1976 and 2007 and vary in size from 1.74 acres to 7,000 acres.

Table 1 – Known Cultural Studies In or Within 0.5 Mile of the Project Property

Report Number	Author(s)	Report Title	Year	Area Covered	Includes Project Area
11826	Theodoratus Cultural Research	Montezuma I & II Cultural Resources	1980	N/A	No
13256	Allan G. Bramlette, et al.	Archaeological Resources Inventory for Los Vaqueros Water Conveyance Alignments, Contra Costa County, California	1991	7,000 Acres	Yes
18352	Busby, Colin I.	Assessment of Archaeological Resources: East/Central Contra Costa County Wastewater Management Plan	1976	N/A	Yes
21181	Basin Research Associates	Cultural Resources Assessment- Proposed Housing Site Between West 7 th and 9 th Streets and I Street, City of Antioch, Contra Costa County, California	1997	1.74 Acres	No
22812	Basin Research Associates	Contra Costa County Water Multipurpose Pipeline Project, Environmental Documentation Study, Cultural Resources Review	1997	Unspecified Linear Survey	Yes
31405	William Self Associates, Inc.	Archaeological Survey and Cultural Resources Assessment for the City of Antioch's proposed Antioch Recycled Water Pipeline project	2006	Unspecified Linear Survey	Yes
33545	National Park Service (Western Regional Office)	Draft Comprehensive Management Plan, Environmental Impact Statement, Juan Bautista de Anza National Historic Trail, Arizona and California	1994	N/A	No

Table 1 – Known Cultural Studies In or Within 0.5 Mile of the Project Property (Continued)

Report Number	Author(s)	Report Title	Year	Area Covered	Includes Project Area
33821	Jones & Stokes	Cultural Resources Inventory Report for the Ironhouse Sanitary District, Wastewater Treatment Plant Expansion, Contra Costa and Sacramento Counties, California	2007	N/A	Yes
35196	William Self Associates, Inc.	Cultural Resource Assessment, Delta Diablo Sanitation District and the City of Antioch, Recycled Water Pipeline Extension Project, Antioch, Contra Costa County, California	2006	Unspecified Linear Survey	Yes

The results of the records search indicate that areas along the creek have been previously surveyed for cultural resources through several linear and block surveys. The records search also determined that ten previously recorded historic-era cultural resources are located within one mile of the Project Area (Table 2).

Table 2 – Known Cultural Resources In or Within 0.5 Mile of the Project Property

Site Number CA-CCO-	Primary Number P-07-	Recorder and Year	Age/ Period	Site Description
718H	806	S. Ashkar 1998; J. Smallwood 2004; S. Atchley, G. Roark 1999	Historic	Atchison, Topeka, and Santa Fe Railroad Line
N/A	813	S. Baker 2006	Historic	Southern Pacific: Northern Contra Costa Route
N/A	2563	R. Harmon 2002	Historic	Antioch Marina spoils site
N/A	2779	M. Dobkin, W. Hill 2006	Historic	Sycamore Park Subdivision
N/A	2780	B. Larson, J. Cheney, M. Bunse 2002	Historic	Hawthorne Hill Subdivision
N/A	2784	B. Larson 2002	Historic	John Marsh Elementary School
N/A	2884	Site record missing from NWIC	Historic	Residence on 20th Street
N/A	2885	M. Dobkin, W. Hill 2006	Historic	329 West 20 th Street
N/A	2886	M. Dobkin, W. Hill 2006	Historic	415 West 20 th Street
N/A	2887	Site record missing from NWIC	Historic	Residence on 20th Street

6.1.2 Records

The *Office of Historic Preservation's Directory of Properties, Historic Property Data File* (OHP 2010a; dated 2/8/2010) did not include any properties within the Project Area; however, many properties were listed within the City of Antioch, primarily historic-era buildings and structures.

The National Register Information System website (National Park Service 2010) failed to reveal any listed or eligible properties within the Project Area; however, the R. B. Hard building is

located 0.55 mile northeast of the Project Area, the Riverview Union High School is located 0.3 mile to the northwest, and the Williamson Ranch is located south of the City of Antioch.

A review of *California Historical Landmarks* (OHP 1996) listed the nearest historical landmark as Number 932: Mount Diablo Coal Field, located 4.3 miles southwest of the Project Area. The OHP Website for California Historical Landmarks also lists the Mount Diablo Coal Field as the nearest landmark (OHP 2010).

A review of *Historic Spots in California* (Kyle 2002) notes that the City of Antioch is located within the Rancho Los Medanos, meaning “the sandbanks.” The 8,859 acres of land was granted to Jose Noriega in 1835 and two years later he sold the land to John Marsh, a local doctor and scholar.

Kyle (2002) describes the City of Antioch as being established by twin brothers, William Wiggan and Joseph Horton Smith, in December 1849. Originally called Smith's Landing, the brothers established the first hotel and eating establishment, known as the New York House. When a group of settlers landed in San Francisco wishing to establish a colony, William Smith met them and convinced many of them to settle at Smith's Landing.

A review of *1500 California Place Names* (Bright 1998) mentions that the residents named the City of Antioch during a picnic in 1851. The name comes from a city in Syria mentioned in the Bible.

Historic federal government land patent records available on the BLM's General Land Office (GLO) website (BLM 2010) revealed that the Project Area in Township 2 North, Range 1 East was part of the 8,859-acre Rancho Los Medanos land grant patented to Ellen Fallon, Michael Murray, Jonathan D. Stevenson, and James Welch on October 8, 1872 (Table 3).

Table 3 – GLO Land Patent Records

Patentee	Patent Date	Serial Number	Patent Type/Authority	Location
Ellen Fallon, Michael Murray, Jonathan D. Stevenson, James Welch	10/8/1872	CACAAA 000476	March 3, 1851: Grant-Spanish/Mexican (9 Stat. 631)	8,859 Acres

A search on the Contra Costa County Mapping Information website (Contra Costa County 2010) revealed that APN 074-130-060 consists of 83,800 square feet with a “commercial/auto agencies” land use description. APN 074-130-050 consists of 19,428 square feet with a “government owned/institutional” land use description.

The Caltrans Structure, Maintenance & Investigations website for state (Caltrans 2010a) and local (Caltrans 2010b) bridges did not list any historic bridges in or within 1.0 mile of the Project Area.

The *Handbook of North American Indians* (Wilson and Towne 1978) lists the nearest Native American village as *Chupcan*, located approximately one mile east of the Project Area. From 1804 to 1812, an estimated 103 *Chupcan* villagers were baptized.

No responses from the letters sent to the Antioch Historical Society or the Contra Costa County Historical Society have been received to date.

6.1.3 Map Review and Aerial Photographs

The review of historical aerial photographs and maps of the Project Area provide information on the past land uses of the property.

- The 1908 (reprinted in 1951) USGS Antioch Creek, CA (1:62,500 scale) map does not indicate the West Antioch Creek in the approximate location of the Project Area.
- Aerial photographs taken in 1939 show the Project Area as an undeveloped plot of land that appears to have been used for agricultural production. The portion of the West Antioch Creek within the Project Area is not clearly visible on the aerial photographs; however, a faint north/south line near the Project Area can be seen as connecting to the southern portion of the creek. The areas east of the Project Area appear to have been graded with east/west rows of unidentified objects.
- The 1953 USGS Antioch North, CA (1:24,000 scale) map shows a building west of the Project Area near the intersection of West 10th and O Streets. This map also shows the westward extension of West 10th Street, directly south of the Project Area. The West Antioch Creek does not appear on the map.
- Aerial photographs taken in 1958 show the Project Area primarily as open fields and the currently-standing Holiday Lodge. One building located directly east of the lodge facilities appears in the photos. The portion of West Antioch Creek within the Project Area appears on the photographs, heading north from the intersection of O and W 10th Streets, then curving northwest, and then heading straight north. The portion of the creek north of the Project Area continues to run straight north till it intersects West 4th Street (currently, the creek turns west between West 5th and West 6th streets, then north again to avoid commercial buildings along West 4th Street.
- Aerial photographs from 1965 show several objects (possibly automobiles) within a parking lot and a large building (Ford dealership) directly west of the Project Area. The building located east of the Holiday Lodge complex still appears, and is located west of the Ford dealership building. The photographs also reveal that the West Antioch Creek concrete channel (current configuration) had been constructed around the perimeter of the parking lot.
- The 1953 (Photorevised 1968) USGS Antioch North, CA (1:24,000 scale) map shows the addition of the creek alignment within the Project Area. Several additional buildings are located east and west of the Project Area.

- The 1978 USGS Antioch North, CA (1:24,000 scale) map shows the Project Area and surrounding areas in their current state, with the addition of the apartment buildings located directly east of the northern end of the Project Area.

In summary, the Project Area appears to have been originally used for agricultural purposes, which may have included crops or grazing, or both. Between 1939 and 1953, the portion of West 10th Street located directly south of the Project Area was constructed, as well as the Holiday Lodge complex on the western end of the Project Area. Between 1953 and 1958, West Antioch Creek appears to have been modified, creating a curve in a northwestern direction offsetting the creek to the west. Between 1958 and 1965 the creek's concrete channel within the Project Area had been constructed. While more buildings were constructed, other portions of the creek north of the Project Area were offset and redirected.

6.2 Native American Consultation Results

A search of the Sacred Land File by the NAHC failed to indicate the presence of Native American cultural resources in the Project Area. Follow-up telephone calls were successful in gathering comments on the proposed project from the list of Native American contacts provided by the NAHC. Both Andrew Galvan of the Ohlone Indian Tribe and Ramona Garibay of the Trina Marine Ruano Family had no concerns or knowledge of any resources within the Project Area. Two detailed telephone messages were left for Katherine Erolinda Perez, but no responses have been received. A record of all correspondence is provided in Attachment B. If any additional comments are received after the submission of this report, then they will be forwarded to the lead agencies for further consideration and appropriate action.

6.3 Field Survey Results

Due to access issues, the field survey was carried out in sections. Using a gate key provided by CCCPWD, the fenced vacant lot located directly south of the apartment complex was first surveyed. The lot was heavily vegetated with annual weeds and plants, and had a large concentration of modern urban trash, such as bottles, plastic, shoes, CDs, and roof shingles, which appeared to have been thrown over the fence from the apartments or from the sidewalk along O Street (Figure 4). None of the debris was identified as historical and therefore, was not recorded or given further consideration in the current study.



Figure 4. Inside vacant lot, adjacent to apartment complex (at left); view east toward O Street.

The canal corridor was surveyed in sections. The portion south of 10th Street was accessed from the fairgrounds property. This portion of the canal was unlined and channeled water northward, under 10th street by a pair of culverts (Figure 5). The channel was approximately 10 feet wide; due to the presence of flowing water, the depth could not be determined. No evidence for cultural resources, other than the canal itself, was identified in this portion of the survey area.



Figure 5. Canal, south of 10th Street, view north; car dealership in background at left.

The portion of the canal that traversed along the eastern side of the car dealership property was found to be improved, either by concrete lining or with a 20-foot wide wooden boardwalk, or both. As a result of the high percentage of pavement or concrete cover, very little natural ground surface was visible. On the northern side of 10th Street, the canal emerges from culverts as a concrete lined canal, covered by a wooden boardwalk for approximately 200 feet, upon which cars were parked at the time of the survey (Figure 6). No evidence for cultural resources, other than the canal itself, was identified in this portion of the survey area.



Figure 6. Wooden boardwalk covering canal along car dealership property; view south towards 10th Street, with O Street at left. Main building of dealership at right.

North of the boardwalk, the canal is again open, and concrete lined, as it makes two nearly 90-degree bends around the car dealership and apartment buildings (Figure 7). The canal measures approximately 20 feet wide (top of bank to top of bank), but due to flowing water, the depth could not be determined. Thick natural vegetation is present between the concrete and chain link fences on either side of the canal, making a pedestrian survey of the portion of the canal shown in Figure 7 very dangerous and impossible. However, those portions of the canal were easily viewed from the other side of the chain link fence, so that survey coverage was complete. No evidence for cultural resources, other than the canal itself, was identified in this portion of the survey area.



Figure 7. Project overview of central portion of canal (view west); secondary building of auto dealership in background.

North of the second bend, and adjacent to the apartment complex, the canal returns to an earthen lining, supported by stone rip-rap in some places (Figure 8). Proceeding northward, outside of the project area, the channel takes on a braided configuration, and is filled with large quantities of modern urban trash. The entire channel from the end of the concrete to its terminus at 4th Street was surveyed. No evidence for cultural resources, other than the canal itself, was identified in this portion of the survey area.



Figure 8. View of unlined channel north of Project Area (view south), with apartment complex at left.

Finally, the paved portion of the Project Area around the auxiliary building of the Holiday Lodge complex and the secondary automotive building next to the former Ford dealership was also surveyed (Figure 9). The building was found to be in disrepair, as the majority of the complex appears to have been abandoned. No evidence for cultural resources, other than the possibility of the building itself, was identified in this portion of the survey area.



Figure 9. Holiday Lodge building (center) and secondary building at auto dealership (right), view north.

6.3.1 Newly Identified Resources

As a result of the survey, one newly identified cultural resource was recorded inside the Project Area: a segment of the West Antioch Creek Canal (EC-10-34). The recorded segment measures 575 feet long and extends from the southern side of the intersection of O Street and West 10th Street north to about West 8th Street. The northern 100 feet of the segment consists of large broken rocks (rip-rap) lining the sides of the creek, while the southern portion is lined with a 20-foot wide (at top) concrete channel which follows the eastern side of an adjacent parking lot. A wooden planked footpath that runs along the western side of O Street covers most of the southern 200 feet of the concrete channel.

According to historic aerial photographs and maps, there is no strong evidence for a natural creek occurring inside the project area. The 1953 topographic map of the Project Area does not include any waterway, seasonal or perennial inside the Project Area; however a riparian belt appears to meander just east of the Project Area, on the eastern side of O Street, on the 1939 aerial photograph, prior to the construction of O Street.

The 1968 revised map of the 1953 topo shows the channel as a newly added feature, indicating that it was constructed after 1953 and before 1968, possibly to reroute the creek to the western side of O Street, which would have cut off flow through the historical creek. Historical aerials show an earthen-lined channel constructed by 1958. Therefore, using both historical aerials and topographic maps, the construction date of the channel has been narrowed to the time period between 1953 and 1958.

Subsequently, between 1958 and 1965, the channel was slightly realigned to exhibit nearly 90-degree bends and portions appear to have been reinforced with concrete. Then, in the late 1980s or early 1990s, another channel modification occurred, immediately north (downstream) of the project area. The channel was graded and realigned from the former straight north-south alignment to a more natural configuration that exists today. Immediately following the reconfiguration, new buildings and structures are clearly visible along Fourth Street.

Based on these records, the West Antioch Creek channel was artificially constructed to divert West Antioch Creek between 1953 and 1958 (likely due to the development of residential housing in Antioch at the time), was remodeled prior to 1965, and again in the late 1980s or early 1990s. Therefore, the channel is 52 to 57 years old, with at least two subsequent and rather substantial changes to its integrity of setting, location, and materials.

6.3.2 Buildings and Structures

Several alternatives proposed by the CCCPWD involve demolition of up to three structures: a carport situated on the western side of the southernmost apartment building, the former Ford dealership building, and an auxiliary motel building associated with the Holiday Lodge.

Alternative 1, the preferred alternative, involves the installation of a sub-grade box culvert that will preserve the most recent use of the former Ford dealership property. It will require the removal of the carport at the apartment complex, but there will be no impacts to the apartment buildings.

Alternative 2 would include the installation of multiple box culverts and an open concrete-lined channel along the approximate path of Alternative 1. The use of an open channel through the former Ford dealership parking lot would eliminate future use in that capacity. No structures or buildings would be removed as a result of this alternative.

Alternative 3 would use a combination of a multiple box culvert and an earthen channel that would be constructed west of the proposed alignments for Alternative 1 and 2. This alternative would require demolition of two buildings - the former Ford dealership building and one of the Holiday Lodge hotel buildings.

Because demolition of historically significant structures (Historical Resources as defined by CEQA) is considered a significant impact under CEQA and an adverse effect under Section 106 NHPA, it is important to first determine whether or not any of these structures are considered cultural resources, and, if so, whether or not they are significant. Significance is established using the eligibility criteria for inclusion in the NRHP and CRHR, discussed in the following section. In order to first establish whether any of these three structures are considered cultural

resources, ECORP consulted county assessor records, as well as historical aerial photographs and topographic maps of the project area that collectively span the period between 1908 and present.

Carport. The carport associated with the southernmost apartment complex was constructed sometime between 1979 and 1984, and therefore, is less than 50 years old and not a cultural resource. Demolition of the carport does not require further evaluation.

Ford Dealership. According to County assessor's records, the main building of the former Ford dealership was constructed in 1962 and is 48 years old. A second automotive building was constructed adjacent to the main building sometime between 1968 and 1978. As such, these structures are considered to be modern, and, if Alternative 3 is selected, demolition of the former Ford dealership buildings can be approved without further evaluation. However, if the project approval process continues such that either building is over 50 years of age at the time of approval, then the building must be evaluated for significance by an architectural historian.

Auxiliary Building of the Holiday Lodge. The date of construction of the Holiday Lodge complex is not on record with the County Assessor; however, historical aerials and topographic maps provide a narrow window of time when the buildings were constructed. Based on these documents, the building was constructed sometime between 1953 and 1958 and is between 52 and 57 years old. Given its age, which is marginally considered historic, this structure should be evaluated for significance by an architectural historian, if Alternative 3 will be considered.

7.0 EVALUATION

This section provides an evaluation of the significance of the West Antioch Creek Canal (EC-10-34), the only cultural resource located within the Project Area, other than the buildings discussed above. Significance is evaluated using the eligibility criteria for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR).

7.1 Federal Evaluation Criteria

Under federal regulations implementing Section 106 of the NHPA (36 CFR 800), cultural resources identified in the Project APE must be evaluated using NRHP eligibility criteria. The eligibility criteria for the NRHP are as follows (36 CFR 60.4):

"The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of state and local importance that possess aspects of integrity of location, design, setting, materials, workmanship, feeling, association, and

- (A) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
- (B) Is associated with the lives of persons important in our past;

- (C) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- (D) Has yielded, or may be likely to yield, information important in prehistory or history.”

In addition, the resource must be at least 50 years old, except in exceptional circumstances (36 CFR 60.4).

Historical buildings, structures, and objects are usually evaluated under Criteria A, B, and C based on historical research and architectural or engineering characteristics. Archaeological sites are usually evaluated under Criterion D, the potential to yield information important in prehistory or history. An archaeological test program may be necessary to determine whether the site has the potential to yield important data. The lead federal agency, in this case, the US Army Corps of Engineers, makes the determination of eligibility based on the results of the evaluation and seeks concurrence from the State Historic Preservation Officer (SHPO).

Effects to NRHP-eligible resources (historic properties) are adverse if the project may alter, directly or indirectly, any of the characteristics of an historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association.

7.2 State Evaluation Criteria

Under state law (the California Environmental Quality Act [CEQA]), cultural resources are evaluated using CRHR eligibility criteria in order to determine whether any of the resources are Historical Resources, as defined by CEQA. CEQA requires that impacts to Historical Resources be identified and, if the impacts would be significant, that mitigation measures to reduce the impacts be applied.

CEQA guidelines state that a Historical Resource is a resource that 1) is listed in or has been determined eligible for listing in the CRHR by the State Historical Resources Commission; 2) is included in a local register of historical resources, as defined in Public Resources Code 5020.1(k); 3) has been identified as significant in an historical resources survey, as defined in Public Resources Code 5024.1(g); or 4) is determined to be historically significant by the CEQA lead agency [CCR Title 14, Section 15064.5(a)]. In making this determination, the CEQA lead agency usually applies the CRHR eligibility criteria.

For this Project, only the fourth definition of a Historical Resource is applicable because there are no resources previously determined eligible or listed on the CRHR, there are no resources included in a local register of historical resources, and no resources identified as significant in a qualified historical resources survey.

The eligibility criteria for the CRHR are as follows [CCR Title 14, Section 4852(b)]:

- (1) It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;
- (2) It is associated with the lives of persons important to local, California, or national history.
- (3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or
- (4) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition, the resource must retain integrity. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association [CCR Title 14, Section 4852(c)].

Historical buildings, structures, and objects are usually evaluated under Criteria 1, 2, and 3 based on historical research and architectural or engineering characteristics. Archaeological sites are usually evaluated under Criterion 4, the potential to yield information important in prehistory or history. An archaeological test program may be necessary to determine whether the site has the potential to yield important data. The CEQA lead agency makes the determination of eligibility based on the results of the test and evaluation program. Cultural resources determined eligible for the NRHP by a federal agency are automatically eligible for the CRHR.

Impacts to a Historical Resource (as defined by CEQA) are significant if the resource is demolished or destroyed or if the characteristics that made the resource eligible are materially impaired [CCR Title 14, Section 15064.5(a)].

7.3 Research Topics for Canals

Historical canals can provide information about the developing economy of rural settlements and how it relates to more regional events in history, including mining, and can shed light on the early development patterns of communities. In response to a growing economy, rural communities often needed to modify their landscapes to accommodate development or to irrigate farmlands, or both. Small canals of the type found inside the Project Area were typically used to channel irrigation water into previously uncultivated land, but were also constructed to control the flow of water during flood events, proving flood protection for the built environment. Based on archival research, the West Antioch Creek Canal was constructed expressly for the purpose of providing flood protection to the growing community of Antioch.

According to JRP and Caltrans (2000: 92-93):

Water systems may be found eligible to the National Register of Historic Places under any of the National Register criteria, although some criteria are more commonly relevant than others. Of 22 eligible water systems identified with one,

or more than one, specified criteria in OHP's statewide inventory as of mid-1995, 21 systems (95%) were listed under Criterion A; 14 (64%) were listed under Criterion C; while only one each (5%) came under criteria B and D. It appears that water conveyance systems are most likely to be found eligible for the National Register of Historic Places under Criterion A (events) or C (type or style of construction, district), and fewer will be found eligible under B (people) or D (information potential). More than one of the National Register criteria may apply to water conveyance systems, such as when a system is eligible under both A and C, for its association with important events and its engineering values. A system may also contain individually eligible properties, such as associated archeological sites that may be eligible under D or structures eligible under C.

The research design and evaluation procedures for historic water conveyance systems in California was developed by JRP and Caltrans in 2000 and provides specific thresholds for canals. While the canals studied by JRP and Caltrans are larger than the Contra Costa Canal, the research themes and significance thresholds apply to the current Project, and therefore, are provided verbatim:

Criterion A

Like other kinds of public works facilities, water conveyance systems are inherently important to the communities they serve, providing infrastructure essential for community development. Water supply has been particularly pivotal in the development of California and other parts of the arid West. Irrigation and reclamation canals provide the lifeblood of farming communities; municipal water canals are of critical importance in city development; hydroelectric canals serve a very specific purpose, but their benefits are widely distributed; mining canals also served a focused purpose, but nonetheless played very key roles in the economies of mining-based communities; and major multi-purpose systems provided far-reaching benefits to many sectors of the state's population. Thus, it is not surprising that water conveyance systems have been found eligible for the National Register of Historic Places under Criterion A for their association with important events.

For a water conveyance system to be eligible under Criterion A, it must be found to be associated with specific important events (e.g., first long-distance transmission of hydroelectric power) or important patterns of events (e.g., development of irrigated farming). This document has established historic contexts for many of these themes, but other events may also be found significant, and assessing local significance may require further research.

A system must be adequately documented, through accepted means of documentary or archeological research, as being associated with the important events; speculative associations cannot confer eligibility. The significance of the documented association must then be demonstrated. In other words, the system's association with the important event must also be an important association, not mere coexistence. For example, an 1850s mining ditch evaluated

for its association with the gold rush would normally not be found eligible under Criterion A if it served only unimportant mines that produced little gold, and it possessed no other associations.

Criterion B

For eligibility under Criterion B, a property must be associated with an important person's productive life and must be the property that is most closely associated with that person. For instance, the office in which a prominent engineer prepared his/her most important designs could be eligible under Criterion B and would be more closely associated with his/her work than would the place where that person was born. On the other hand, a property such as a dam that represents the work of a master engineer would be eligible under Criterion C, as the work of a master, rather than B, as representing an important person. Water conveyance systems will rarely be found eligible under Criterion B. There may be instances, however, when a water conveyance system would be eligible under Criterion B, notably when the person's association with the system is very strong and no properties more intimately associated with that person remain. Researching associations with people important in water history should include a careful evaluation as to whether the water system under investigation is the property that best represents that association. In California notable names for which there might be associations with water planning, construction, or engineering include: Anthony Chabot, George Chaffey, Frederick Eaton, William Mulholland, George Maxwell, Robert Marshall, Elwood Mead and C. E. Grunsky.

Criterion C

Water conveyance systems have been found eligible for the National Register of Historic Places under Criterion C for their engineering or design values. Examples of different types, periods, or methods of construction; the works of a master; properties with high artistic merit; and properties which together constitute a historic district may be eligible under Criterion C. Properties eligible under C may have unique values or they may be the best or good examples of a type of property. The earliest, best preserved, largest, or sole surviving examples of particular types of water conveyance systems or a property that introduced a design innovation may be eligible as examples of evolutionary trends in engineering. To be considered a good representative of that type, period, or method of construction, a water conveyance system must possess "distinctive characteristics," the common features or traits of that type, period, or method of construction. Through those distinctive characteristics, a property must clearly illustrate one or more of the following: the pattern of features common to a particular class of resources; the individuality or variation of features that occurs within the class; the evolution of that class; or the transition between classes of resources. When water systems are examined as good examples of a particular class of property, it is necessary to establish a comparative framework in order to understand how they relate to other properties with similar characteristics.

Water conveyance systems can be eligible as the work of a master when designed by a figure of acknowledged greatness in the field or by someone unknown whose workmanship is distinguishable from others by its style and quality. However, the system must be a good example of the designer's work, and not all works of a master will be eligible. Systems designed by individuals identified in the Criterion B discussion above should be examined for the possibility of their eligibility under Criterion C as the work of a master. High artistic values can also be found in properties that articulate a particular concept of design so well that it expresses an aesthetic ideal. To be eligible for its artistic value, a property must express the aesthetic ideal or design concept more fully than other properties of its type. A large water conveyance system with multiple components will often be evaluated as a district rather than as a single property. An eligible historic district must possess a significant concentration or linkage of resources that are united historically or aesthetically by plan or physical development. It should be a significant and distinguishable entity, although its components need not possess individual distinction.

Criterion D

Water conveyance systems may be eligible for the National Register if they may be likely to yield information important in history or prehistory. These properties must be studied within an appropriate historic context and they must possess the potential to answer specific important research questions. Once the research value of a property is realized, it is no longer eligible under Criterion D. However, properties that have yielded important information may in rare cases also be found eligible under Criterion A when that data has proven seminal to research in that field.

The properties most commonly found eligible under Criterion D are archeological sites, but buildings, structures, and objects can also, if infrequently, be found eligible for their information potential. In order for these other property types to be eligible under D, the physical properties themselves must be or have been the principal source of the important information. Because water conveyance systems are often complex properties that may be composed of both structural elements and directly associated resources, eligibility under Criterion D may derive from both the research value of individual elements and/or relationships among those parts.

The information value of water conveyance systems has not been widely recognized to date, and few water conveyance systems have been found significant for their research potential. Attention has generally focused on the ability of water conveyance systems to yield important information about vernacular competencies and construction methods. That work has examined the traditional models water conveyance systems were drawn from, how such models were modified to meet new situations, and the factors that influenced the success or failure of those constructions. Prehistoric irrigation systems, Spanish irrigation systems, and early mining and irrigation systems of the American Period all have

the potential to provide such insights. Certain water conveyance systems also may possess research value stemming from their associations with other types of resources.

When documentary sources fail to reveal the precise alignment of a water system, field verification of the route may help locate associated properties both directly related and incidental to those systems. Knowing the period during which the water conveyance system operated may also guide the interpretation of associated resources. Mining ditches in the foothills of the Sierra Nevada are particularly likely to possess this kind of limited value. While unlikely to be individually eligible, systems that possess incidental information may require consideration within the larger context of any important information they can generate as a group. With that said, their aggregate value may be fully realized through appropriate survey efforts, rendering such properties ineligible after their alignment and period of use are verified.

Associated archeological sites that are either directly related to the construction and maintenance of water conveyance systems or linked by dependence on their water also may be eligible under Criterion D. Occupation sites directly associated with the construction and operation of water conveyance systems, such as construction camps, ditch tenders' cabins, and operators' housing compounds, may contain archaeological deposits and features with the potential to provide important information. Other types of incidental habitation sites also may contain such information. For example, Native Americans commonly relocated near mining ditches after they were displaced from traditional occupation sites, and miners also situated their camps near ditches when other sources of potable water were not readily available. Detailed descriptions and evaluations of associated archeological sites are normally undertaken only when those properties will be directly impacted by a project. Unevaluated occupation sites should be treated as potentially eligible for the National Register until they are formally evaluated.

Integrity

Water conveyance systems that appear to meet the National Register criteria must also retain integrity, which is the ability of a property to convey its significance. To retain historic integrity, a system must possess at least several, and usually most, of the seven aspects of integrity: location, design, setting, materials, workmanship, feeling, and association. The property's essential physical features, important elements that were present during the historic period, must be present and visible. To address integrity, the appearance of the water system and its setting during its period of significance must be known and the following questions should be asked: Does the system follow the alignment of its period of significance? Have the significant elements of design, materials, and workmanship been retained? Does the setting still evoke the important qualities of the water system? And does the property retain the feeling and associations needed to convey its significance? For water conveyance systems or features within a

system that may be eligible under Criterion D, an evaluation will normally focus on whether the property retains the potential to yield important information. That consideration will usually focus on location, design, and materials, although it is possible that other elements of integrity may sometimes apply.

As with other types of historic properties, the fundamental test of the integrity of a water conveyance system consists of the relationship between its current appearance and its appearance during the period of significance. Integrity will not be lost as the result of modifications that were undertaken during the system's period of significance, and modifications made within that time may actually contribute to the importance of the property. Subsequent repairs or modifications may have greater effects on the system's integrity than abandonment and deterioration of the system. An abandoned system that has deteriorated in place can retain integrity despite erosion or sedimentation, while systems that continue in use may have lost integrity because they have been substantially modified in the course of maintenance and repairs (JRP and Caltrans 2000: 93-95).

8.0 EVALUATION

This section provides an evaluation of the significance of the West Antioch Creek Canal (EC-10-34) located within the Project APE using the NRHP and CRHR eligibility criteria as they relate to water conveyance systems.

8.1 West Antioch Creek Canal

The West Antioch Creek Canal (EC-10-34) has not been associated with important events in California or National history. The canal was constructed long after the CVP's Contra Costa Canal for the purpose of providing flood control protection to the City of Antioch. Therefore, it is not part of the infrastructure that was essential for community development and is not eligible under Criterion A of the NRHP or Criterion 1 of the CRHR.

Archival research did not reveal any association between the canal and any persons important in state or national history, and did not reveal any association with those notable names in canal construction and engineering, such as Anthony Chabot, George Chaffey, Frederick Eaton, William Mulholland, George Maxwell, Robert Marshall, Elwood Mead and C. E. Grunsky. Therefore, it is not eligible under Criterion B of the NRHP or Criterion 2 of the CRHR.

In addition, the canal is very similar to canals of this same era, and while the boardwalk cover is not a common element of flood control canals, neither it nor the canal exhibit "distinctive characteristics" or represent evolutionary trends in engineering, and are not representative of the work of a master. In addition, historical aerial photographs show the boardwalk having been constructed in recent years. Therefore, the canal is not eligible under Criterion C of the NRHP or Criterion 3 of the CRHR.

Finally, the segment of the canal studied in the current analysis does not have any archaeological sites or features associated with it that could be used to answer important

questions in history. There does not appear to be any research value associated with the canal itself that is not already (and better) documented in the archival record, primarily through historical aerials and topographic maps. Therefore, the canal is not eligible under Criterion D of the NRHP or Criterion 4 of the CRHR.

Based on the archival research and field inventory, the West Antioch Creek Canal does not appear to meet any of the significance criteria for inclusion in the NRHP or CRHR. It is not an Historic Property defined by Section 106 of NHPA, and is not considered an Historical Resource under CEQA.

9.0 MANAGEMENT CONSIDERATIONS

9.1 Conclusions

The West Antioch Creek Canal has been evaluated as not eligible for the CRHR or NHRP. If the U.S. Army Corps of Engineers determines that the canal is ineligible for the NRHP and the State Historic Preservation Officer concurs, then no mitigation measures for the canal will be necessary under Section 106. If the CCCPWD determines that the canal is ineligible for the CRHR and, therefore, is not an Historical Resource for the purposes of CEQA, then no mitigation measures for the canal will be necessary under CEQA.

In addition, and assuming that the canal is formally determined not significant by the agencies, the carport has been determined to be a recent structure that is not considered a cultural resource under either state or federal law. Therefore, implementation of Alternative 1 will not have a significant impact to historical resources under CEQA or an adverse effect to historic properties under Section 106.

Likewise, because Alternative 2 does not propose demolition of any structures, and assuming that the canal is formally determined not significant by the agencies, implementation of this alternative will not have a significant impact to historical resources under CEQA or an adverse effect to historic properties under Section 106.

Because Alternative 3 would require demolition of the former Ford dealership building and one of the Holiday Lodge hotel buildings, both of which are old enough to require further consideration, implementation of this alternative would first require that these structures be evaluated for significance by an architectural historian.

9.2 Unanticipated Discovery

There always remains a possibility that unrecorded cultural resources are present beneath the ground surface, and that such resources could be exposed during project construction. Both CEQA and Section 106 of the National Historic Preservation Act, via NEPA, require the lead agency to address any unanticipated cultural resource discoveries during project construction. Therefore, ECORP recommends the following mitigation measures be adopted and implemented by the lead agency to reduce potential adverse impacts to less than significant.

Mitigation Measure #1: Unanticipated Discovery

If subsurface deposits believed to be cultural or human in origin are discovered during construction, then all work must halt within a 200-foot radius of the discovery. A qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric and historic archaeologist, shall be retained at the Applicant's expense to evaluate the significance of the find. A Native American monitor, following the Guidelines for Monitors/Consultants of Native American Cultural, Religious, and Burial Sites established by the Native American Heritage Commission, may also be required and, if required, shall be retained at the Applicant's expense.

Work cannot continue at the discovery site until the archaeologist conducts sufficient research and data collection to make a determination that the resource is either 1) not cultural in origin; or 2) not potentially significant or eligible for listing on the NRHP or CRHR.

If a potentially-eligible resource is encountered, then the archaeologist, lead agency, and project proponent shall arrange for either 1) total avoidance of the resource, if possible; or 2) test excavations to evaluate eligibility and, if eligible, total data recovery as mitigation. The determination shall be formally documented in writing and submitted to the lead agency as verification that the provisions in CEQA/NEPA for managing unanticipated discoveries have been met.

In the event that evidence of human remains is discovered, construction activities within 200 feet of the discovery will be halted or diverted and the requirements of Mitigation Measure #1 will be implemented. In addition, the provisions of Section 7050.5 of the California Health and Safety Code, Section 5097.98 of the California Public Resources Code, and Assembly Bill 2641 will be implemented. When human remains are discovered, state law requires that the discovery be reported to the County Coroner (Section 7050.5 of the Health and Safety Code) and that reasonable protection measures be taken during construction to protect the discovery from disturbance (AB 2641). If the Coroner determines the remains are Native American, the Coroner notifies the Native American Heritage Commission which then designates a Native American Most Likely Descendant (MLD) for the project (Section 5097.98 of the Public Resources Code). The designated MLD then has 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains (AB 2641). If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (Section 5097.94 of the Public Resources Code). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (Section 5097.98 of the Public Resources Code). This will also include either recording the site with the NAHC or the appropriate Information Center; using an open space or conservation zoning designation or easement; or recording a document with the county in which the property is located (AB 2641).

The Lead Agency is responsible for ensuring compliance with these mitigation measures because damage to significant cultural resources is in violation of CEQA and Section 106.

Section 15097 of Title 14, Chapter 3, Article 7 of CEQA, *Mitigation Monitoring or Reporting*, "the public agency shall adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects. A public agency may delegate reporting or monitoring responsibilities to another public agency or to a private entity which accepts the delegation; however, until mitigation measures have been completed the lead agency remains responsible for ensuring that implementation of the mitigation measures occurs in accordance with the program."

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LIST OF ATTACHMENTS

Attachment A – Records Search Confirmation

Attachment B – Native American Consultation

Attachment C – Project Area Photographs

Attachment D – ***Confidential*** Cultural Resource Site Locations and Site Records

ATTACHMENT A

Records Search Confirmation

OK to pay
2007-040, phase 003-
5/28/10 Lisa Westwood
Lisa

-----STAFF USE ONLY-----

INFORMATION CENTER ACCESS AGREEMENT BILLING ITEMIZATION

FILE NO.: 09-1497

Date request rec'd: Mail _____ Phone _____ Fax _____ In person 26 May 2010

Date of response: Mail _____ Phone _____ Fax _____ In person _____

CHECK IN: 9:20 CHECK OUT: 12:00

CHECK IN: _____ CHECK OUT: _____

Staff processing: _____ hour(s) @ \$150/hour \$ _____

In person research: 3 hour(s) @ \$100/hour/person \$ 300.00

Shapes: Number: _____ \$ _____

Quads: Number: _____ \$ _____

Address-mapped Flat Fee: _____ \$ _____

Xerox/Computer Pages(\$0.15/page): Page(s): 408 \$ 61.20

Labor Charge: Hour(s): _____ \$ _____

Fax @ \$1/page: Page(s): _____ \$ _____

PDF pages(\$0.15/page): Page(s): _____ \$ _____

PDF Flat Fee: _____ \$ _____

Other: _____ \$ _____

SUBTOTAL \$ 361.20

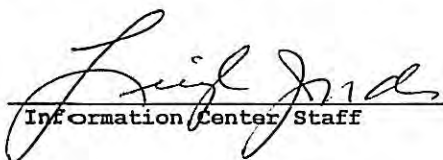
SUBTOTAL Date: _____ \$ _____

SUBTOTAL Date: _____ \$ _____

SUBTOTAL Date: _____ \$ _____

Rapid Response surcharge of 50% of total cost: SURCHARGE \$ _____

Emergency Response surcharge of 100% of total cost: SURCHARGE \$ _____


Information Center Staff

Invoice N13424

TOTAL \$ 361.20



1 July 2010

Antioch Historical Society
1500 W. Fourth Street
Antioch, California 94509

RE: Cultural Resources Identification Effort at West Antioch Creek, Antioch, California (ECORP Project No. 2009-040).

Dear Antioch Historical Society:

ECORP Consulting, Inc. has been retained to assist in the planning of the development on the project indicated above. As part of the identification effort, we are seeking information from all parties that may have knowledge of or concerns with historic properties or cultural resources in the area of potential effect.

Included are maps showing the project area outlined. We would appreciate input on this undertaking from the historical society with concerns about possible cultural properties or potential impacts within or adjacent to the area of potential effect. If possible, please fax your response to my attention at (916) 782-9134. If you have any questions, please contact me at (916) 782-9100 or LWestwood@ecorpconsulting.com.

Thank you in advance for your assistance in our cultural resource management study.

Sincerely,

Lisa Westwood, RPA
Cultural Resource Manager

Attachment(s)

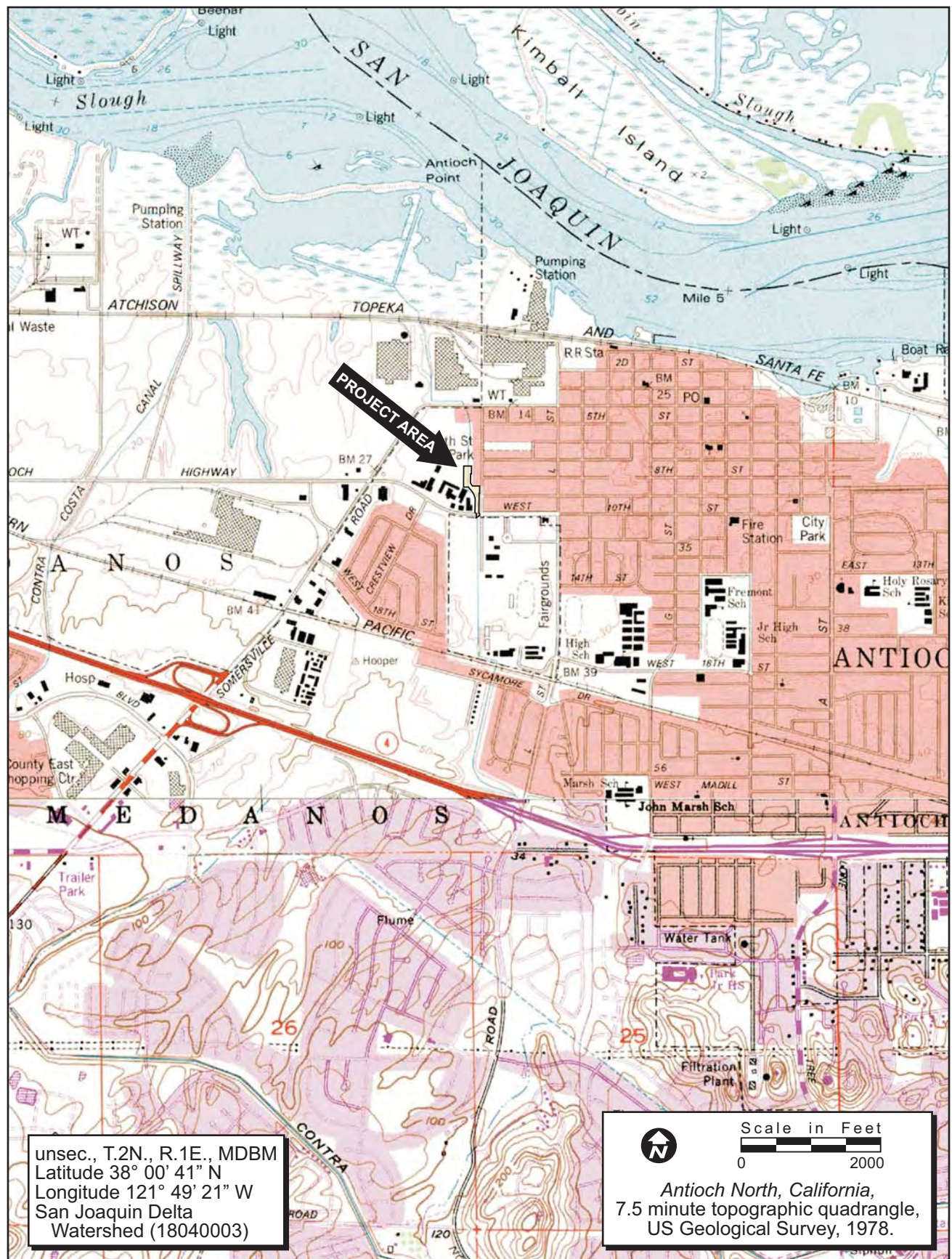


FIGURE 1. Project Site and Vicinity

1 July 2010

Contra Costa County Historical Society
610 Main Street
Martinez, California 94553

RE: Cultural Resources Identification Effort at West Antioch Creek, Antioch, California (ECORP Project No. 2009-040).

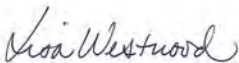
Dear Contra Costa County Historical Society:

ECORP Consulting, Inc. has been retained to assist in the planning of the development on the project indicated above. As part of the identification effort, we are seeking information from all parties that may have knowledge of or concerns with historic properties or cultural resources in the area of potential effect.

Included are maps showing the project area outlined. We would appreciate input on this undertaking from the historical society with concerns about possible cultural properties or potential impacts within or adjacent to the area of potential effect. If possible, please fax your response to my attention at (916) 782-9134. If you have any questions, please contact me at (916) 782-9100 or LWestwood@ecorpconsulting.com.

Thank you in advance for your assistance in our cultural resource management study.

Sincerely,



Lisa Westwood, RPA
Cultural Resource Manager

Attachment(s)

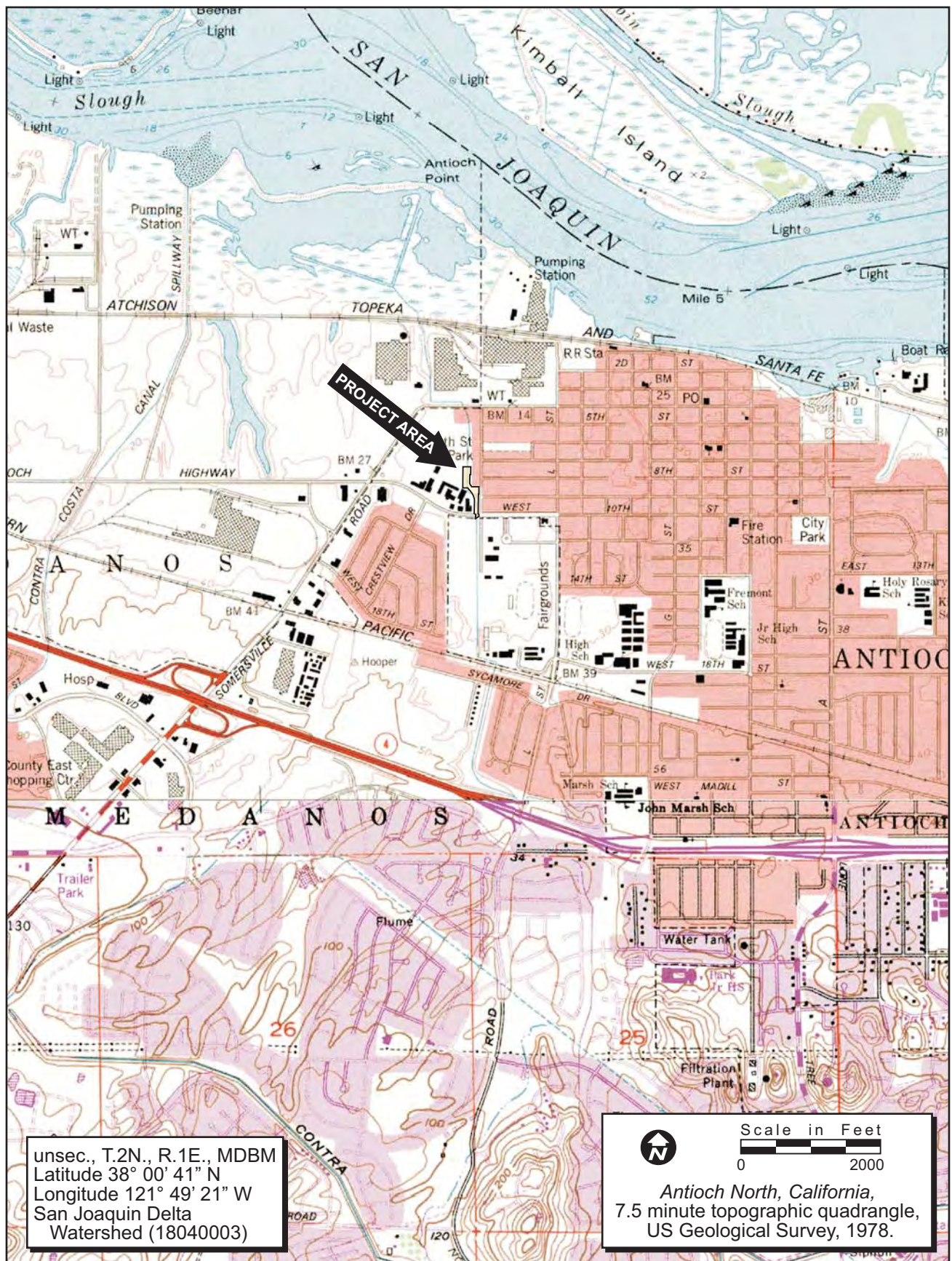


FIGURE 1. Project Site and Vicinity

ATTACHMENT B

Native American Consultation

**Native American Contacts
West Antioch Creek, 2009-040, Contra Costa County**

Name	Affiliation	Date Contacted			Response Received?	Comments
		1. Letter	2. Phone	3. Phone		
Native American Heritage Commission 915 Capital Mall, Room 364 Sacramento, CA 95814	N/A	5/14/2010	N/A	N/A	Yes	No sacred lands; list of three contacts provided
Katherine Erolinda Perez PO Box 717 Linden, CA 95236 (209) 887-3415	Ohlone/Costanoan No. Valley Yokuts Bay Miwok	5/24/2010	6/28/2010	6/30/2010	No	6/28/2010 SP left detailed message 6/30/2010 SP left detailed message
Andrew Galvan The Ohlone Indian Tribe PO Box 3152 Fremont, CA 94539 chochenyo@aol.com (510) 882-0527 cell (510) 687-9393 fax	Ohlone/Costanoan Bay Miwok Plains Miwok Patwin	5/24/2010	6/28/2010	6/30/2010	Yes	6/28/2010 SP left detailed message 6/30/2010 SP spoke with Andrew, he said that he had no questions or concerns regarding the project.
Ramona Garibay, Representative Trina Marine Ruano Family 16010 Halmar Lane Lathrop, CA 95330 soaprootmo@msn.com (209) 629-8619	Ohlone/Costanoan Bay Miwok Plains Miwok Patwin	5/24/2010	6/28/2010	6/29/10	Yes	6/28/2010 Phone number provided is out of service. Sent detailed E-mail. 6/29/2010 Ramona called back at 3:00, She said that she does not have any questions or concerns regarding the project.

May 14, 2010

Ms. Debbie Pilas-Treadway
Associate Governmental Program Analyst
Native American Heritage Commission
915 Capital Mall, Room 364
Sacramento, CA 95814

***RE: Cultural Resources Identification Effort for West Antioch Creek Improvements
Project in Contra Costa County, California T2N, R1E, Unsectioned.***

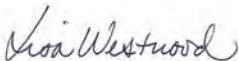
Dear Ms. Pilas-Treadway:

ECORP Consulting, Inc. has been retained to assist in the planning of the development on the project indicated above. As part of the identification effort, we are seeking information from all parties that may have knowledge of or concerns with historic properties or cultural resources in the area of potential effect.

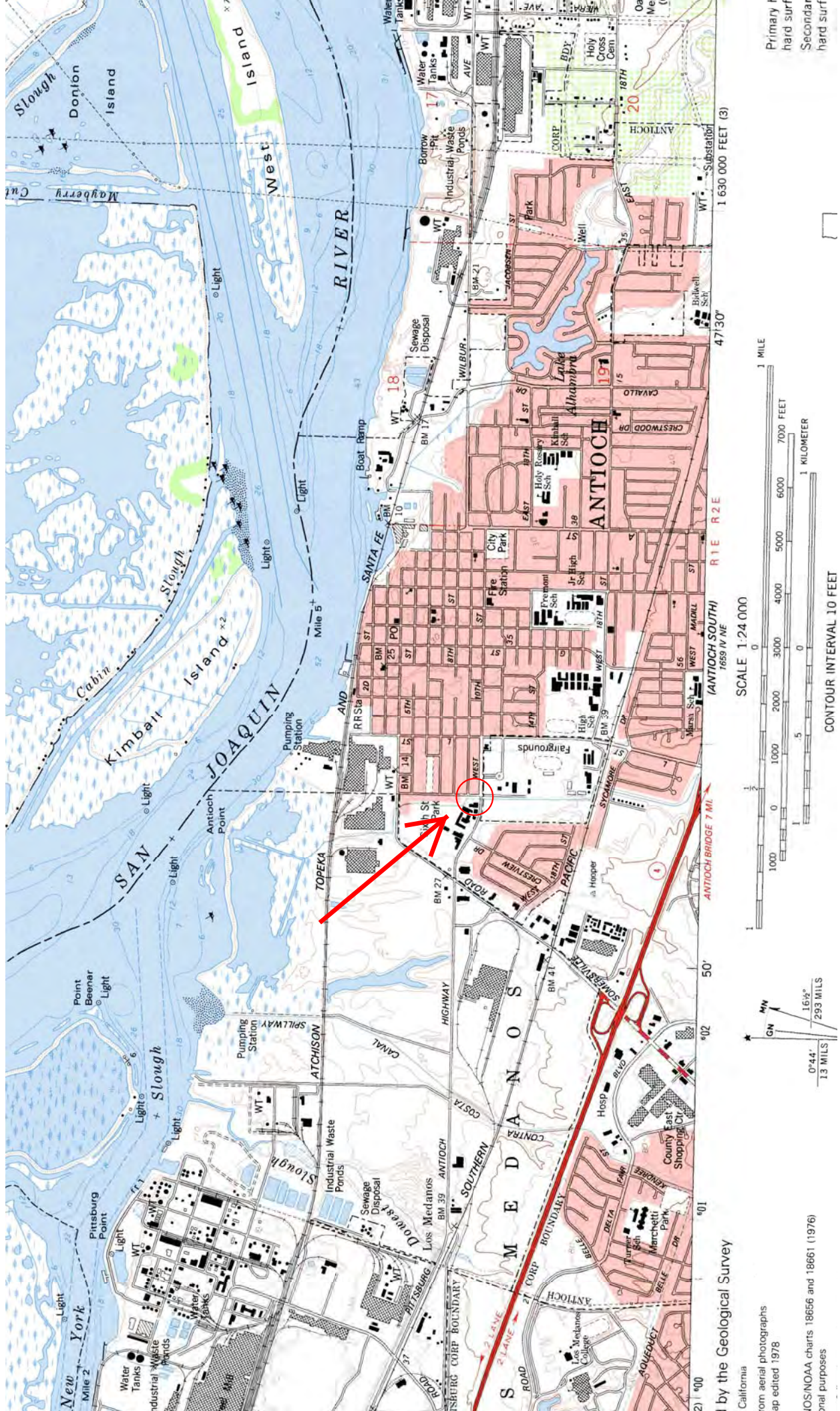
Included is a map showing the project area outlined. We would appreciate input on this undertaking from the Native American community with concerns about possible traditional cultural properties or potential impacts within or adjacent to the area of potential effect. Please understand that this is not a request for location, data or any other information that may be deemed sensitive or confidential to individual Native Americans, Native American organizations, or Federally Recognized Tribes. Information on other parties that may have interests or concerns in the undertaking would be appreciated. Please fax your response to my attention at (916) 782-9134. If you have any questions, please contact me at (916) 782-9100.

Thank you in advance for your assistance in our cultural resource management consultation.

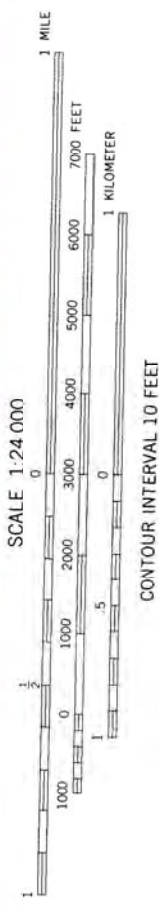
Sincerely,



Lisa Westwood, RPA
Cultural Resource Manager



Primary
hard surf
Secondary
hard surf



by the Geological Survey

California
from aerial photographs
map edited 1978

USNOAA charts 18556 and 18661 (1976)
for navigational purposes

STATE OF CALIFORNIA

NATIVE AMERICAN HERITAGE COMMISSION

915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-6251
Fax (916) 657-5390
Web Site www.nahc.ca.gov
e-mail: ds_nahc@pacbell.net

Arnold Schwarzenegger Governor



May 20, 2010

Lisa Westwood
ECORP
2525 Warren Drive
Rocklin, CA 95677

Sent by Fax: 916-782-9134
Number of Pages: 2

Re: West Antioch Creek Improvements, Contra Costa County

Dear Ms. Westwood:

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4038.

Sincerely,

for: Karen Lee
Debbie Pilas-Treadway
Environmental Specialist III

RECEIVED

MAY 24 2010

ECORP Consulting

Contra Costa Oncall

2010-040 *gmr*

W/ Reg/ File

Native American Contacts
Contra Costa County
May 20, 2010

Katherine Erolinda Perez
PO Box 717
Linden, CA 95236
(209) 887-3415

Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152
Fremont, CA 94539
chochenyo@AOL.com
(510) 882-0527 - Cell
(510) 687-9393 - Fax

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Trina Marine Ruano Family
Ramona Garibay, Representative
16010 Halmar Lane
Lathrop, CA 95330
soaprootmo@msn.com
209-629-8619

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed West Antioch Creek Improvements project, Contra Costa County



25 March 2010

Katherine Erolinda Perez
North Valley Yokuts Tribe
P.O. Box 717
Linden, California 95236

RE: *Cultural Resources Identification Effort at West Antioch Creek, Antioch, California (ECORP Project No. 2009-040).*

Dear Ms. Perez:

ECORP Consulting, Inc. (ECORP) is currently conducting a cultural resources inventory of a 2-acre parcel located in the City of Antioch in Contra Costa County. The study is being conducted in advance of approval of the proposed West Antioch Creek Public Safety Improvement project. The project area is situated near 10th and O Streets and in unseccioned parts of Township 2N, Range 1E MDBM. For your reference, the boundaries of the project area are marked on the enclosed topographic quadrangle map.

The purpose of the study is to identify cultural resources that could be affected by the proposed project, as required by Section 106 of the National Historic Preservation Act (NHPA) and the California Environmental Quality Act (CEQA). The investigation includes a records search conducted with the Northwest Information Center at Sonoma State University and a search of the Native American Heritage Commission's Sacred Lands File, and a field survey and inventory.

As part of this study, ECORP would like to identify archaeological, historic resources, or locations that are of cultural importance to the local Native American community. We would appreciate any information you may have regarding Native American cultural resources located in or near the proposed project location that could be affected by the proposed development of the parcel.

ECORP will forward your comments or requests to the federal (Section 106) lead agency for consideration and appropriate action. The lead agency will respond to your comments after a permit application has been submitted, at which time the Section 106 process will be initiated. At this time, however, cultural resources investigations are being conducted for project planning purposes only. ECORP is gathering information on potentially unrecorded cultural resources that might be affected by this project.

We encourage you to participate in this process. The potential impacts that this project may have on cultural resources important to the Native American community cannot be evaluated unless we are aware the resources exist. If possible, for project planning purposes, we would like to receive a response from you about this project within the next two weeks. If we have not heard from you within 30 days of the receipt of this letter, we will assume that you do not wish to comment on this project. If you have any questions, please feel free to call me at (916) 782-9100 or via email at lwestwood@ecorpc consulting.com. Thank you for your assistance and participation in this project.

Sincerely,

Lisa Westwood, RPA
Cultural Resource Manager

Attachment(s)

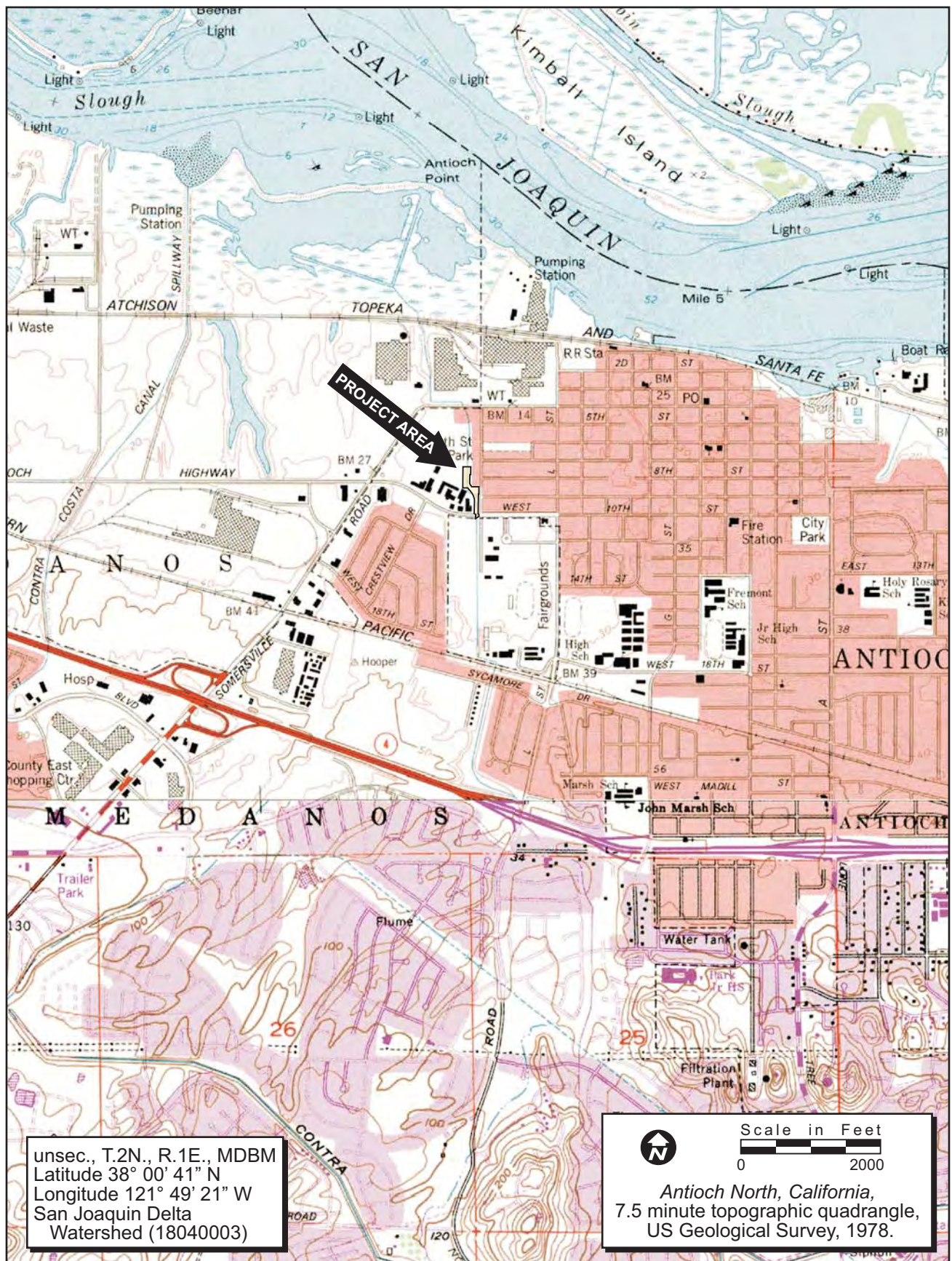


FIGURE 1. Project Site and Vicinity

25 March 2010

Andrew Galvan
The Ohlone Indian Tribe
P.O. Box 3152
Fremont, California 94539

RE: *Cultural Resources Identification Effort at West Antioch Creek, Antioch, California (ECORP Project No. 2009-040).*

Dear Mr. Galvan:

ECORP Consulting, Inc. (ECORP) is currently conducting a cultural resources inventory of a 2-acre parcel located in the City of Antioch in Contra Costa County. The study is being conducted in advance of approval of the proposed West Antioch Creek Public Safety Improvement project. The project area is situated near 10th and O Streets and in unseccioned parts of Township 2N, Range 1E MDBM. For your reference, the boundaries of the project area are marked on the enclosed topographic quadrangle map.

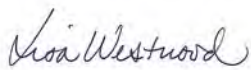
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Sincerely,



Lisa Westwood, RPA
Cultural Resource Manager

Attachment(s)

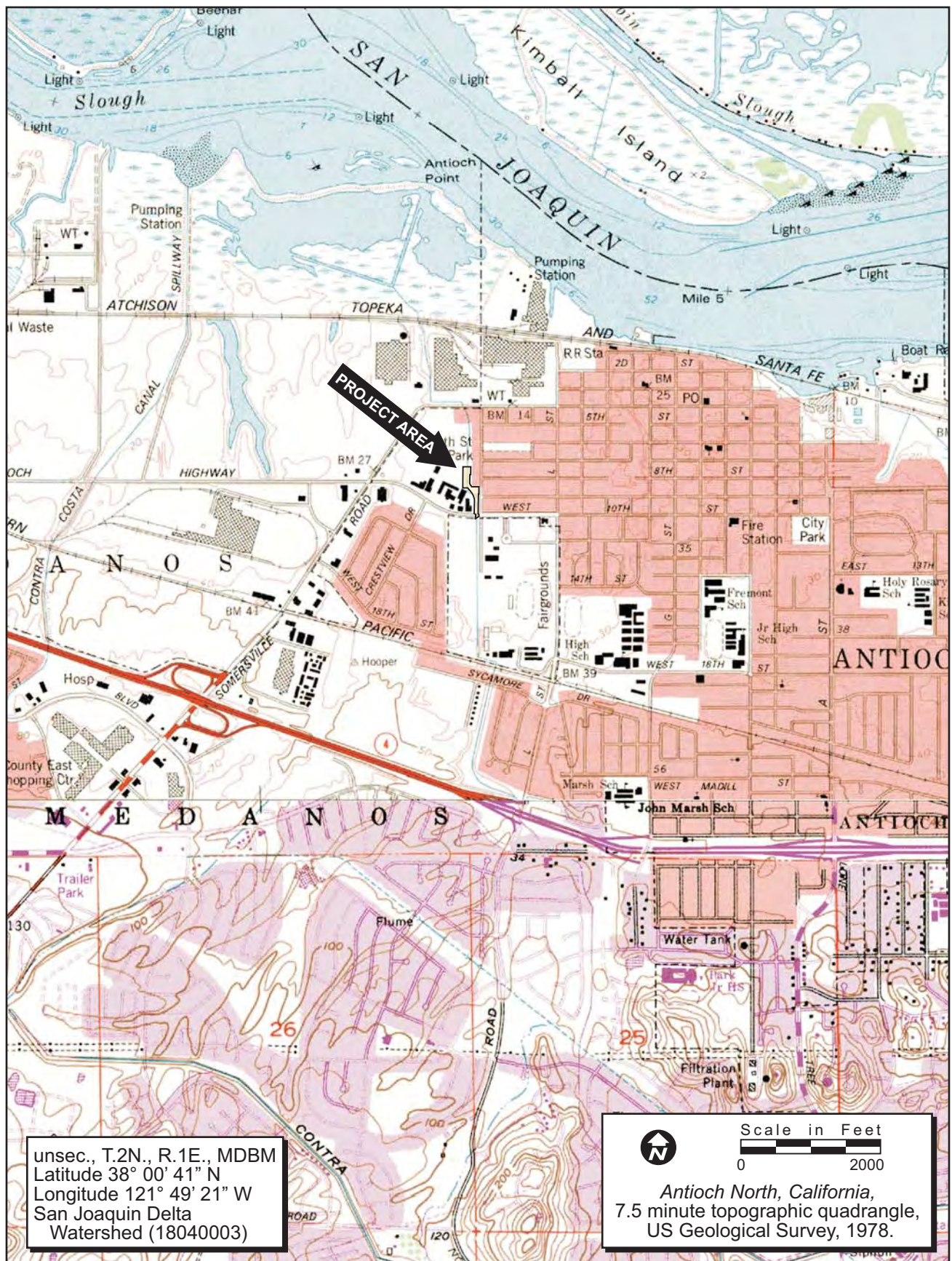


FIGURE 1. Project Site and Vicinity

25 March 2010

Ramona Garibay, Representative
Trina Marine Ruano Family
16010 Halmar Lane
Lathrop, California 95330

RE: *Cultural Resources Identification Effort at West Antioch Creek, Antioch, California (ECORP Project No. 2009-040).*

Dear Ms. Garibay:

ECORP Consulting, Inc. (ECORP) is currently conducting a cultural resources inventory of a 2-acre parcel located in the City of Antioch in Contra Costa County. The study is being conducted in advance of approval of the proposed West Antioch Creek Public Safety Improvement project. The project area is situated near 10th and O Streets and in unseccioned parts of Township 2N, Range 1E MDBM. For your reference, the boundaries of the project area are marked on the enclosed topographic quadrangle map.

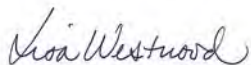
The purpose of the study is to identify cultural resources that could be affected by the proposed project, as required by Section 106 of the National Historic Preservation Act (NHPA) and the California Environmental Quality Act (CEQA). The investigation includes a records search conducted with the Northwest Information Center at Sonoma State University and a search of the Native American Heritage Commission's Sacred Lands File, and a field survey and inventory.

As part of this study, ECORP would like to identify archaeological, historic resources, or locations that are of cultural importance to the local Native American community. We would appreciate any information you may have regarding Native American cultural resources located in or near the proposed project location that could be affected by the proposed development of the parcel.

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Sincerely,



Lisa Westwood, RPA
Cultural Resource Manager

Attachment(s)

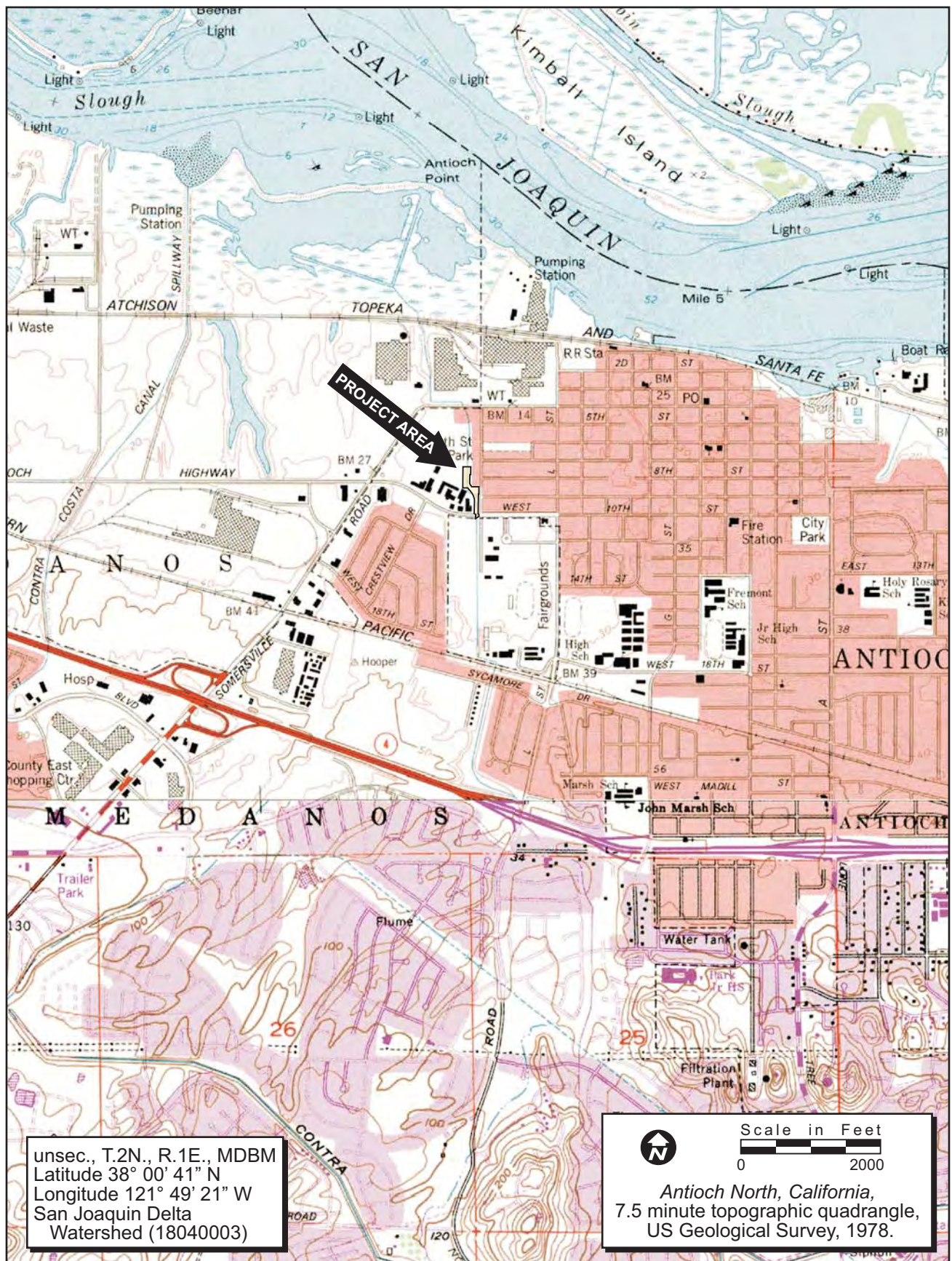


FIGURE 1. Project Site and Vicinity

Stephen Pappas

From: Stephen Pappas
Sent: Monday, June 28, 2010 10:53 AM
To: 'soaprootmo@msn.com'
Subject: Cultural Resources letter for West Antioch Creek

Ms. Ramona Garibay,

This E-mail is to follow up the letter we sent out May 25, 2010 regarding the West Antioch Creek project located in the City of Antioch, California. I was wondering if you had received our letter and map for the project, if not, I can resend the letter and map. If you have any comments or questions regarding the project, please feel free to call or E-mail me.

Thank you,

Stephen Pappas
Staff Archaeologist
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, CA 95677
(916) 782-9100
(916) 782-9134 fax

ATTACHMENT C

Project Area Photographs

**State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PHOTOGRAPH RECORD**

**Primary #
HRI#
Trinomial**

Page 1 of 1 **Resource Name or #:** West Antioch Creek **Year** 2010
 Camera Format: Digital Lens Size: 35mm
 Film Type and Speed: Digital (Lisa Westwood) Negatives Kept at: ECORP Consulting, Inc.

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward	Accession #
6	2		P1010008	View of canal crossing under car lot, from O-street sidewalk, viewing toward 10th street	10th street	
6	2		P1010009	View of canal from same photo point as above, with building #2 in background		
6	2		P1010011	View of ground conditions within fenced lot just north of the canal		
6	2		P1010012	Detail of boarded canal roof that cars park on, at northern end		
6	2		P1010013	Northern end of boarded canal roof with Building #1 in background		
6	2		P1010014	View of canal with Building #2 in background		
6	2		P1010015	Building #1 at left, Building #2 at right; with fenced in lot in foreground		
6	2		P1010016	Detail of canal as it emerges from underneath the boarded canal roof at the northern end. Water flows toward camera.		
6	2		P1010017	Backside of Building #2 at left and Building #1 at right, as viewed from Holiday Lodge parking lot		
6	2		P1010018	Left to right: vacant Holiday Lodge main building, Building #3 (two story), and backside of Building #2, as viewed from Holiday Lodge parking lot		
6	2		P1010019	Building #3 as viewed from Holiday Lodge parking lot		
6	2		P1010020	Vacant portion of Holiday Lodge building		
6	2		P1010021	Southern end of project area, where canal enters the culverts beneath 10th street	North	
6	2		P1010022	View of northern fence within fenced lot north of canal and south of apartment buildings	East	
6	2		IMAGE_137	Canal as it passes west of apartment complex with carport at right. View from inside fenced lot.	North	
6	2		IMAGE_138	Rock "rip-rap" along western face of canal near palm trees shown in IMAGE_137		
6	2		IMAGE_139	Canal from inside fenced lot. Building #2 at right, end of Building #1 at left	South	
6	2		IMAGE_140	Canal adjacent to apartment buildings, showing degradation of defined channel and presence of debris		
6	2		IMAGE_141	Canal adjacent to apartment buildings (at left)	South	
6	2		IMAGE_142	Canal adjacent to apartment buildings (at left)	South	



IMAGE_137



IMAGE_138



IMAGE_139



IMAGE_140



IMAGE_141



IMAGE_142



P1010008



P1010009



P1010011



P1010012



P1010013



P1010014



P1010015



P1010016



P1010017



P1010018



P1010019



P1010020



P1010021



P1010022











ATTACHMENT D

Confidential Cultural Resource Site Locations and Site Records

This attachment contains information on the specific locations of cultural resources. This information is not for publication or release to the general public. It is for planning, management and research purposes only. Information on the locations of prehistoric and historic sites are exempted from the California Freedom of Information Act, as specified in Government Code 6254.10.

ATTACHMENT B

Historic Architectural Evaluation of the Former Al Ford Dealership Buildings, 2013



Mead & Hunt, Inc.
M & H Architecture, Inc.
180 Promenade Circle, Suite 240
Sacramento, California 95834
916-971-3961
meadhunt.com

June 20, 2013

Mr. Chris Stabenfeldt
ECORP Consulting, Inc.
2525 Warren Drive
Rocklin, CA 95677

Subject: Historic Architectural Evaluation
Former Al Eames Ford Dealership Buildings (APN 074-130-060)
Antioch, Contra Costa County, California

Dear Mr. Stabenfeldt:

ECORP Consulting, Inc. (ECORP) requested that Mead & Hunt, Inc. (Mead & Hunt) prepare a historic architectural evaluation of the former Al Eames Ford Dealership buildings at 1400 West 10th Street in Antioch, California, to determine if either of the buildings qualifies for listing in the National Register of Historic Places (National Register) or the California Register of Historical Resources (California Register). See Attachment 1 for a location map. Mead & Hunt conducted a literature review, researched the history and architecture of the buildings, and completed a physical inspection of the buildings, and found no evidence to suggest the buildings possess qualities that qualify them for listing in the National Register or California Register. Based on available information, the buildings are not a designated local landmark or listed in a previous historic resource survey. As such, the former Al Eames Ford Dealership buildings are not considered historic properties under Section 106 of the National Historic Preservation Act (Section 106) or historical resources for the purposes of California Environmental Quality Act (CEQA).

Objectives, Survey Methodology, and Research Design

The objective of the historic architectural evaluation is to determine if the buildings qualify for listing in the National Register or the California Register and determine if the buildings are designated a local landmark or listed in a historic resource survey to comply with Section 106 and CEQA. See the *Regulatory Context* section below for further information on compliance with Section 106 and CEQA.

On May 28, 2013, Mead & Hunt staff spoke with second generation owner Gary Eames regarding the history of the former Al Eames Ford Dealership buildings. On May 29, 2013, Mead & Hunt staff conducted a site visit to record the physical features of the buildings to assist in assessing their age, architectural features, and historic character. The site visit was completed by Mead & Hunt staff exceeding the *Secretary of the Interior's Standards for Professional Qualifications* in history and architectural history. See the *Description* section below for a physical description of the building and Attachment 2, which includes a Department of Parks and Recreation 523 Form.

ECORP made a records search request to the Northwest Information Center (NWIC) of the California Historical Resources Information System and results were provided to Mead & Hunt on May 23, 2013, for cultural resource studies and documented properties within the general project area (see Attachment 3 for a list of these studies). Based on information provided to Mead & Hunt, none of the previous studies included the former Al Eames Ford Dealership buildings. A search of the California Office of Historic Preservation's historic resources database listed five properties that have been identified as National Register-listed, State Landmarks, or as points of interest in Antioch (see Attachment 4). None of these properties are related to the former Al Eames Ford Dealership buildings and none of the properties are located on the parcel or immediately adjacent to the buildings on the parcel.

Based on a review of the City of Antioch General Plan, the former Al Eames Ford Dealership buildings are not listed as a historical landmark or identified in a local survey of historic resources.

Primary and secondary sources research materials provide an understanding of the development and history of Antioch and whether the former Al Eames Ford Dealership buildings have an association with any important historic themes or represent a distinctive property type within the city, region, state, or nation. Site-specific research determined the age of the building.¹

Property Description

The parcel (APN 074-130-060) includes two buildings: the dealership main building constructed in 1962 and an auxiliary body shop building constructed in 1972, which is located at the rear (north end) of the parcel.² Attachment 1 includes a location map and Figure 1 provides an overview of the subject parcel.

¹ Site-specific research to determine the age of the buildings included aerials dating to 1957-1966, city directories dating to 1956 and later, and an interview with the current property owner

² City directories list the Al Eames Ford Dealership at this location in 1961. However, according to the property owner, whose family has owned the building since its construction, the dealership was constructed in 1962.



Figure 1. Location of subject parcel and former Al Eames Ford Dealership buildings.

Al Eames Ford Dealership Main Building

The main building is of concrete block construction and rests on a poured concrete foundation. Exterior walls consist of exposed concrete block with large areas on the principal (south) and side (east) elevations covered with brick veneer. Upper portions of the principal (south) and side (east and west) elevations are clad in vertical composite wood siding. Fenestration consists of replacement fixed-frame and plate glass storefront windows and a bank of four small, one-beside-one, sliding sash windows along the side (east) elevation. The main building has an aluminum-frame glass entry door to the former showroom on the side (east and west) elevations and four secondary metal doors to the building. Five metal, overhead retractable garage doors are located on the rear half of the side (east and west) elevations. The low-pitched front-gable roof is covered with rolled asphalt and has wide overhanging eaves that feature exposed wood brackets. Large wood-frame awnings with metal supports shelter driveways on the side (east and west) elevations.

The main building features several alterations, including replacement of the original storefront windows with narrow fixed-frame windows and brick veneer along the principal (south) elevation. The large awning on the side (west) elevation was constructed in 1985 and the overhead retractable garage doors were replaced c.2000. Several original windows have been enclosed with concrete block; others are covered with plywood. Brick planters located along the main (south) elevation, at the corners of the parcel, and at driveway entrances were later additions. Original signage has been removed. Images of the main building are provided in Figures 2, 3, and 4.



Figure 2. Former Al Eames Ford Dealership Main Building located at 1400 West 10th Street, view facing northwest.



Figure 3. Former Al Eames Ford Dealership Main Building, view facing east.



Figure 4. Detail of enclosed storefront windows of the Former Al Eames Ford Dealership Main Building, view facing northwest.

Al Eames Ford Dealership Auxiliary Body Shop Building

The concrete block auxiliary body shop building was constructed in 1972 to serve as a body shop for Al Eames Ford Dealership. Exterior walls exhibit vertical composite wood siding with six service bays located along the primary (east) elevation. An image of the auxiliary body shop building is provided in Figure 5.

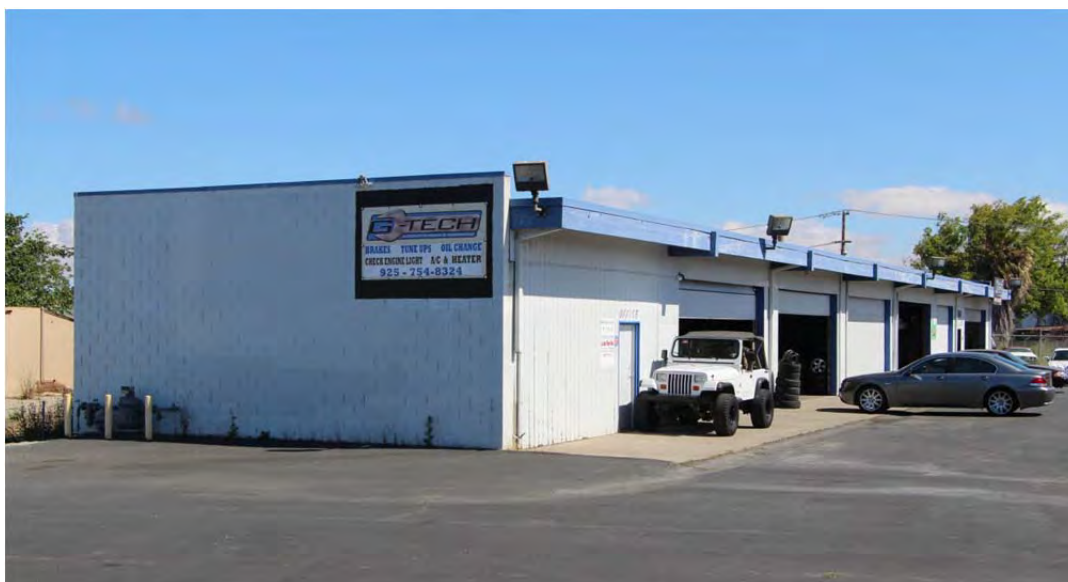


Figure 5. Al Eames Ford Dealership Auxiliary Body Shop Building, view facing north.

Historic Context

Antioch was established in 1849 by William Wiggin Smith and Joseph Horton Smith. The discovery of coal near Mount Diablo resulted in an influx of immigrants and the establishment of towns in Contra Costa County in the mid-nineteenth century. Coal mining and agriculture fueled the local economy in the early years. A network of roads and railroads was constructed to transport goods and passengers. The San Joaquin River also provided an efficient means of transportation within the region. Early commercial development in Antioch occurred primarily along present-day West 2nd Street and West 3rd Street. Throughout the late nineteenth century and early decades of the twentieth century, Antioch gradually expanded south with new residential areas and isolated commercial buildings.³

Following national trends, construction and commercial growth in Antioch slowed considerably during the Great Depression. The post-World War II American economy was characterized by a housing boom and an increase in consumer goods, including automobile sales. New purpose-built automobile dealerships were constructed throughout the nation; their design is sometimes reflective of architectural planning guides provided by automobile manufacturers. No evidence suggests that the former Al Eames Ford Dealership building reflects a standard plan design by an automobile manufacturer. In Antioch, transportation corridors developed along State Highway 4 and West 10th Street.⁴

Automobile sales surged after World War II and numerous automobile-oriented businesses, including dealerships, opened along or near major urban transportation and commercial corridors, which was a common pattern throughout the nation and in California, and was reflected in Antioch during the post-World War II period. Among the earliest automobile dealerships during this period was Ralph's, a c.1949 local dealership for the Hudson Motor Car Company, located at the corner of A Street and Wilbur Avenue and away from the subject parcel. In 1956 local businessman Al Eames began purchasing Flying A gas stations and acquired the Ford franchise in Antioch. City directories indicate that the original Al Eames Ford Sales was located at the corner of H Street and Third Street in downtown Antioch and away from the subject parcel.

By 1962 Al Eames Ford Sales relocated to its current location on the northwest corner of West 10th Street and O Street, at the western edge of the city. According to the current owner and aerial photographs of the period, the main building was constructed in 1962. The front portion of the original rectangular building featured a showroom with large plate glass windows fronting West 10th Street to showcase the latest Ford models to passing motorists. The building also had an awning on the side (east) elevation, which is still extant. Two other automobile dealerships opened along West 10th Street within just a few years. Don Campbell's Chevrolet dealership at the corner of West 10th Street and Somersville Road (currently Auto Center Drive) advertised new modern facilities and factory-trained mechanics in 1963. Another nearby auto dealership was Mazzei Pontiac/Cadillac, constructed in 1963 at 1530 West 10th

³ Antioch Historical Society et al., eds., *Images of America: Antioch* (Arcadia Publishing, 2005), 7; Mildred Brooke Hoover et al., eds., revised by Douglas E. Kyle, *Historic Spots in California, 5th Edition* (Stanford, Calif.: Stanford University Press, 2002), 66-67; Nationwide Environmental Title Research, LLC, Historic Topographical Maps, 1918, 1936, 1943, 1947, <http://www.historicaerials.com/> (accessed 2 June 2013).

⁴ Robert Genat, *The American Car Dealership* (Osceola, Wis.: MBI Publishing Company), 42-44.

Street; this building is still extant. The corridor along West 10th Street traditionally was an entrance point into the city in which the three dealerships and other automobile-related business lined the street; however, over the years, the dealerships and other businesses moved to locations with greater visibility and access from State Highway 4.⁵

Four mechanic stalls were added to the rear of Al Eames Ford Dealership's main building in 1964. The business gradually required more room and a separate building was constructed at the rear of the lot as a body shop in 1972. In 1985 Al Eames purchased the adjacent parcel to the west, demolished an existing building for more lot space, and added an awning to the side (west) elevation of the main building. Gary Eames, son of Al Eames, took over the Ford dealership until his retirement in 2000.⁶

Regulatory Context

Application of the California Register of Historical Resources Criteria

A property is a "historical resource" under California law if it is eligible for listing in the California Register, per Public Resource Code Section (PRC §) 5024.1. Historical resources include: a resource listed in or formally determined eligible for listing in the California Register; a resource included in a local register of historical resources as defined in PRC § 5020.1(k); or any object, building, structure, site, area, place, record or manuscript that a lead agency determines to be historically significant. A resource shall be considered to be "historically significant" if it meets the criteria for listing on the California Register. Criteria for listing include:

1. Association with events that have made a significant contribution to broad patterns of local or regional history
2. Association with the lives of persons important to local, California, or national history
3. Embodies the distinctive characteristics of a type, period, or region
4. Has yielded or has potential to yield information important to prehistory or history

In addition to meeting one or more of the criteria for listing, the property must retain integrity. Integrity is defined as the ability of a property to convey its historic significance. The California Register references

⁵ Paul Burgarino, "Revitalization of auto-based storefronts gives Antioch street new life" *Contra Costa Times*, 11 November 2012, http://www.contracostatimes.com/antioch/ci_22053640 (accessed 14 June 2013).; Hudsonjet.net, "History of Hudson Dealerships," <http://home.comcast.net/~sarahdyoung/hudsondealerships.html> (accessed 2 June 2013); Contra Costa County Telephone Directory, 1956, 1957, 1961, 1962, 1963 (available at Pleasant Hill Public Library, Pleasant Hill, California); Gary Eames, phone interview by Mead & Hunt, Inc., 28 May 2013; Nationwide Environmental Title Research, LLC, Historic Aerials 1957, 1958, 1964, 1966, <http://www.historicaerials.com/> (accessed 2 June 2013).

⁶ Gary Eames, phone interview by Mead & Hunt, Inc., 28 May 2013.

the National Park Service's seven aspects of integrity, including location, design, setting, materials, workmanship, feeling, and association, for determining integrity.

PRC § 21084.1 and CEQA Guidelines (§15064.5 (D)(4)) require the evaluation of the historic significance of a property even if it is not listed in the California Register or in a local register of historical resources. In evaluating properties that are less than 50 years old, the California Register regulations require only that sufficient time has passed in order to obtain a scholarly perspective sufficient to allow an understanding of the property's historic importance.

Actions that would cause a substantial adverse change in the significance of a historical resource may result in a significant effect on the environment. Substantial adverse change is defined under CEQA as demolition or alteration such that a property no longer conveys its historical significance or no longer possesses the physical characteristics that account for its inclusion in the California Register or a local register, as determined by the lead agency.

Application of the National Register Criteria for Evaluation

The National Register is the official federal list of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture. Properties can be significant at the local, state, or national level. To qualify for listing in the National Register, properties generally must be at least 50 years old, possess historic significance, and retain physical integrity. For the former Al Eames Ford Dealership Building to be eligible for listing in the National Register, it must retain integrity and possess significance under one or more of the National Register Criteria, which include:

- A. Association with events or activities that have made a significant contribution to the broad patterns of history
- B. Association with the lives of persons significant in our past
- C. Association with the distinctive characteristics of a type, period, or method of construction, or represents the work of a master, possesses high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction
- D. Holds the potential to provide important information about prehistory or history

To determine if a property is significant under one or more of these criteria, site-specific research and documentation must be completed to appropriately evaluate it within the associated historic context(s). In addition, a property must retain integrity to convey its significance by retaining the essential physical features common to its property type as discussed above.

For more information on the National Register Criteria, see *How to Apply the National Register Criteria for Evaluation* (National Park Service 1990, revised 1998).

Evaluation and Recommendation

The former Al Eames Ford Dealership buildings were evaluated for historical and architectural significance under the evaluation criteria for the California Register and the National Register. The former Al Eames Ford Dealership buildings were constructed after the formative period of post-World War II development, which began in 1945, and reflect a continuation of common post-World War II trends in commercial development that were well underway in Antioch and throughout the region by 1962. In addition, the buildings are the second location of Al Eames' Ford dealership business in Antioch; individually under commerce, the original location would better exemplify the contribution of this local business to early and important commercial development in Antioch. Research does not suggest that this dealership individually served as the impetus to the growth of automobile services along West 10th Street nor does research indicate that this dealership individually was an important factor that spurred commercial growth within the community or the region during the 1960s. The former Al Eames Ford Dealership buildings lacks a direct and important association individually with a significant local or regional event or trend and does not possess significance under California Register *Criterion 1* or National Register *Criterion A*.

Research did not reveal the building to be associated with a person significant in local or regional history and the building has no known potential to provide information important to pre-history or history. Therefore, the building is not considered to possess significance under California Register *Criteria 2 or 4* and National Register *Criterion B or D*.

Automobile dealerships from the late post- World War II period and recent past represent a common property type constructed in Antioch, the region, the state, and nationally during the 1960s. Character-defining features of automobile dealerships of this period include a plate glass storefront for displaying new automobiles, signage (either free-standing or attached to the building) to attract passing motorists, a service wing with service bays, and broad overhangs or canopies to visually connect the adjacent sales lot to the building and showroom. Location may also be a character-defining feature; dealerships and sale lots were preferably sited on a corner parcel and along a major transportation corridor to capture the attention of motorists and those waiting at stoplights.⁷ Alterations to the former Al Eames Ford Dealership building result in the loss of integrity. The glass storefront is enclosed and now exhibits small fixed-frame windows that represent a loss of the primary character-defining feature of the type, obscuring its design and historic function and severing its associative values. No signage from the 1960s remains. Additional alterations that add to a loss of integrity include altered exterior wall materials, altered fenestration on side and rear elevations (replacement doors and windows), and the addition of the canopy to the side (west) elevation. Research did not indicate that the dealership building replicates or adheres to planning guides or standard plans for automobile showrooms developed by automobile manufacturers. The 1972 body shop does not meet the general age threshold for inclusion in the National Register or California Register and does not possess exceptional importance to qualify under *Criterion Consideration G: Properties that have Achieved Significance Within the Last Fifty Years*. As such, the former Al Eames Ford Dealership buildings do not retain the level of integrity necessary to convey the essential physical features of a 1960s

⁷ Chester H. Liebs, *Main Street to Miracle Mile: American Roadside Architecture* (Baltimore, Md.: The John Hopkins University Press, 1995), 88-90; Genat, *The American Car Dealership*, 39-63.

Mr. Chris Stabenfeldt

June 20, 2013

Page 10

automobile dealership and showroom property type and do not qualify for listing in the California Register under *Criterion 3* or the National Register under *Criterion C*.

The former Al Eames Ford Dealership is recommended not eligible for listing in the California Register or the National Register. It is not considered a historic property under Section 106 and Mead & Hunt recommends a finding of *no historic properties affected* (per CFR 800.4(d)(1)). Under the CEQA, since the building is not a historical resource as defined in PRC § 5024.1, any changes to the former Al Eames Ford Dealership buildings resulting from the project would not cause a substantial adverse change in a historical resource. No further work is recommended.

Sincerely,

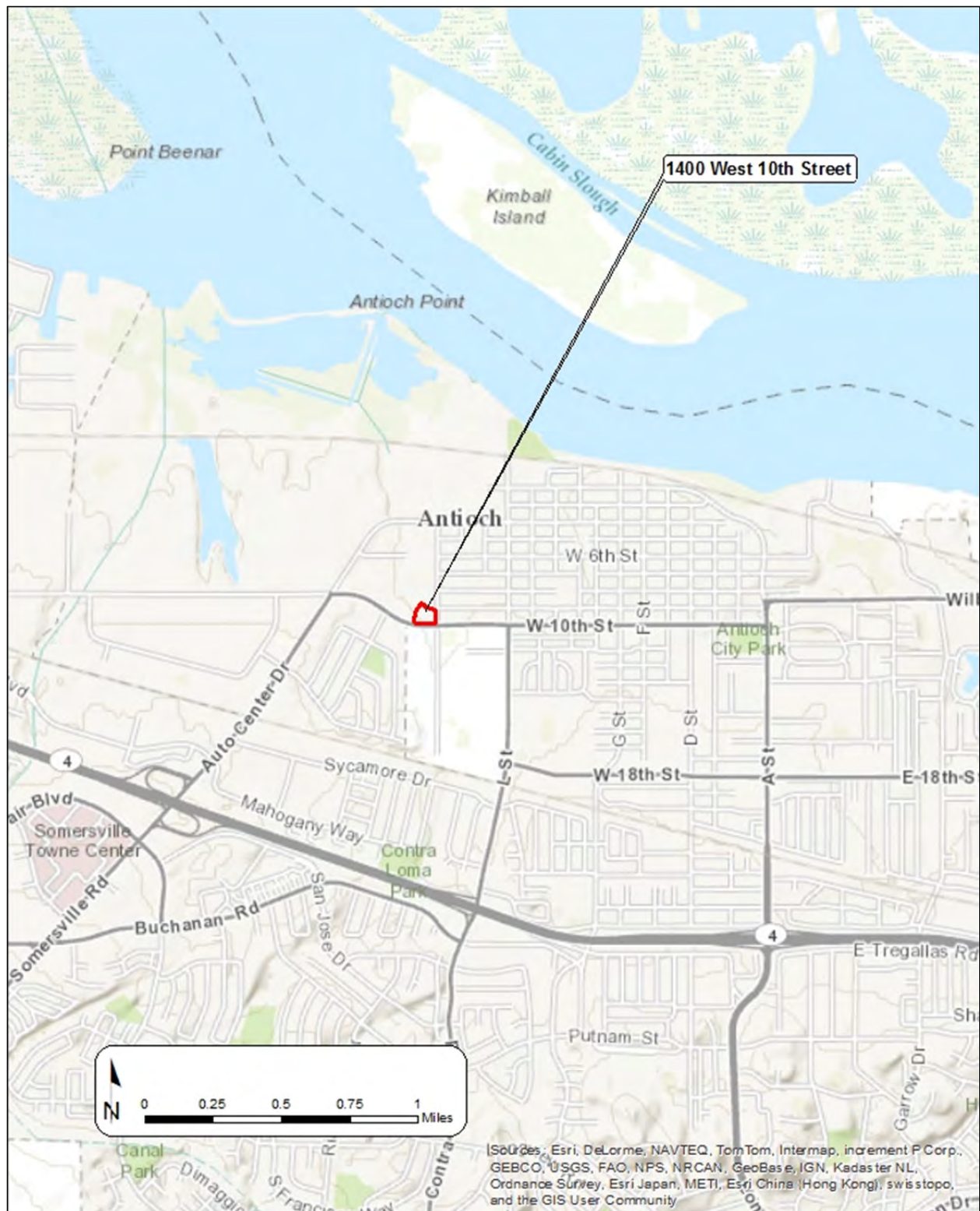
MEAD & HUNT, Inc.

A handwritten signature in black ink, appearing to read "Timothy Smith", with a stylized, flowing script.

Timothy Smith

Attachments

Attachment 1. Location Map



Location of the former Al Eames Ford Dealership, 1400 West 10th Street, Antioch, California
Assessor Parcel Number (APN) 074-130-060.

Attachment 2. Department of Parks and Recreation 523 Form

PRIMARY RECORD

Primary # _____
HRI # _____
Trinomial _____
NRHP Status Code: _____
Other Listings _____
Review Code _____ Reviewer _____ Date _____

*Resource Name or #: Al Eames Ford Dealership Building
P1. Other Identifier: _____
*P2. Location: *a. County Contra Costa County/Route/Postmile: _____
b. Address 1400 West 10th St
City Antioch Zip 94509
*c. UTM: USGS Quad: Antioch North, (1979) d. UTM: 10S 603228E 4207755N
*e. Other Locational Data (APN #) 074-130-060
*P3a. Description: (Briefly describe resource below)

See continuation sheet, page 3

*P3b. Resource Attributes: HP6: 1-3 story commercial building
**P4. Resources Present: ☒ Building ☐ Structure ☐ Object ☐ Site ☐ District
☐ Elements of District ☐ Other

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)



P5b. Description of Photo:
Facing northwest

*P6. Date Constructed/Age:
1962 (main); 1972 (auxiliary)
☒ Historic ☐ Prehistoric ☐ Both

*P7. Owner and Address:

*P8. Recorded by:
Mead & Hunt, Inc.
180 Promenade Circle
Sacramento, California 95834

*P9. Date Recorded:
5/29/2013

*P10. Type of Survey: ☐ Intensive
☒ Reconnaissance ☐ Other
Describe: _____

*P11. Report Citation: Historic Architectural Evaluation of former Al Eames Ford Dealership Building, Mead & Hunt, Inc., 2013 (letter report to Mr. Chris Stabenfeldt, ECORP, dated 20 June 2013)

*Attachments: ☐ NONE ☒ Map Sheet ☒ Continuation Sheet ☐ Building, Structure and Object Record
☐ Linear Resource Record ☐ Archaeological Record ☐ District Record ☐ Milling Station Record ☐ Rock Art Record
☐ Artifact Record ☐ Photograph Record ☐ Other (List): _____

State of California — The Resources Agency: DEPARTMENT OF PARKS AND RECREATION	Primary # _____ HRI#: _____
BUILDING, STRUCTURE, AND OBJECT RECORD	

*Resource Identifier: Al Eames Ford Dealership building
*NRHP Status Code: 6Z

B1. Historic Name: Al Eames Ford Dealership building

B2. Common Name: _____ County/Route/Postmile: _____

B3. Original Use: Car dealership
B4. Present Use: Commercial

*B5. Architectural Style: Modern

*B6. Construction History: 1962 (main building); 1972 (auxiliary body shop building)

*B7. Moved? ☒ No ☐ Yes ☐ Unknown
 Date: _____ Original Location: _____

*B8. Related Features (describe below): _____

B9a. Architect: Unknown
B9b. Builder: Unknown

*B10. Significance: Theme: Commercial Development
Area: _____

Period of Significance: N/A
Property Type: COMMERCE Applicable Criteria: N/A

(See Continuation Sheet, page 3)

B11. Additional Resource Attributes: _____

B12. References: _____
 (See Continuation Sheet, page 3)

B13. Remarks: _____

B14. Evaluator: Timothy Smith
Mead & Hunt, Inc.
180 Promenade Circle, Suite 240
Sacramento, CA 95834

 Date of Evaluation: June 2013

(This space reserved for official comments.)

(Sketch Map with north arrow required.)

See Sketch map attached.

CONTINUATION SHEET

☒ Continuation ☐ Update

Resource Identifier: Al Eames Ford Dealership

County/Route/Postmile: _____

***P3a. Description:** (Briefly describe resource below) **(Continued)**

The former Al Eames Ford Dealership includes a 1962 main building and a 1972 auxiliary building located at the rear of the property.¹ The main building is of concrete block construction and rests on a poured concrete foundation. Exterior walls consist of exposed concrete block with large areas on the principal (south) and side (east) elevations covered with brick veneer. Upper portions of the principal (south) and side (east and west) elevations are clad in vertical composite wood siding. Fenestration consists of replacement fixed-frame and plate glass storefront windows and a bank of four small, one-beside-one, sliding sash windows along the side (east) elevation. The main building has an aluminum-frame glass entry door to the former showroom on the side (east and west) elevations and four secondary metal doors to the building. Five metal, overhead retractable garage doors are located on the rear half of the side (east and west) elevations. The low-pitched front-gable roof is covered with rolled asphalt and has wide overhanging eaves that feature exposed wood brackets. Large wood-frame awnings with metal supports shelter driveways on the side (east and west) elevations.

The main building features several alterations, including replacement of the original storefront windows with narrow fixed-frame windows and brick veneer along the principal (south) elevation. The large awning on the side (west) elevation was constructed in 1985 and the overhead retractable garage doors were replaced c.2000. Several original windows have been enclosed with concrete block; others are covered with plywood. Brick planters located along the main (south) elevation, at the corners of the parcel, and at driveway entrances were later additions. Original signage has been removed.

The concrete block auxiliary body shop building was constructed in 1972 to serve as a body shop for Al Eames Ford Dealership. Exterior walls exhibit vertical composite wood siding with six service bays located along the primary (east) elevation.

B10. Significance: (Continued)

The former Al Eames Ford Dealership buildings were evaluated for historical and architectural significance under the evaluation criteria for the California Register and the National Register. The former Al Eames Ford Dealership buildings were constructed after the formative period of post-World War II development, which began in 1945, and reflect a continuation of common post-World War II trends in commercial development that were well underway in Antioch and throughout the region by 1962. In addition, the buildings are the second location of Al Eames' Ford dealership business in Antioch; individually under commerce, the original location would better exemplify the contribution of this local business to early and important commercial development in Antioch. Research does not suggest that this dealership individually served as the impetus to the growth of automobile services along West 10th Street nor does research indicate that this dealership individually was an important factor that spurred commercial growth within the community or the region during the 1960s. The former Al Eames Ford Dealership buildings lacks a direct and important association individually with a significant local or regional event or trend and does not possess significance under California Register *Criterion 1* or National Register *Criterion A*.

Research did not reveal the building to be associated with a person significant in local or regional history and the building has no known potential to provide information important to pre-history or history. Therefore, the building is not considered to possess significance under California Register *Criteria 2 or 4* and National Register *Criterion B or D*.

Automobile dealerships from the late post-World War II period and recent past represent a common property type constructed in Antioch, the region, the state, and nationally during the 1960s. Character-defining features of automobile dealerships of this period include a plate glass storefront for displaying new automobiles, signage (either free-standing or attached to the building) to attract passing motorists, a service wing with service bays, and broad overhangs or canopies to visually connect the adjacent sales lot to the building and showroom. Location may also be a character-defining feature; dealerships and sale lots were preferably sited on a corner parcel and along a major transportation corridor to capture the attention of motorists and those waiting at stoplights.² Alterations to the former Al Eames Ford Dealership building result in the loss of integrity. The glass storefront is enclosed and now exhibits small fixed-frame windows that result in a loss of the primary character-defining feature

¹ City directories list the Al Eames Ford Dealership at this location in 1961. However, according to the property owner, whose family has owned the building since its construction, the dealership was constructed in 1962.

² Chester H. Liebs, *Main Street to Miracle Mile: American Roadside Architecture* (Baltimore, Md.: The John Hopkins University Press, 1995), 88-90; Genat, *The American Car Dealership*, 39-63.

CONTINUATION SHEET

☒ Continuation ☐ Update

Resource Identifier: Al Eames Ford Dealership **County/Route/Postmile:** _____

of the type, obscuring its design and historic function and severing its associative values. No signage from the 1960s remains. Additional alterations that add to a loss of integrity include altered exterior wall materials, altered fenestration on side and rear elevations (replacement doors and windows), and the addition of the canopy to the side (west) elevation. Research did not indicate that the dealership building replicates or adheres to planning guides or standard plans for automobile showrooms mentioned in the historic context. The 1972 auxiliary body shop building does not meet the general age threshold for inclusion in the National Register or California Register and does not possess exceptional importance to qualify under *Criterion Consideration G: Properties that have Achieved Significance Within the Last Fifty Years*. As such, the former Al Eames Ford Dealership buildings do not retain the level of integrity necessary to convey the essential physical features of a 1960s automobile dealership and showroom property type and do not qualify for listing in the California Register under *Criterion 3* or the National Register under *Criterion C*.

The former Al Eames Ford Dealership is recommended not eligible for listing in the California Register or the National Register.

B12. References:

Antioch Historical Society et al., eds., *Images of America: Antioch*. N.p.: Arcadia Publishing, 2005.

Burgarino, Paul. "Revitalization of Auto-based Storefronts Gives Antioch Street New Life." *Contra Costa Times*, 11 November 2012. http://www.contracostatimes.com/antioch/ci_22053640 (accessed 14 June 2013).

Contra Costa County Telephone Directory, 1956, 1957, 1961, 1962, 1963. Available at Pleasant Hill Public Library, Pleasant Hill, California.

Eames, Gary. Phone interview by Mead & Hunt, Inc., 28 May 2013.

Genat, Robert. *The American Car Dealership*. Osceola, Wis.: MBI Publishing Company, n.d.

Hoover, Mildred Brooke Hoover et al., eds., revised by Douglas E. Kyle. *Historic Spots in California, 5th Edition*. Stanford, Calif.: Stanford University Press, 2002.

Hudsonjet.net, "History of Hudson Dealerships," 2013. <http://home.comcast.net/~sarahdyoung/hudsondealerships.html> (accessed 2 June 2013).

Liebs, Chester H. *Main Street to Miracle Mile: American Roadside Architecture*. Baltimore: The John Hopkins University Press, 1995.

Nationwide Environmental Title Research, LLC, Historic Aerials 1918, 1936, 1943, 1947, 1957, 1958, 1964, 1966. <http://www.historicaerials.com/> (accessed 2 June 2013).

LOCATION MAP

Primary #

HRI#

Trinomial

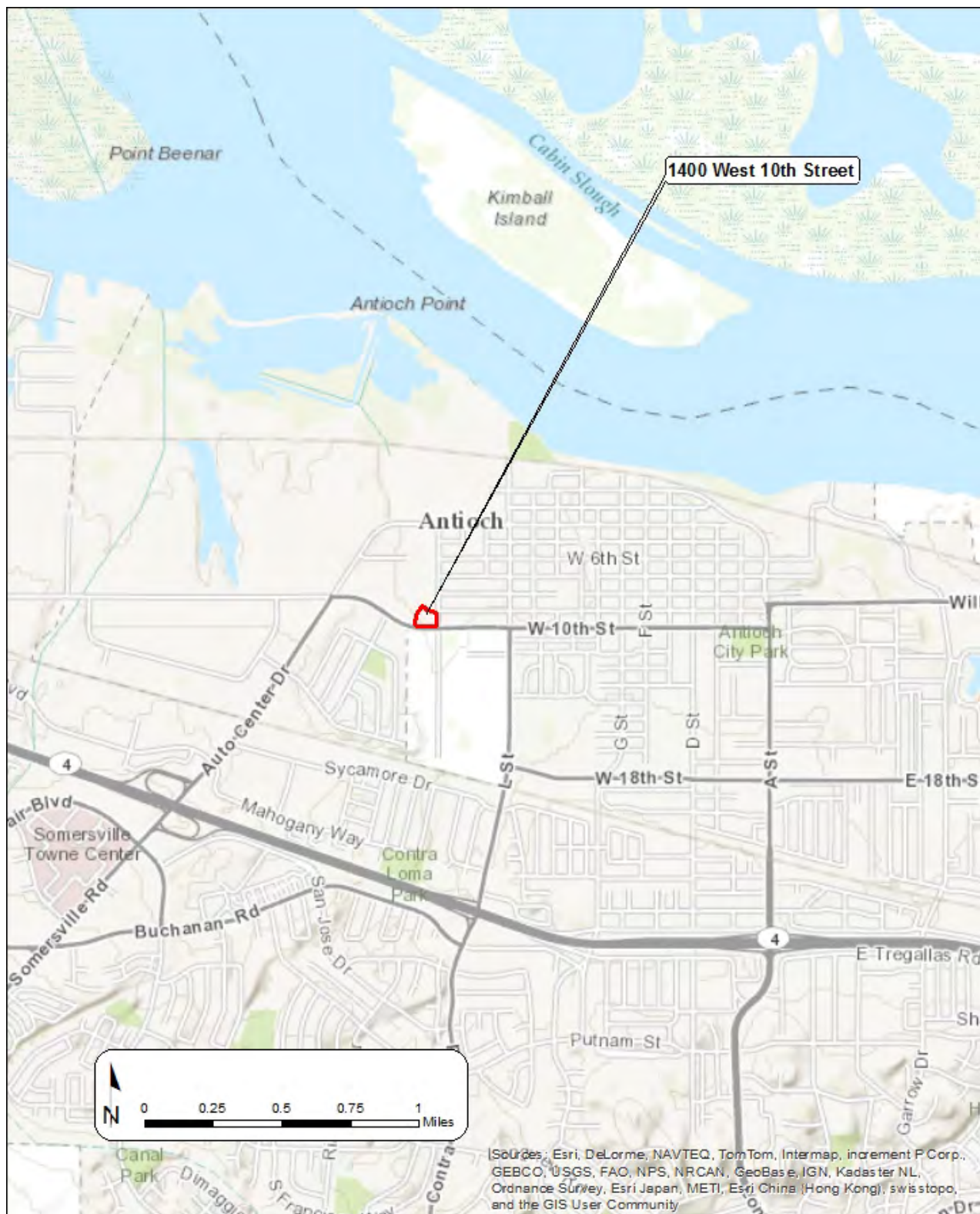
Resource Identifier: Al Earns Ford Dealership Building

County/Route/Postmile: Contra Costa

Map Name: Antioch North

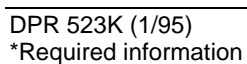
*Scale: 1:24,000

*Date of Map: 1979



***Drawn By:** Mead & Hunt, Inc.

*Date: 2013



**Attachment 3. Previous Cultural Resource Studies Identified
Through IC Request**

Attachment 3. Previous Cultural Resource Studies Identified Through IC Request

A review of these studies did not reveal information related to the former Al Eames Ford Dealership buildings or buildings on immediately adjacent parcels.

Report Title	Report No.	Author	Date
Montezuma I & II Cultural Resources	11826	Theodoratus Cultural Research	1980
Archaeological Resources Inventory for Los Vaqueros Water Conveyance Alignments, Contra Costa County, California	13256	Allan G. Bramlette, et al.	1991
Assessment of Archaeological Resources: East/Central Contra Costa County Wastewater Management Plan	18352	Colin I. Busby	1976
Cultural Resources Assessment- Proposed Housing Site Between West 7th and 9 th Streets and I Street, City of Antioch, Contra Costa County, California	21181	Basin Research Associates	1997
Contra Costa County Water Multipurpose Pipeline Project, Environmental Documentation Study, Cultural Resources Review	22812	Basin Research Associates	1997
Archaeological Survey and Cultural Resources Assessment for the City of Antioch's proposed Antioch Recycled Water Pipeline project	31405	William Self Associates, Inc.	2006
Draft Comprehensive Management Plan, Environmental Impact Statement, Juan Bautista de Anza National Historic Trail, Arizona and California	33545	National Park Service (Western Regional Office)	1994
Cultural Resources Inventory Report for the Ironhouse Sanitary District, Wastewater Treatment Plant Expansion, Contra Costa and Sacramento Counties, California	33821	Jones & Stokes	2007
Cultural Resource Assessment, Delta Diablo Sanitation District and the City of Antioch, Recycled Water Pipeline Extension Project, Antioch, Contra Costa County, California	35196	William Self Associates, Inc.	2006
Archaeological Reconnaissance of Proposed Park Site Situated in Northwestern Antioch (ARs 78-138)	1418	Archaeological Resource Service	1978
Western Leg – Alaska Highway Pipeline Project: Cultural Resources; Volume II: Pacific Gas Transmission Company, Pacific Gas and Electric Company, Evaluation of Previously Recorded Archaeological Sites	4991	Wirth Associates, Inc.	1980
An Investigation of the Cultural Resources Within the Antioch Marina Park, Antioch, Contra Costa County, California	5798	Peter M. Banks	1983
Cultural Resources Evaluation for the Delta Landing EIR/EIS, Antioch, Contra Costa County, California	7386	David Chavez & Associates Cultural Resources Consultants	1985
Archaeological Survey Report for the Highway 4/Somersville Cell Site, Antioch, Contra Costa County	25238	Pacific Legacy, Inc.	2002

Report Title	Report No.	Author	Date
Historical Resources Compliance Report: Burlington Northern Santa Fe Railway, Double Track Project (Segment 2), Oakley (MP 1146.1) to Port Chicago (MP 1164.4), In and near the Cities of Oakley, Antioch, and Pittsburgh, and the Port Chicago Naval Weapons Station, Contra Costa County	30387, 35861	CRM Tech	2005
Cultural Resources Report: Delta Entergy Center Site (DEC) and Associated Linears, Cities of Pittsburg and Antioch, Contra Costa County, California	30579	Basin Research Associates, Inc.	2004
Cultural Resource Assessment Report Supplement, Delta Diablo Sanitation District and the City of Antioch Recycled Water Pipeline Extension Project, Antioch Contra Costa County, California	37097	William Self Associates, Inc.	2010
Revised Cultural Resources Assessment of the Accidental Discovery at the Antioch Marina Boat Launch Facility Project, Antioch, Contra Costa County, California (Corps File No. SPK-2004-00520; LSA Project No. CAN1002)	38577	LSA Associates, Inc.	2010
Revised Preliminary Historic Resources Inventory, Contra Costa County, California	HRI-1989	Contra Costa County Community Development Dept.	1989

**Attachment 4. Built Environment Properties in the California Historic
Properties Database**

Attachment 4. Built Environment Properties in the California Historic Properties Database

None of these properties are related to the former Al Eames Ford Dealership buildings and none of the properties are located on the parcel or immediately adjacent to the buildings on the parcel.

Name	Status	Date Listed	Landmark Plaque Number
Black Diamond Mines	National Register	1991	N1737
Roswell Butler Hard House	National Register	1993	N1844
Mount Diablo Coal Field	State Landmark	1980	932
Riverview Union High School Building	National Register	1998	N2033
Shannon-Williamson Ranch	National Register	1987	N1478

Source: California State Parks, Office of Historic Preservation. California Historic Resources for Grass Valley, Nevada County, California, available at <http://ohp.parks.ca.gov/ListedResources/?view=county&criteria=7> (accessed 2 June 2013).

ATTACHMENT C

Updated Records Search Confirmation

NWIC Billing Worksheet

Client Name: Jeremy Adams

IC File Number: 12-1408

Affiliation: ECORP Consulting, Inc.

Proj. Name/Number: City of Antioch Drainage P-12-024

Date request rec'd: 5-20-13

Date of response: _____

CHECK IN: 9:55 CHECK OUT: 11:40

CHECK IN: _____ CHECK OUT: _____

In-person Time: Hour(s): 2 \$ 200.00

Staff Time: Hour(s): _____ \$ _____

Shapefiles: Number: _____ \$ _____

Custom Map Features: Number: _____ \$ _____

Digital Database Record: Number of row(s): _____ \$ _____

Quads: Number: _____ \$ _____

Address-mapped Flat Fee: \$ _____

Hard Copy (Xerox/Computer) pages: Page(s): 38 \$ 5.70

Labor Charge: Hour(s): _____ \$ _____

PDF pages: Page(s): _____ \$ _____

PDF Flat Fee: \$ _____

Other: \$ _____

SUBTOTAL: \$ 205.70

SUBTOTAL Date: _____ \$ _____

SUBTOTAL Date: _____ \$ _____

SUBTOTAL Date: _____ \$ _____

Rapid Response surcharge of 50% of total cost: SURCHARGE: \$ _____

Emergency Response surcharge of 100% of total cost: SURCHARGE: \$ _____

L. B. Blum
Information Center Staff

TOTAL: \$ 205.70

Sonoma State University Customer ID 0001001567

Sonoma State University Invoice No. _____

CHRIS Access and Use Agreement No. 34

ATTACHMENT D

Updated Field Survey Photographs

**State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PHOTOGRAPH RECORD**

**Primary #
HRI#
Trinomial**

Page 1 of 1

Resource/Project Name: West Antioch Creek

Year 2013

Camera:

Lens Size: 35mm

Film Type and Speed: Digital

Negatives Kept at: ECORP Consulting, Inc.

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward	Accession #
8	23			Overview of field 074 130 081 from NE corner	SW	023
8	23			Field 074 130 081 east end	North	024
8	23			field 074 130 081 east end	South	025
8	23			field 074 130 081 SE corner	NE	026
8	23			field 074 130 081 south end	East	027
8	23			field 074 130 081 from center	NW	028
8	23			field 074 130 081 from center	NE	029
8	23			field 074 130 081 from center at bi-level	South	030
8	23			field 074 130 081 from center at bi-level	North	031
8	23			field 074 130 081 overview of SE portion	SE	032
8	23			field 074 130 081 along north center	West	033
8	23			field 074 130 081 along north center	East	034
8	23			field 074 130 081 along north center	SE	035
8	23			field 074 130 081 along center	South	036
8	23			field 074 130 081 along center	North	037
8	23			field 074 130 081 center	NW	038
8	23			field 074 130 081 center	South	039
8	23			field 074 130 081 center	North	040
8	23			field 074 130 081 west end	NE	041
8	23			field 074 130 081 west edge	SW	042
8	23			field 074 130 081 west edge	NE	043
8	23			field 074 130 081 west side overview	SE	044
8	23			North end APE creek 074 040 044 from west end	SE	045
8	23			Pavement in 074 040 047 (mess up)	SW	046
8	23			Pavement in 074 040 047 (mess up)	South	047
8	23			Clipboard (mess up)	-	048
8	23			Heavy vegetated area north of RR tracks	NE	049
8	23			Creek area 074 040 044 directly south of RR tracks	East	050
8	23			Pavement west of creek area 074 040 044	North	051
8	23			Transmission pole in APE 074 040 047	SW	052
8	23			Area north of museum parking lot 074 040 046	NE	053
8	23			East central portion of APE 074 040 036	North	054
8	23			Fenced off area in 074 040 036 (football shaped)	NW	055
8	23			Fenced off area in 074 040 036 (football shaped)	West	056
8	23			Stacked pallets west of fenced off area in 074 040 036 (football shaped)	NW	057
8	23			Fenced off area in 074 040 036 (football shaped)	West	058
8	23			Fenced off area in 074 040 036 (football shaped)	SE	059
8	23			Fenced off area in 074 040 036 (south of football shaped)	West	060
8	23			Central portion (adjacent to O Street)	West	061
8	23			Parking lot, NE intersection of O and 10 th streets	South	062
8	23			South end of Project	SE	063
8	23			Boardwalk at O and 10 th intersection	North	064
8	23			Boardwalk at O and 10 th intersection	South	065
8	23			South end of 074 130 076 north of motel	North	066

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PHOTOGRAPH RECORD

Primary #
HRI#
Trinomial

Page 1 of 1

Resource/Project Name: West Antioch Creek

Year 2013

Camera:

Lens Size: 35mm

Film Type and Speed: Digital

Negatives Kept at: ECORP Consulting, Inc.

Mo.	Day	Time	Exp./Frame	Subject/Description	View Toward	Accession #
8	23			Center of 074 130 064	North	067
8	23			Creek area of 074 130 XXX	SE	068
8	23			Creek area of 074 130 XXX	NE	069
8	23			Creek area of 074 130 XXX	North	070
8	23			Creek area of 074 130 XXX narrow portion	South	071
8	23			Creek area of 074 130 XXX at west turn	NW	072
8	23			Creek area of 074 130 XXX at north-south	North	073
8	23			North creek area 074 040 044 from east side	North	074
8	23			North central Creek area 074 040 044	West	075
8	23			North creek area 074 040 044 looking towards museum	South	076
8	23			North creek area 074 040 044 (north end of fenced off area)	West	077
8	23			North creek area 074 040 044 (north end of fenced off area)	NW	078
8	23			North Creek area 074 040 044 directly north of W 4 th Street	South	079



070



071



072



073



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ATTACHMENT E

Updated Native American Coordination

STATE OF CALIFORNIA

Edmund G. Brown, Jr., Governor

NATIVE AMERICAN HERITAGE COMMISSION

1550 Harbor Blvd.
West SACRAMENTO, CA 95691
(916) 373-3710
Fax (916) 373-5471



September 25, 2013

Jeremy Adams
ECORP
2525 Warren Drive
Rocklin, CA 95677

By Fax: 916-782-9134

Number of Pages: 2

Re: West Antioch Creek project, Contra Costa, County

Dear Mr. Adams,

A record search of the sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend others with specific knowledge. By contacting all those listed, your organization will be better able to respond to claims of failure to consult with the appropriate tribe or group. If a response has not been received within two weeks of notification, the Commission requests that you follow-up with a telephone call to ensure that the project information has been received.

If you receive notification of change of addresses and phone numbers from any of these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 373-3713.

Sincerely,

A handwritten signature in cursive script, appearing to read "Debbie Pilas-Treadway".

Debbie Pilas-Treadway
Environmental Specialist III

**Native American Contacts
Contra Costa County
September 25, 2013**

Katherine Erolinda Perez
PO Box 717
Linden, CA 95236
canutes@verizon.net
(209) 887-3415

Ohlone/Costanoan
Northern Valley Yokuts
Bay Miwok

The Ohlone Indian Tribe
Andrew Galvan
PO Box 3152
Fremont, CA 94539
chochenyo@AOL.com
(510) 882-0527 - Cell
(510) 687-9393 - Fax

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

Trina Marine Ruano Family
Ramona Garibay, Representative
30940 Watkins Street
Union City, CA 94587
510-972-0645-home
soaprootmo@msn.com

Ohlone/Costanoan
Bay Miwok
Plains Miwok
Patwin

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code

This list is only applicable for contacting local Native Americans with regard to cultural resources for the proposed West Antioch Creek project, Contra Costa County

**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

APPENDIX D

Noise Assessment

Environmental Noise Assessment

West Antioch Creek Channel Improvement Project

Antioch, California

BAC Job # 2012-078

Prepared For:

ECORP Consulting, Inc.

Attn: Mr. Chris Stabenfeldt
2525 Warren Drive
Rocklin, CA 95677

Prepared By:

Bollard Acoustical Consultants, Inc.



Paul Bollard, President

October 17, 2013



CEQA Checklist

NOISE – Would the Project Result in:	NA – Not Applicable	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less Than Significant Impact	No Impact
a) 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?			X		
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?				X	
c) A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?				X	
d) A substantial temporary or periodic increase in ambient noise levels in the project vicinity above level existing without the project?			X		
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 expose people residing or working in the project to excessive noise levels?					X
f) For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?					X

Introduction & Project Description

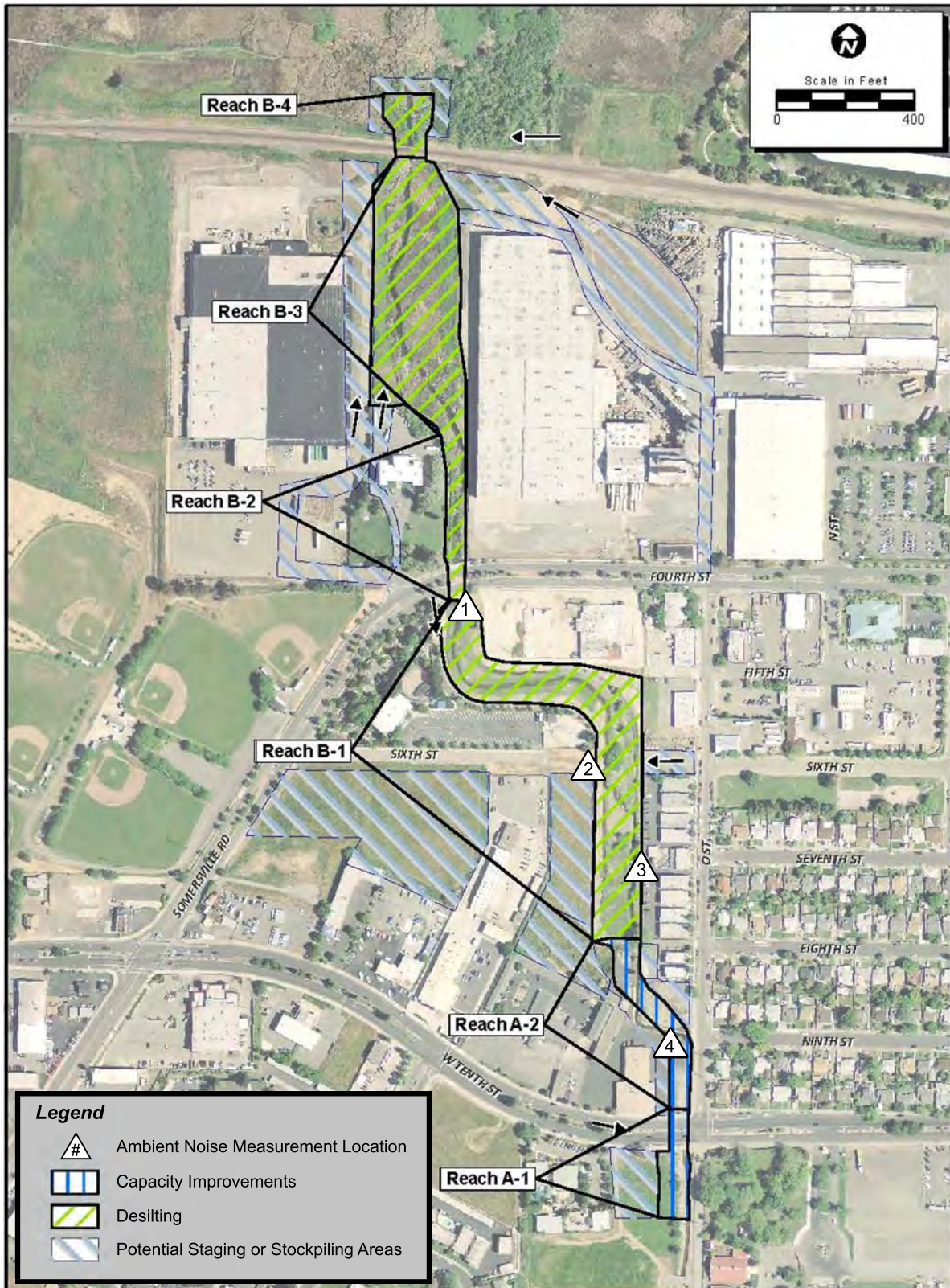
The West Antioch Creek Channel Improvement Project (Proposed Project) is located in the City of Antioch, Contra Costa County. The Proposed Project would reduce flood risk in the project area by increasing the capacity of the West Antioch Creek channel between West Tenth Street and West Eighth Street and re-establishing the 25 year flood protection capacity of the channel downstream of West Eighth Street to the BNSF railroad trestle.

The Proposed Project is intended to reduce flooding in the project area. Currently within the project area the West Antioch Creek channel transitions from structural plate steel arch culverts under West Tenth Street, to a concrete-lined ditch covered by wooden planking under a parking lot at 1400 West Tenth Street, to an open concrete-lined ditch adjacent to a carport for an apartment building, to an earthen channel, to a concrete box culverts under West Fourth Street, to a concrete channel that extends approximately 400 feet north of West Fourth Street, to an earthen channel that continues north to the BNSF railroad trestle.

The Proposed Project would alter two adjacent reaches of the channel. Project work in Reach A (conveyance improvements) would increase the capacity of the conveyance system between West Tenth Street and approximately West Eighth Street. Project work in Reach B (desilting) would desilt the channel from approximately West Eighth Street to approximately 200 feet north of the BNSF railroad trestle to restore design capacity. Either reach can be improved independently from the other or concurrently, but work in both reaches must be conducted to realize improved levels of flood protection. Figure 1 shows the project extents.

Five alternatives were proposed for Reach A (conveyance). All alternatives would use pre-cast concrete box culverts under West Tenth Street. However, the alternatives differ in the conveyance configuration from West Tenth Street to approximately West Eighth Street. Although the conveyance configurations differ under these alternatives, the proposed hours of construction and heavy equipment required for construction is similar. As a result, the potential noise impact associated with each of the alternatives is also considered to be similar. As a result, a single analysis of construction noise generation is considered to be representative of potential impacts for all Reach A alternatives.

Figure 1
West Antioch Creek Channel Improvement Project
Ambient Noise Measurement Locations



Fundamentals of Noise

Noise is often defined simply as unwanted sound, and thus is a subjective reaction to characteristics of a physical phenomenon. Researchers have generally agreed that A-weighted sound pressure levels (sound levels) are very well correlated with community reaction to noise. The unit of sound level measurement is the decibel (dB), sometimes expressed as dBA. Variations in sound levels over time are represented by statistical descriptors, and by time-weighted composite noise metrics such as the Day-Night Average Level (L_{dn}), or the Community Noise Equivalent Level (CNEL). Throughout this analysis, A-weighted sound pressure levels will be used to describe community noise unless otherwise indicated. Please refer to Appendix A for definitions of acoustic terminology.

The decibel notation used for sound levels describes a logarithmic relationship of acoustical energy, so that sound levels cannot be added or subtracted in the conventional arithmetic manner. For example, a doubling of acoustical energy results in a change of 3 decibels (dBA), which is usually considered to be barely perceptible. A 10-fold increase in acoustical energy yields a 10 decibel change, which is subjectively like a doubling of loudness. Table 1 shows common noise levels associated with various sources.

Community noise is commonly described in terms of the “ambient” noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the average, or equivalent sound level (L_{eq}), which corresponds to a steady-state sound level containing the same total energy as a time-varying signal over a given period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, and shows very good correlation with community response to noise.

Table 1
Typical A-Weighted Sound Levels of Common Noise Sources

Loudness Ratio	dBA	Description
128	130	Threshold of pain
64	120	Jet aircraft take-off at 100 feet
32	110	Riveting machine at operators position
16	100	Shotgun at 200 feet
8	90	Bulldozer at 50 feet
4	80	Diesel locomotive at 300 feet
2	70	Commercial jet aircraft interior during flight
1	60	Normal conversation speech at 5-10 feet
1/2	50	Open office background level
1/4	40	Background level within a residence
1/8	30	Soft whisper at 2 feet
1/16	20	Interior of recording studio

Fundamentals of Vibration

Vibration is like noise in that it involves a source, a transmission path, and a receiver. While vibration is related to noise, it differs in that noise is generally considered to be pressure waves transmitted through air, while vibration is usually associated with transmission through a structure. As with noise, vibration consists of an amplitude and frequency. A person's response to vibration will depend on their individual sensitivity as well as the amplitude and frequency of the source.

Vibration can be described in terms of acceleration, velocity, or displacement. A common practice is to monitor vibration measures in terms of peak particle velocities (inches/second). Standards pertaining to perception as well as damage to structures have been developed for vibration in terms of peak particle velocity.

Human response to vibration is difficult to quantify. Vibration can be felt or heard well below the levels that produce any damage to structures. The duration of the event has an effect on human response, as does frequency. Generally, as the duration and vibration frequency increase, the potential for adverse human response increases.

Table 2 summarizes the average human response to vibration that may be anticipated when a person is at rest in quiet surroundings. If the person is engaged in any type of physical activity, the level required for the responses indicated is increased considerably.

Table 2
Human Response to Ground Vibration

Response	Ground Vibration Range ppv (inches per second)
Barely to distinctly perceptible	0.02–0.10
Distinctly perceptible to strongly perceptible	0.10–0.50
Strongly perceptible to mildly unpleasant	0.50–1.00
Mildly unpleasant to distinctly unpleasant	1.00–2.00
Distinctly unpleasant to intolerable	2.00–10.00
Source: Caltrans 2004.	

Existing Ambient Noise Environment in the Project Vicinity

The existing ambient noise environment in the immediate project vicinity is defined primarily by local traffic on West 4th, West 10th, and O Streets, as well as from the railroad tracks to the North of the project vicinity and light industrial uses. To generally quantify the existing ambient noise environment in the project vicinity, short-term ambient noise surveys were conducted at four (4) locations on the project site on October 4, 2013. The noise survey locations are shown on Figure 1.

Larson Davis Laboratories (LDL) Model 820 precision integrating sound level meters were used for the ambient noise level measurement surveys. The meters were calibrated before use with an LDL Model CAL200 acoustical calibrator to ensure the accuracy of the measurements. The equipment used meets all specifications of the American National Standards Institute for Type 1 sound level meters (ANSI S1.4). A summary of the noise level measurement results are provided in Table 3. The Table 3 data indicate that the measured ambient noise conditions in the project vicinity are typical for residential areas affected primarily by local traffic noise sources.

Table 3
Ambient Short-Term Noise Level Measurement Survey
West Antioch Creek Project

Site #	Interval #	Time	Duration	Leq, dB	Lmax, dB
1	2	1:15 pm	15 min	54	68
2	3	1:37 pm	15 min	48	58
3	4	1:58 pm	15 min	55	66
4	5	2:20 pm	15 min	52	68

Notes:

- Traffic from O Street and W. 10th Street is dominant.
- Distant back-up beeper from adjacent industrial land uses.
- Noise measurement locations are indicated on Figure 1

Criteria for Acceptable Noise Exposure

City of Antioch General Plan

Section 11.6 of the City of Antioch General Plan contains the City's noise policies. The following specific policies which pertain to temporary construction are included within the General Plan:

- i. Ensure that construction activities are regulated as to hours of operation in order to avoid or mitigate noise impacts on adjacent noise-sensitive land uses.
- j. Require proposed development adjacent to occupied noise sensitive land uses to implement a construction-related noise mitigation plan. This plan would depict the location of construction equipment storage and maintenance areas, and document methods to be employed to minimize noise impacts on adjacent noise sensitive land uses.
- k. Require that all construction equipment utilize noise reduction features (e.g., mufflers and engine shrouds) that are no less effective than those originally installed by the manufacturer.
- m. Prior to the issuance of any grading plans, the City shall condition approval of subdivisions and non-residential development adjacent to any developed/occupied noise-sensitive land uses by requiring applicants to submit a construction-related noise mitigation plan to the City for review and approval. The plan should depict the location of construction equipment and how the noise from this equipment will be mitigated during construction of the project through the use of such methods as:
 - The construction contractor shall use temporary noise-attenuation fences, where feasible, to reduce construction noise impacts on adjacent noise sensitive land uses.
 - During all project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.
 - The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.

- The construction contractor shall limit all construction-related activities that would result in high noise levels to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. No construction shall be allowed on Sundays and public holidays.
- n. The construction-related noise mitigation plan required shall also specify that haul truck deliveries be subject to the same hours specified for construction equipment. Additionally, the plan shall denote any construction traffic haul routes where heavy trucks would exceed 100 daily trips (counting those both to and from the construction site). To the extent feasible, the plan shall denote haul routes that do not pass sensitive land uses or residential dwellings. Lastly, the construction-related noise mitigation plan shall incorporate any other restrictions imposed by the City.

Evaluation of Project Noise Generation

The project would essentially generate changes in ambient noise and vibration levels in the immediate project vicinity in the following three different ways:

- On-site construction equipment used for project demolition, culvert replacement, roadway reconstruction, and channel desilting.
- Off-site heavy truck traffic hauling silt away from the project area.
- Off-site changes in traffic patterns resulting from construction detours.

On-Site Equipment Noise Generation

During the construction phases of the proposed project, noise from construction activities would add to the noise environment in the immediate project vicinity. Activities involved in typical construction would generate maximum noise levels, as indicated in Table 4, ranging from 70 to 90 dB at a distance of 50 feet.

Table 4 Typical Construction Equipment Noise	
Equipment Description	Maximum Noise Level at 50 feet, dBA
Auger drill rig	85
Backhoe	80
Chain saw	85
Compactor (ground)	80
Compressor (air)	80
Concrete mixer truck	85
Concrete pump truck	82
Concrete saw	90
Crane (mobile or stationary)	85
Dozer	85
Dump truck	84
Excavator	85
Front end loader	80
Generator (25 kilovolt-amperes [kVA] or less)	70
Grader	85
Jackhammer	85
Mounted impact hammer (hoe ram)	90
Paver	85
Pneumatic tools	85
Pumps	77
Scraper	85
Vibratory concrete mixer	80
Welder/Torch	73
<i>Source: Federal Highway Administration 2006.</i>	

Off-Site Haul Truck Noise Generation

The proposed project would result in the generation of approximately 20 heavy truck trips per day for the hauling of vegetation and soils to and from the project site. BAC file data for both loaded and empty 20-ton haul trucks indicates that a typical haul truck passby at 50 feet can be expected to generate an average Sound Exposure Level (SEL) of approximately 80 dB. Given approximately 20 haul trips in a typical day, it is reasonable to conclude that there would likely be no more than 4 off-site heavy truck trips in a given hour. Based on 4 trips in an hour, and a SEL of 80 dB at 50 feet, the hourly average noise level resulting from those four trips would be 50 dB Leq at a distance of 50 feet.

Noise Generated by Project Detours

During a portion of Reach A-1 project demolition, culvert replacement, and roadway reconstruction, West 10th Street will be closed and local traffic will detour around the construction. As part of the proposed project, a Traffic Management Plan (TMP) will be prepared which will evaluate detour plans for street closures. It is anticipated that the TMP will develop detour plans which maximize the use of the larger West 4th and L Streets, while minimizing cut through traffic on the smaller residential roadways.

Vibration Generated by Heavy Equipment

BAC file data for heavy earthmoving equipment indicates that vibration levels range from 0.02 inches/second for a passing bulldozer at 35 feet to 0.005 inches/second for a front-loader at distance of 100 feet. These data indicate that, unless the receiver is very close to the equipment, ground borne vibration generated by heavy earthmoving equipment is negligible. The facades of the nearest existing residences to the proposed construction (apartments along east side of Reach B and single-family residences along the east side of "O" Street) will be approximately 50+ feet from the proposed construction and desilting operations. As a result, project-generated vibration levels at those nearest residences are predicted to be well below 0.1 inches/second peak particle velocity.

Support for Checklist Answers

- a) **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?**

As indicated above the City of Antioch General Plan does not apply specific noise standards to construction activities. Rather, the City's noise policies identify practical measures which should be implemented to the extent possible to reduce the potential to adverse public reaction to noise generated during short-term construction projects. To reduce this impact to a level of insignificance, the following specific measures are recommended:

- 1. During all project site excavation and grading on-site, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards.*
- 2. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from sensitive receptors nearest the project site.*
- 3. The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receptors nearest the project site during all project construction.*
- 4. The construction contractor shall limit all construction-related activities that would result in high noise levels to between the hours of 7:00 a.m. and 7:00 p.m. Monday through Saturday. No construction shall be allowed on Sundays and public holidays.*
- 5. Haul truck activity shall be subject to the same hours specified for construction equipment.*
- 6. Project haul routes shall be developed in the Traffic Management Plan which minimize the usage of routes through residential neighborhoods or other sensitive land uses.*

*Following implementation of these mitigation measures, this impacts is considered **Less than Significant**.*

- b) **Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?**

*The analysis above indicates that peak particle velocities of less than 0.1 inches per second are predicted for the nearest residences to the project site. Because the Table 2 data indicate such levels would be barely perceptible, and because construction activities would be temporary and limited to daytime hours, this impact is considered **Less than Significant**.*

- c) **A substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project?**

*The proposed project would occur for a limited duration. As a result, no permanent increase in ambient noise levels would result from this project and this impact is considered **Less than Significant**.*

- d) **A substantial temporary or periodic increase in ambient noise levels in the project vicinity above level existing without the project?**

*As indicated in Table 4, construction equipment generates elevated noise levels while in use. However, because the project would temporary in nature, limited to daytime hours, and would utilize the construction noise mitigation measures required in the City of Antioch General Plan noise policies (See Pages 7-8 of this report), This impact is considered **Less than Significant with Mitigation Incorporated**.*

- 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 expose people residing or working in the project to excessive noise levels?**

*The project is not located within an airport land use plan or within 2 miles of a public use airport. As a result, relative to criteria (e), there is **No Impact**.*

- f) **For a project within the vicinity of a private airstrip, would the project expose people residing or working in the project area to excessive noise levels?**

*The project is not located in the vicinity of a private use airstrip. As a result, relative to criteria (f), there is **No Impact**.*

Appendix A

Acoustical Terminology

Acoustics	The science of sound.
Ambient Noise	The distinctive acoustical characteristics of a given space consisting of all noise sources audible at that location. In many cases, the term ambient is used to describe an existing or pre-project condition such as the setting in an environmental noise study.
Attenuation	The reduction of an acoustic signal.
A-Weighting	A frequency-response adjustment of a sound level meter that conditions the output signal to approximate human response.
Decibel or dB	Fundamental unit of sound, A Bell is defined as the logarithm of the ratio of the sound pressure squared over the reference pressure squared. A Decibel is one-tenth of a Bell.
CNEL	Community Noise Equivalent Level. Defined as the 24-hour average noise level with noise occurring during evening hours (7 - 10 p.m.) weighted by a factor of three and nighttime hours weighted by a factor of 10 prior to averaging.
Frequency	The measure of the rapidity of alterations of a periodic signal, expressed in cycles per second or hertz.
L_{dn}	Day/Night Average Sound Level. Similar to CNEL but with no evening weighting.
L_{eq}	Equivalent or energy-averaged sound level.
L_{max}	The highest root-mean-square (RMS) sound level measured over a given period of time.
Loudness	A subjective term for the sensation of the magnitude of sound.
Masking	The amount (or the process) by which the threshold of audibility is for one sound is raised by the presence of another (masking) sound.
Noise	Unwanted sound.
Peak Noise	The level corresponding to the highest (not RMS) sound pressure measured over a given period of time. This term is often confused with the Maximum level, which is the highest RMS level.
RT₆₀	The time it takes reverberant sound to decay by 60 dB once the source has been removed.
Sabin	The unit of sound absorption. One square foot of material absorbing 100% of incident sound has an absorption of 1 sabin.
SEL	A rating, in decibels, of a discrete event, such as an aircraft flyover or train passby, that compresses the total sound energy of the event into a 1-s time period.
Threshold of Hearing	The lowest sound that can be perceived by the human auditory system, generally considered to be 0 dB for persons with perfect hearing.
Threshold of Pain	Approximately 120 dB above the threshold of hearing.



**Draft Initial Study and Mitigated Negative Declaration
West Antioch Creek Channel Improvement Project**

APPENDIX E

Paleontological Assessment



METHODS

A paleontological assessment of the West Antioch Creek project (project) in Contra Costa County, California was conducted by ECORP Biologist Marin Meza. The assessment included a query of the University of California Museum of Paleontology (UCMP) online catalog records for Contra Costa County, a review of regional geologic maps from the California Geological Survey, and a review of existing literature on paleontological resources of Contra Costa County. The purpose of the paleontological assessment was to determine: the sensitivity of the project area; whether or not known occurrences of paleontological resources are present within or immediately adjacent to the project area; and whether or not implementation of the project could result in significant impacts to paleontological resources. Paleontological resources include mineralized (fossilized) or unmineralized bones, teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains.

Sedimentary rock units may be described as having (a) high (or known) potential for containing significant nonrenewable paleontological resources; (b) low potential for containing nonrenewable paleontological resources; or (c) undetermined potential (SVP 2013). The determination of a site's (or rock unit's) degree of paleontological potential is first founded on a review of pertinent geological and paleontological literature and on locality records of specimens deposited in institutions. The sensitivity of rock units in which fossils occur may be divided into three operational categories:

I. **HIGH POTENTIAL.** Rock units from which vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a have potential for containing significant nonrenewable fossiliferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.

II. **UNDETERMINED POTENTIAL.** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

III. **LOW POTENTIAL.** Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections. These deposits generally will not require protection or salvage operations.

RESULTS

The UCMP has 11,888 paleontological specimens from 2,476 localities in Contra Costa County (UCMP 2013a). Not all specimens in the UCMP collections have been cataloged and digitized however, and other specimens have likely been recorded within the vicinity of the project area. The specific location of all localities is available only to qualified paleontologists, and the location of these occurrences relative to the project area is unclear without more extensive archival research. Of the 11,888 specimens recorded within Contra Costa County, 1,064 are fossil invertebrates, 820 are microfossils, 208 are plant fossils, and 9,794 are fossil vertebrates (UCMP 2013a). At least seventeen UCMP records are recorded in Antioch where the project is located (Table 1) (UCMP 2013a).

Table 1 – Previously Recorded Paleontological Specimens Near the Project Area

Spec #	Class	Genus, Species	Period	Epoch	Loc ID#	Locality Name	County
M23842	Polythalamia	Foraminifera, sorted assemblage	Tertiary	Eocene	MF8077	Antioch	Contra Costa
V35651	Mammalia	unspecified	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V35652	Mammalia	unspecified	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V35653	Mammalia	Bison	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V35654	Mammalia	unspecified	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V35655	Mammalia	Glossotherium	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V153899	Mammalia	Equus	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa
V58180	Mammalia	Equus caballus	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58189	Mammalia	Taxidea	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58190	Mammalia	Equus	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58191	Mammalia	Odocoileus	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58192	Mammalia	unspecified	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58193	Mammalia	unspecified	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58194	Mammalia	unspecified	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V58195	Mammalia	Bison	Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa
V22575	Mammalia	Mammut americanum	Quaternary	Pleistocene	V1604	Antioch General	Contra Costa
V23191	Mammalia	Mammuthus	Quaternary	Pleistocene	V1604	Antioch General	Contra Costa

All but one of the recorded occurrences shown in Table 1 are fossilized mammalian species from the Pleistocene epoch of the Quaternary period found in clay and fluvial sand soil types.



The Pleistocene, approximately 2.6 million to 11,700 years ago, included the most recent episodes of global cooling (UCMP 2013b). Much of the world's temperate zones were alternately covered by glaciers during cool periods and uncovered during the warmer interglacial periods when the glaciers retreated. The Pleistocene was characterized by the presence of distinctive large land mammals and birds including the mammoth, mastodons, longhorned bison, saber-toothed cats, and giant ground sloths.

The remaining occurrence shown in Table 1 is a microfossil from the late Eocene epoch of the Tertiary period found in the Kreyenhagen Formation. The Eocene is from the Tertiary period and it lasted from about 55.8 to 33.9 million years ago (UCMP 2013c). The oldest known fossils of most of the modern orders of mammals appear in a brief period during the early Eocene. By the late Eocene, the lower temperatures and increased seasonality drove increased body size of mammals, and caused a shift towards increasingly open savanna-like vegetation, with a corresponding reduction in forests (UCMP 2013c).

The recorded occurrences of paleontological resources from the Quaternary period are commensurate with the underlying geology of the project area. According to the 2010 Geologic Map of California (Gutierrez et al. 2010) and the Geologic Map of the Sacramento Quadrangle (Wagner et. al. 1981), the geologic feature that underlies the project area is classified as older alluvium, lake, playa, and terrace deposits with intertidal deposits at the north end of the project area from the Quaternary period. The Soil Resource Report for Contra Costa County, California (NRCS 2008) indicates that five soil types exist on-site: Brentwood clay loam, Joice muck, Marcuse clay, Rincon clay loam, and sycamore silty clay loam. The Brentwood clay loam, Rincon clay loam, and Sycamore silty clay loam are dominated by a mixture of clay loam, clay, and loamy sand to silty clay over a restrictive layer more than 80 inches (approximately seven feet) below the surface. The parent material for these three soil types is alluvium derived from sedimentary rock. Joice muck is dominated by muck over a restrictive layer of organic material more than 80 inches below the surface. Lastly, Marcuse clay is dominated by clay over a restrictive layer more than 80 inches below the surface. The parent material for Marcuse clay is alluvium derived from sandstone and shale.

Ground disturbing activities associated with the proposed project include realigning the creek, installing culverts and retaining walls, and cutting new channel slopes. The creek, for project purposes, has been split into two adjacent reaches: A and B. Reach A involves conveyance configuration, installation of culverts/walls, and potential demolition or relocation of buildings. Five alternatives have been proposed for Reach A. All alternatives would use pre-cast concrete box culverts but they differ in the conveyance configuration of the reach. In addition, all alternatives would install four culverts 14 feet wide by seven feet high and could range from 100-700 feet in length. Reach B involves desilting, which includes the removal of accumulated sediment from the earthen channel. Approximately 3,000 linear feet of channel would be desilted. Multiple staging/stockpiling areas will be designated surrounding the project. The general construction activities involve trenching and excavating for cofferdam/sump/pump/pipeline installation and relocation, culvert and retaining wall construction, excavation for shaping of the channel, demolition of concrete channel/parking area/road, and grading and paving.

The records search determined that there are fossil vertebrate localities located in proximity to the project area and the geology underlying the project area has high potential for containing



nonrenewable paleontological resources. Monitoring is not required during desilting activities which include the removal of accumulated sediment within the existing earthen channel (Reach B). However, monitoring during all subsurface ground-disturbing activities that will impact undisturbed native soils shall be conducted by a qualified vertebrate paleontologist. The monitor shall be equipped to recover fossils and sediment samples during excavation, and shall have the authority to temporarily halt or divert equipment to allow for recovery of large or numerous fossils. If any fossils are recovered, they shall be analyzed to a point of identification and curated at an established accredited museum repository with permanent retrievable paleontologic storage. A technical report of findings shall be prepared with an appended itemized inventory of identified specimens and submitted with the recovered specimens to the curation facility.

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spec_id	specno	ucmp_coll	class	genus	species	subspecies	other_id	type_status	period	epoch	loc_id_num	loc_name	county_std	state_prov_std	country_std	cont_ocean	pic	access
M23842		23842 M	Polythalamia				FORAMINIFERA, Serial Association		Tertiary	Eocene	M8077	Antioch	Contra Costa County	California	United States	North America		yes
V35651		35651 V	Mammalia						Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V35652		35652 V	Mammalia						Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V35653		35653 V	Mammalia	Bison					Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V35654		35654 V	Mammalia						Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V35655		35655 V	Mammalia	Glossotherium					Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V153899		153899 V	Mammalia	Equus	caballus			PUBL	Quaternary	Pleistocene	V4008	Antioch 2	Contra Costa County	California	United States	North America		yes
V58180		58180 V	Mammalia	Equus					Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58189		58189 V	Mammalia	Taxidea					Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58190		58190 V	Mammalia	Equus					Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58191		58191 V	Mammalia	Odocoileus					Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58192		58192 V	Mammalia						Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58193		58193 V	Mammalia						Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58194		58194 V	Mammalia						Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V58195		58195 V	Mammalia	Bison					Quaternary	Pleistocene	V6007	Antioch 3	Contra Costa County	California	United States	North America		yes
V22575		22575 V	Mammalia	Mammuth	americanum				Quaternary	Pleistocene	V1604	Antioch General	Contra Costa County	California	United States	North America		yes
V23191		23191 V	Mammalia	Mammuthus					Quaternary	Pleistocene	V1604	Antioch General	Contra Costa County	California	United States	North America		yes
V6997		7697 V	Mammalia	Mammuth					Quaternary	Pleistocene	V6650	Antioch Dam	Contra Costa County	California	United States	North America		yes
M16556.3		16556.3 M	Polythalamia				FORAMINIFERA		Tertiary	Eocene	A6652		Contra Costa County	California	United States	North America		yes
V37727		37727 V	Mammalia	Glossotherium					Quaternary	Pleistocene	V4404	Alamo Creek 2	Contra Costa County	California	United States	North America		yes
V37728		37728 V	Mammalia	Spermophilus					Quaternary	Pleistocene	V4404	Alamo Creek 2	Contra Costa County	California	United States	North America		yes
V57553		57553 V	Chondrichthyes	Ptychodus					Cretaceous	Late Cretaceous	V6113	Alhambra Valley Rd	Contra Costa County	California	United States	North America		yes
I10532		10532 I	Gastropoda	Polypoda	lamellosa				Tertiary	Oligocene	D118	Arnold Industrial Highway	Contra Costa County	California	United States	North America		yes
V92915		32915 V	Mammalia					PUBL	Tertiary	Miocene	V3614	Arroyo Cayetano	Contra Costa County	California	United States	North America		yes
I11939		11939 I	Gastropoda	Xenophora	zitteli			Holotype	Tertiary	Miocene	208	Arroyo del Hambre	Contra Costa County	California	United States	North America		yes
V43407		43407 V	Mammalia						Tertiary	Miocene	V5330	Avila	Contra Costa County	California	United States	North America		yes
P1135		1135 P	Sphenopsida	Equisetum					Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1142		1142 P	Liliopsida	Poaetes					Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1143		1143 P	Liliopsida	Poaetes					Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1149		1149 P	Magnoliopsida	Salix					Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1236		1236 P	Magnoliopsida	Populus	balsamoides			plesiotype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1237		1237 P	Magnoliopsida	Populus	balsamoides			plesiotype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1238		1238 P	Magnoliopsida	Populus	emersoni			cotype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1242		1242 P	Magnoliopsida	Myrica				plesiotype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1243		1243 P	Magnoliopsida	Juglans	oregoniana				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1257		1257 P	Magnoliopsida	Persea					Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1258		1258 P	Magnoliopsida	Persea	princeps				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1259		1259 P	Magnoliopsida	Umbellularia	oregonensis				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1260		1260 P	Magnoliopsida	Umbellularia	oregonensis				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1265		1263 P	Magnoliopsida	Platanus	dissecta				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1266		1264 P	Magnoliopsida	Prunus	chanceyi			paratype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1266		1266 P	Magnoliopsida	Prunus	chanceyi			cotype	Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1271		1271 P	Magnoliopsida	Populus	balsamoides				Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
P1277		1277 P	Magnoliopsida						Tertiary	Miocene		618 Bailey Road	Contra Costa County	California	United States	North America		yes
V5002		5002 V	Mammalia	Eucator	lecontei			TYPE	Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America	2222 0904 0041 0011	yes
V10420		10420 V	Mammalia	Meshipp					Tertiary	Miocene	V67102	Bald Peak N	Contra Costa County	California	United States	North America		yes
V19826		19826 V	Mammalia	Prosthenops			FIG		Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America		yes
V19827		19827 V	Mammalia	Lepus			PUBL		Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America		yes
V19828		19828 V	Reptilia				PUBL		Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America		yes
V30572		30572 V	Mammalia	Eucator	lecontei		FIG		Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America		yes
V31574		31574 V	Mammalia	Eucator	lecontei		TYPE		Tertiary	Miocene		-1082 Bald Peak N	Contra Costa County	California	United States	North America		yes
V11242		11242 V	Mammalia	americanum				Quaternary	Tertiary	Miocene		-1076 Bear Stone S.P. Tunnel	Contra Costa County	California	United States	North America		yes
I11131		11131 I	Bivalvia	Chondotona	weaveri			Holotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11134		11134 I	Bivalvia	Antigona	undosa			Holotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11135		11135 I	Bivalvia	Antigona	neglecta			Holotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11136		11136 I	Bivalvia	Antigona	undosa			Paratype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11144		11144 I	Bivalvia	Antigona	mathewsoni			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11146		11146 I	Bivalvia	Dosinia	whitneyi			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11156		11156 I	Bivalvia	Macrocallista	sp.			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11159		11159 I	Gastropoda	Sium	scopolusum			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11166		11166 I	Bivalvia	Tellina	praecuta			Holotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11191		11191 I	Bivalvia	Tellina	oregonensis			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11241		11241 I	Gastropoda	Cancellaria	sp.			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11245		11245 I	Gastropoda	Agasoma	gravidum			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11247		11247 I	Gastropoda	Agasoma	gravidum			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11256		11256 I	Gastropoda	Olivella	quadruplicata			Paratype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11283		11283 I	Gastropoda	Agasoma	gravidum			Hypotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
I11585		11585 I	Bivalvia	Pecten	cierboensis			Holotype	Tertiary	Oligocene	14-	Bear Valley	Contra Costa County	California	United States	North America		yes
M12185		2185 M	Polythalamia				FORAMINIFERA		Tertiary	Miocene	M7254	Bear-Riole Creek Divide	Contra Costa County	California	United States	North America		yes
V82636		82636 V	Chondrichthyes	Chondrodon	californica				Tertiary	Miocene	V68104	Bellamy	Contra Costa County	California	United States	North America		yes
V32870		32870 V	Mammalia	Ticholeptus			PUBL		Tertiary	Miocene	V3603	Bellshire	Contra Costa County	California	United States	North America		yes
V131828		131828 V	Mammalia	Antilocapra	pacifica		TYPE		Quaternary	Pleistocene	V87047	Big Break	Contra Costa County	California	United States	North America		yes
V131829		131829 V	Mammalia	Antilocapra			FIG		Quaternary	Pleistocene	V87047	Big Break	Contra Costa County	California	United States	North America		yes
V32869		32869 V	Mammalia				PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33049		33049 V	Mammalia	Eucator	lecontei		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33050		33050 V	Mammalia	Epicyon	diaboliensis		PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33051		33051 V	Mammalia	Hipparion	forcei		TYPE		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 1002 0163	yes
V33052		33052 V	Mammalia	Hipparion	mohavense		PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33053		33053 V	Mammalia	Gomphotherium			PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33054		33054 V	Mammalia	Ticholeptus	major		PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33055		33055 V	Mammalia	Procamelus			PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33056		33056 V	Mammalia	Capromeryx			PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33099		33099 V	Mammalia	Eucator	lecontei		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33475		33475 V	Mammalia	Aelurodon	taxoides		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0823	yes
V33476		33476 V	Mammalia	Borophagus	littoralis		TYPE		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 1002 0174	yes
V33477		33477 V	Mammalia	Borophagus	littoralis		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33478		33478 V	Mammalia	Aelurodon	taxoides		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0626	yes
V33484		33484 V	Mammalia	Epicyon	diaboliensis		PUBL		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0775	yes
V33492		33492 V	Mammalia	Borophagus	littoralis		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33493		33493 V	Mammalia	Borophagus	littoralis		FIG		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V33494		33494 V	Mammalia	Borophagus														

[illegible]

[illegible]

V34623	34623 V	Mammalia	Borophagus	littoralis		FIG	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34624	34624 V	Mammalia	Procamelus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34625	34625 V	Mammalia	Procamelus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0628	yes
V34626	34626 V	Mammalia	Procamelus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34627	34627 V	Mammalia	Megatylopus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34628	34628 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34629	34629 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34630	34630 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34631	34631 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34632	34632 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34633	34633 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34635	34635 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34636	34636 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0422	yes
V34637	34637 V	Mammalia	Gomphotherium				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34638	34638 V	Mammalia	Woodburnehyus	grenaderae			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0785	yes
V34639	34639 V	Mammalia	Prosthennops			FIG	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0425	yes
V34640	34640 V	Mammalia	Borophagus	littoralis		FIG	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0730	yes
V34641	34641 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34642	34642 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34643	34643 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0631	yes
V34644	34644 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0442	yes
V34645	34645 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0627	yes
V34646	34646 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0629	yes
V34647	34647 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0447	yes
V34648	34648 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America		yes
V34649	34649 V	Mammalia	Hipparion				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0449	yes
V34650	34650 V	Mammalia	Hipparion				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0452	yes
V34651	34651 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0459	yes
V34652	34652 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0459	yes
V34653	34653 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0466	yes
V34654	34654 V	Mammalia	Eucastor				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0313 0472	

[illegible]

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V58075	58075 V	Mammalia	Prosthennops							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58076	58076 V	Mammalia	Nannippus	forcei						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58077	58077 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58078	58078 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58079	58079 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58080	58080 V	Mammalia	Osteoborus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58081	58081 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58082	58082 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58083	58083 V	Mammalia	Osteoborus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58084	58084 V	Mammalia			Fissipeda	PUBL				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58085	58085 V	Mammalia	Borophagus	littoralis						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58086	58086 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58087	58087 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58088	58088 V	Mammalia	Eucator	lecontei						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58089	58089 V	Mammalia			Fissipeda					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58090	58090 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58091	58091 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58173	58173 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58174	58174 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58175	58175 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58176	58176 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58177	58177 V	Mammalia			Eutheria					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58178	58178 V	Mammalia	Procamelus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58179	58179 V	Mammalia			Fissipeda					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58210	58210 V	Mammalia	Nimravides							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58211	58211 V	Mammalia	Dinohippus	leardi						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58212	58212 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58213	58213 V	Mammalia			Eutheria					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58214	58214 V	Mammalia	Procamelus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58215	58215 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58216	58216 V	Mammalia	Pliohippus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58217	58217 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58218	58218 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58259	58259 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58260	58260 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58261	58261 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58262	58262 V	Mammalia	Osteoborus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58263	58263 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58264	58264 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58265	58265 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58266	58266 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58267	58267 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58268	58268 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58269	58269 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58320	58320 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58321	58321 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58322	58322 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58323	58323 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58324	58324 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58325	58325 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58326	58326 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58327	58327 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58328	58328 V	Mammalia	Procamelus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58329	58329 V	Mammalia	Procamelus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58330	58330 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58331	58331 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58332	58332 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58333	58333 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58334	58334 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58335	58335 V	Mammalia	Woodburneius	grenaderae			PUBL			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58336	58336 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58337	58337 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58338	58338 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58339	58339 V	Mammalia	Prosthennops							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58340	58340 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58341	58341 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58342	58342 V	Mammalia	Hystriops	forcei						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58343	58343 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58344	58344 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58345	58345 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58668	58668 V	Mammalia	Eucator							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58669	58669 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58670	58670 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58671	58671 V	Mammalia	Prosthennops							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58672	58672 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58673	58673 V	Mammalia	Nannippus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58674	58674 V	Mammalia			Fissipeda					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58675	58675 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58676	58676 V	Mammalia	Nannippus	forcei						Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58677	58677 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58678	58678 V	Mammalia	Aelurodon	taxoides			PUBL			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0511 0640
V58679	58679 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V58680	58680 V	Mammalia	Capromeryx							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61394	61394 V	Mammalia	Hystriops							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61393	61393 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61394	61394 V	Mammalia	Gomphotherium	productum			simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61395	61395 V	Mammalia	Pliohippus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61396	61396 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61397	61397 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61398	61398 V	Mammalia	Hipparion							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61399	61399 V	Mammalia								Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61400	61400 V	Mammalia	Aelurodon							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61401	61401 V	Mammalia	Osteoborus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61402	61402 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61403	61403 V	Mammalia	Megatylopus							Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V61404	61404 V	Mammalia	Procamelus															

V61530	61530 V	Mammalia	Alurondor			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61531	61531 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61532	61532 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61533	61533 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61534	61534 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61535	61535 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61536	61536 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61537	61537 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61538	61538 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61539	61539 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61540	61540 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61541	61541 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61542	61542 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61543	61543 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61544	61544 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61545	61545 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61546	61546 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61547	61547 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61548	61548 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V61549	61549 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62581	62581 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62582	62582 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62583	62583 V	Mammalia	Pliohippus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62584	62584 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62585	62585 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62586	62586 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62587	62587 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62588	62588 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V62589	62589 V	Mammalia	Nannippus	forcei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64405	64405 V	Mammalia	Nimravus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0856	yes
V64406	64406 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64407	64407 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64408	64408 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64409	64409 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64410	64410 V	Mammalia	Nannippus	forcei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64411	64411 V	Mammalia	Merycodus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64412	64412 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64413	64413 V	Mammalia	Woodburnehyus	grenaderae		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64414	64414 V	Mammalia	Borophagus	littoralis		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64415	64415 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64732	64732 V	Mammalia	Nannippus	forcei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64733	64733 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0023	yes
V64734	64734 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64735	64735 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64736	64736 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64738	64738 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64739	64739 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64740	64740 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64741	64741 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64742	64742 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64743	64743 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64744	64744 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64745	64745 V	Mammalia	Eutheria	Fissipeda		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64746	64746 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64747	64747 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64748	64748 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64749	64749 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64750	64750 V	Mammalia	Eucastor			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64751	64751 V	Mammalia	Eucastor			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V64752	64752 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65203	65203 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65204	65204 V	Mammalia	Eucastor			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65205	65205 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65206	65206 V	Mammalia	Nannippus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65207	65207 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65208	65208 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65209	65209 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65210	65210 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65211	65211 V	Mammalia	Pliohippus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65212	65212 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65213	65213 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65214	65214 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65215	65215 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65216	65216 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65217	65217 V	Mammalia	Prosthennops			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65218	65218 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65219	65219 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65220	65220 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65221	65221 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65222	65222 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65223	65223 V	Mammalia	Nannippus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65620	65620 V	Mammalia	Dinohippus	leardi		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65641	65641 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65642	65642 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65643	65643 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65644	65644 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65645	65645 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65646	65646 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65647	65647 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65648	65648 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65649	65649 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65650	65650 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65651	65651 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65652	65652 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65653	65653 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65654	65654 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65655	65655 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65656	65656 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65657	65657 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65658	65658 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65659	65659 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65660	65660 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65661	65661 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65662	65662 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65663	65663 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65664	65664 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65665	65665 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65687	65687 V	Mammalia	Eucastor	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes	
V65688	65688 V	Mammalia	Eucastor	lecontei											

V55690	65689 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55690	65690 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55691	65691 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55692	65692 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55693	65693 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55694	65694 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V55695	65695 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V66128	66128 V	Mammalia			Fissipeda	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0800
V66129	66129 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V66130	66130 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V66483	66483 V	Reptilia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67021	67021 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67022	67022 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67023	67023 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67024	67024 V	Mammalia	Hipparion			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67025	67025 V	Mammalia	Nannipus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67544	67544 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67588	67588 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67589	67589 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67590	67590 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67591	67591 V	Mammalia	Nimravides			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67592	67592 V	Mammalia	Pliothipus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67593	67593 V	Mammalia	Capromeryx			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67594	67594 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V67919	67919 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V68030	68030 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V68663	68663 V	Mammalia	Gomphotherium			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V69309	69309 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70150	70150 V	Mammalia	Osteoborus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70151	70151 V	Mammalia	Aelurodon			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70158	70158 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70159	70159 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70160	70160 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70161	70161 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70162	70162 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70163	70163 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70164	70164 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70165	70165 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70166	70166 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70167	70167 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70168	70168 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70169	70169 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70170	70170 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70171	70171 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70172	70172 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70173	70173 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70174	70174 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70175	70175 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70180	70180 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70181	70181 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70182	70182 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70757	70757 V	Mammalia	Protolabis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70758	70758 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70759	70759 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70760	70760 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70761	70761 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70762	70762 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70763	70763 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70764	70764 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70765	70765 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V70766	70766 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V71805	71805 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V71806	71806 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74812	74812 V	Mammalia	Woodburneohyus	grenaderae		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74904	74904 V	Mammalia			TYPE	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74905	74905 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74906	74906 V	Mammalia			Antilocaprinae	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74907	74907 V	Mammalia	Prosthennops			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74908	74908 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74909	74909 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74910	74910 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74911	74911 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V74912	74912 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77327	77327 V	Mammalia	Gomphotherium			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77515	77515 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77516	77516 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77517	77517 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77518	77518 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77519	77519 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77520	77520 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77521	77521 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77522	77522 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77675	77675 V	Mammalia	Woodburneohyus	grenaderae		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77676	77676 V	Mammalia	Merycodus		FIG	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77677	77677 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77678	77678 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77679	77679 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77680	77680 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77946	77946 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V77947	77947 V	Mammalia	Gomphotherium	productum	simpsoni	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V78398	78398 V	Mammalia	Dinorchippus	leardi		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V78399	78399 V	Mammalia	Borophagus	littoralis		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V78400	78400 V	Mammalia			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V79520	79520 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V84794	84794 V	Mammalia	Eucator	lecontei		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85156	85156 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85157	85157 V	Mammalia	Megatylopus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85159	85159 V	Mammalia	Pliothipus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85162	85162 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85163	85163 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85165	85165 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85166	85166 V	Mammalia	Procamelus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0702 0027
V85169	85169 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85170	85170 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85173	85173 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85174	85174 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V85175	85175 V	Mammalia				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V8517														

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V125285	125285 V	Mammalia	Woodburneohys	grenaderae		PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125286	125286 V	Mammalia	Woodburneohys	grenaderae		PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125287	125287 V	Mammalia	Woodburneohys	grenaderae		PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125288	125288 V	Mammalia	Prosthenops			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125289	125289 V	Mammalia	Prosthenops			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125290	125290 V	Mammalia	Prosthenops	grenaderae		PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125291	125291 V	Mammalia	Prosthenops			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125292	125292 V	Mammalia	Prosthenops			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V125293	125293 V	Mammalia	Woodburneohys			PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V126141	126141 V	Mammalia	Dinophippus			FIG	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V128154	128154 V	Mammalia	Hipparion	leardi forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131045	131045 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131046	131046 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131047	131047 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131048	131048 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131049	131049 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131615	131615 V	Mammalia	Borophagus	littoralis		PUBL	Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131616	131616 V	Mammalia	Megatylopus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131617	131617 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131618	131618 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131619	131619 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131620	131620 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131621	131621 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131622	131622 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131623	131623 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131624	131624 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131625	131625 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131626	131626 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131627	131627 V	Mammalia	Gomphotherium	simpsoni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131628	131628 V	Mammalia	Uistatoceros	californicus			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131629	131629 V	Mammalia	Eucastor	lecontei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131630	131630 V	Aves					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131631	131631 V	Mammalia	Prosthenops				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131632	131632 V	Mammalia	Prosthenops				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131633	131633 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131634	131634 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131635	131635 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131636	131636 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131637	131637 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131638	131638 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131639	131639 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131640	131640 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131641	131641 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131642	131642 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131643	131643 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131644	131644 V	Mammalia	Osteoborus	diabloensis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131645	131645 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131646	131646 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131647	131647 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131648	131648 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131649	131649 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131650	131650 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131651	131651 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131652	131652 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131653	131653 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131654	131654 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131655	131655 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131656	131656 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131657	131657 V	Mammalia	Neohipparion				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131658	131658 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131659	131659 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131660	131660 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131661	131661 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131662	131662 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131663	131663 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131664	131664 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131666	131666 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131667	131667 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131668	131668 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131669	131669 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131670	131670 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131671	131671 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131672	131672 V	Mammalia	Capromeryx				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V131673	131673 V	Mammalia	Megatylopus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V132042	132042 V	Reptilia	Clemmys	marmorata			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V132065	132065 V	Reptilia	Geochelone				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V134812	134812 V	Mammalia	Gomphotherium	productum	simpsoni		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V134813	134813 V	Mammalia	Gomphotherium	productum	simpsoni		Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138277	138277 V	Mammalia	Aelurodon	haydeni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138278	138278 V	Mammalia	Aelurodon	haydeni			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138279	138279 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138280	138280 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138281	138281 V	Mammalia	Machairodus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138282	138282 V	Mammalia	Machairodus				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138283	138283 V	Mammalia	Aelurodon				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138284	138284 V	Mammalia	Aelurodon				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138285	138285 V	Mammalia	Aelurodon				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138286	138286 V	Mammalia	Aelurodon				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138287	138287 V	Mammalia	Aelurodon				Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138288	138288 V	Mammalia	Aelurodon	taxoides			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V138334	138334 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V140267	140267 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V153858	153858 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V153859	153859 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V153860	153860 V	Mammalia	Hipparion	forcei			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192610	192610 V	Mammalia	Aelurodon	taxoides			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192633	192633 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192634	192634 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192635	192635 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192636	192636 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192637	192637 V	Mammalia	Borophagus	littoralis			Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192638	192638 V	Mammalia					Tertiary	Miocene	V3310	Black Hawk Ranch	Contra Costa County	California	United States	North America	yes
V192639	192639 V														

P1739	1739 P	Magnoliopsida	Salix	hesperia		plesiotype	Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1740	1740 P	Magnoliopsida	Salix	hesperia			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1741	1741 P	Magnoliopsida	Quercus	conversa			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1742	1742 P	Magnoliopsida	Quercus	lakevilleensis			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1743	1743 P	Magnoliopsida	Ulmus	californica		plesiotype	Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1744	1744 P	Magnoliopsida	Ulmus	californica			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1745	1745 P	Magnoliopsida	Ulmus	californica			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1746	1746 P	Magnoliopsida	Ulmus	californica		plesiotype	Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America	0000 0000 0602 0420	yes
P1747	1747 P	Magnoliopsida	Ulmus	californica			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1748	1748 P	Magnoliopsida	Ulmus	californica			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1749	1749 P	Magnoliopsida	Ulmus	californica			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1750	1750 P	Magnoliopsida	Cercocarpus	cuneatus			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1751	1751 P	Magnoliopsida	Platanus	dissecta		plesiotype	Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1752	1752 P	Magnoliopsida	Platanus	dissecta		plesiotype	Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1753	1753 P	Magnoliopsida	Platanus	dissecta			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
P1754	1754 P	Magnoliopsida	Rhus	morangensis			Tertiary	Miocene	P3723	Blackhawk Ranch	Contra Costa County	California	United States	North America		yes
V34599	34599 V	Mammalia	Hipparion				Tertiary	Miocene	V3925	Blackhawk Ranch 3	Contra Costa County	California	United States	North America		yes
V34719	34719 V	Mammalia	Nannippus				Tertiary	Miocene	V3925	Blackhawk Ranch 3	Contra Costa County	California	United States	North America		yes
V34720	34720 V	Mammalia	Hipparion				Tertiary	Miocene	V3925	Blackhawk Ranch 3	Contra Costa County	California	United States	North America		yes
P19801	19801 P	Magnoliopsida	Magnolia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0572	yes
P19802	19802 P	Magnoliopsida	Alnus	corrallina			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0573	yes
P19803	19803 P	Magnoliopsida	Arctostaphylos				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America		yes
P19804	19804 P	Magnoliopsida	Arctostaphylos				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0574	yes
P19805	19805 P	Magnoliopsida	Ulmus				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0575	yes
P19806	19806 P	Magnoliopsida	Ulmus				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0576	yes
P19807	19807 P	Magnoliopsida	Ulmus	americana			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America		yes
P19808	19808 P	Magnoliopsida	Betula	lutea			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0578	yes
P19809	19809 P	Magnoliopsida	Betula	lutea			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0579	yes
P19810	19810 P	Magnoliopsida	Alnus	corrallina			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0580	yes
P19811	19811 P	Magnoliopsida	Alnus	corrallina			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0581	yes
P19812	19812 P	Magnoliopsida	Alnus	corrallina			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0582	yes
P19813	19813 P	Magnoliopsida	Ulmus	corrallina			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America		yes
P19814	19814 P	Magnoliopsida	Magnolia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0583	yes
P19815	19815 P	Magnoliopsida	Magnolia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0584	yes
P19816	19816 P	Magnoliopsida	Populus				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0585	yes
P19817	19817 P	Magnoliopsida	Platanus				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0587	yes
P19820	19820 P	Magnoliopsida	Umbellularia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0588	yes
P19821	19821 P	Magnoliopsida	Umbellularia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0589	yes
P19822	19822 P	Magnoliopsida	Umbellularia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0590	yes
P19823	19823 P	Magnoliopsida	Umbellularia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0591	yes
P19824	19824 P	Magnoliopsida	Persea	pseudocarolinensis			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0592	yes
P19825	19825 P	Magnoliopsida	Persea	pseudocarolinensis			Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America		yes
P19826	19826 P	Magnoliopsida	Persea				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0594	yes
P19827	19827 P	Magnoliopsida	Magnolia				Tertiary	Miocene	PA300	Blackhawk Ranch Hillside	Contra Costa County	California	United States	North America	0000 0000 0702 0595	yes
V34601	34601 V	Mammalia					Tertiary	Miocene	V3921	Blackhawk Ranch N	Contra Costa County	California	United States	North America		yes
V34619	34619 V	Mammalia	Hypolagus				Tertiary	Miocene	V3921	Blackhawk Ranch N	Contra Costa County	California	United States	North America		yes
V85059	85059 V	Reptilia	Geochelone				Tertiary	Miocene	V6877	Blake	Contra Costa County	California	United States	North America		yes
V86152	86152 V	Mammalia	Tapirus				Tertiary	Miocene	V6877	Blake	Contra Costa County	California	United States	North America		yes
V1560	1560 V	Mammalia	Procamelus			FIG	Tertiary	Miocene		-299 Bolinger Canyon 1	Contra Costa County	California	United States	North America		yes
V1324	1324 V	Mammalia	Hipparion	mohaveense		FIG	Tertiary	Miocene		-1035 Bolinger Canyon 2	Contra Costa County	California	United States	North America		yes
V9858	9858 V	Mammalia				FIG	Tertiary	Miocene		-1042 Bolinger Canyon 3	Contra Costa County	California	United States	North America		yes
V38445	38445 V	Mammalia	Procamelus				Tertiary	Miocene	V4821	Bolinger Canyon 4	Contra Costa County	California	United States	North America		yes
V38531	38531 V	Mammalia					Tertiary	Miocene	V4821	Bolinger Canyon 4	Contra Costa County	California	United States	North America		yes
V38532	38532 V	Mammalia					Tertiary	Miocene	V4821	Bolinger Canyon 4	Contra Costa County	California	United States	North America		yes
V64700	64700 V	Mammalia	Pliauchenia				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112203	112203 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112204	112204 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112205	112205 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112206	112206 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112207	112207 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112208	112208 V	Mammalia	Nannippus				Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112768	112768 V	Mammalia	Nannippus	tehonensis			Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V112791	112791 V	Mammalia					Tertiary	Miocene	V6318	Bolinger Canyon 5	Contra Costa County	California	United States	North America		yes
V3806	3806 V	Bivalvia	Mya	dickersoni			Tertiary	Miocene	V225	Bolinger Creek	Contra Costa County	California	United States	North America		yes
V38309	38309 V	Aves					Tertiary	Miocene	V4717	Borghesani	Contra Costa County	California	United States	North America		yes
V78246	78246 V	Mammalia	Eucastor	lecontei			Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V88691	88691 V	Mammalia	Eucastor				Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V88692	88692 V	Reptilia					Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V94892	94892 V	Mammalia	Eucastor	lecontei			Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V94893	94893 V	Mammalia	Hipparion				Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V95982	95982 V	Mammalia	Eucastor				Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V95983	95983 V	Mammalia	Gomphotherium				Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V116563	116563 V	Mammalia	Pliophippus				Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V132035	132035 V	Reptilia	Clemmys	marmorata			Tertiary	Miocene	V6796	Briones Dam-Site	Contra Costa County	California	United States	North America		yes
V161490	161490 V	Anthozoa	Tubipora	musica			Tertiary	Miocene		-8 Briones Valley 1	Contra Costa County	California	United States	North America		yes
V161686	161686 V	Anthozoa					Tertiary	Miocene		-9 Briones Valley 2	Contra Costa County	California	United States	North America		yes
V61228	61228 V	Mammalia					Tertiary	Miocene	V6205	Brown Avenue	Contra Costa County	California	United States	North America		yes
V1325	1325 V	Mammalia	Equus				Quaternary	Pleistocene		-1363 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V1596	1596 V	Mammalia	Equus				Quaternary	Pleistocene		-1359 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V1696	1696 V	Mammalia	Glossotherium				Quaternary	Pleistocene		-1363 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V1697	1697 V	Mammalia	Glossotherium				Quaternary	Pleistocene		-1363 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V1698	1698 V	Mammalia	Glossotherium				Quaternary	Pleistocene		-1363 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V1699	1699 V	Mammalia	Glossotherium				Quaternary	Pleistocene		-1363 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V19071	19071 V	Mammalia	Equus				Quaternary	Pleistocene		-1359 Bulls Head Point	Contra Costa County	California	United States	North America		yes
V44940	44940 V	Mammalia	Gomphotherium				Tertiary	Miocene	V5506	Burton 1	Contra Costa County	California	United States	North America		yes
V72168	72168 V	Mammalia					Tertiary	Miocene	V65129	Bush	Contra Costa County	California	United States	North America		yes
V72781	72781 V	Polychaeta					Tertiary	Miocene	A1782	Byron-Kellogg Creek Rd	Contra Costa County	California	United States	North America		yes
M8413	8413 M	Polychaeta					Tertiary	Eocene	A1782	Byron-Kellogg Creek Rd	Contra Costa County	California	United States	North America		yes
M8414	8414 M	Polychaeta					Tertiary	Eocene	A1782	Byron-Kellogg Creek Rd	Contra Costa County	California	United States	North America		yes
M9859	9859 M	Polycystina					Tertiary	Eocene	A1782	Byron-Kellogg Creek Rd	Contra Costa County	California	United States	North America		yes
V32924	32924 V	Mammalia					Tertiary	Miocene	V3615	Caldecott Tunnel 1	Contra Costa County	California	United States	North America		yes
V33057	33057 V	Mammalia					Tertiary	Miocene	V3615	Caldecott Tunnel 1	Contra Costa County	California	United States	North America		yes
V57777	57777 V	Mammalia					Tertiary	Miocene	V6031	Caldecott Tunnel 2	Contra Costa County	California	United States	North America		yes
V131580	131580 V	Mammalia	Procamelus				Tertiary	Miocene	V6031	Caldecott Tunnel 2	Contra Costa County	California	United States	North America		yes
V62771	62771 V	Mammalia	Hipparion				Tertiary	Miocene	V6224	Caldecott Tunnel 3	Contra Costa County	California	United States	North America		yes
V62772	62772 V	Mammalia	Aphelops				Tertiary	Miocene</								

V21843	218483 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21844	218484 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21845	218485 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21846	218486 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21847	218487 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21848	218488 V	Reptilia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V21849	218489 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218490	218490 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218491	218491 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218492	218492 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218493	218493 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218494	218494 V	Reptilia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218495	218495 V	Reptilia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218496	218496 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218497	218497 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218498	218498 V				Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218499	218499 V				Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218500	218500 V	Reptilia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218501	218501 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218502	218502 V	Mammalia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218504	218504 V	Reptilia			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218507	218507 V	Reptilia	Hesperotestudo		Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218508	218508 V	Mammalia	Copemys		Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V218530	218530 V	Osteichthyes			Tertiary	Miocene	V12012	Caldecott Tunnel 4th Bore Drifts General	Contra Costa County	California	United States	North America	yes
V86419	86419 V	Mammalia	Hipparion		Tertiary	Miocene	V70135	Caldecott Tunnel 5	Contra Costa County	California	United States	North America	yes
V96501	96501 V	Mammalia	Barbouroufelis		Tertiary	Miocene	V70135	Caldecott Tunnel 5	Contra Costa County	California	United States	North America	yes
V96502	96502 V	Mammalia	Cranioceras		Tertiary	Miocene	V70135	Caldecott Tunnel 5	Contra Costa County	California	United States	North America	yes
V41025	41025 V	Mammalia	Hipparion		Tertiary	Miocene	V70135	Caldecott Tunnel 5	Contra Costa County	California	United States	North America	yes
V42889	42889 V	Mammalia	Bison	latifrons	Quaternary	Pleistocene	V5126	Cameo Acres	Contra Costa County	California	United States	North America	yes
M15431	15431 M	Ostracoda	Candona	lactea	acuminata var.	Pliocene	26mf	Cape Horn	Contra Costa County	California	United States	North America	yes
V74659	74659 V	Mammalia	Neohipparion	gldleyi	Tertiary	Miocene	6V623	Carlyle Terrace	Contra Costa County	California	United States	North America	yes
V56281	56281 V	Mammalia	Eques		Tertiary	Miocene	V5332	Catholic School	Contra Costa County	California	United States	North America	yes
V92118	92118 V	Osteichthyes			Quaternary	Pleistocene	V71001	Central Channel	Contra Costa County	California	United States	North America	yes
V92119	92119 V	Osteichthyes			Quaternary	Pleistocene	V71001	Central Channel	Contra Costa County	California	United States	North America	yes
V92120	92120 V	Osteichthyes			Quaternary	Pleistocene	V71001	Central Channel	Contra Costa County	California	United States	North America	yes
V92121	92121 V	O											

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V130468	130468 V	Mammalia	Panthera	onca			Tertiary	Miocene	V4001	Collier Canyon	Contra Costa County	California	United States	North America	yes
V40356	40356 V	Mammalia	Equus				Quaternary	Pleistocene	V5116	Concord 1	Contra Costa County	California	United States	North America	yes
V40357	40357 V	Mammalia					Quaternary	Pleistocene	V5116	Concord 1	Contra Costa County	California	United States	North America	yes
V23799	23799 V	Mammalia	Bison				Quaternary	Pleistocene	V65310	Concord 2	Contra Costa County	California	United States	North America	yes
V11901	11901 I	Gastropoda	Agasoma	sinuata		Hypotype	Tertiary	Miocene	IP222	Concord Qd.	Contra Costa County	California	United States	North America	yes
P198918	198918 P	Magnoliopsida	Rosa				Tertiary	Miocene	P3647	Condi/Sander San Pablo	Contra Costa County	California	United States	North America	yes
P198919	198919 P	Magnoliopsida	Rosa				Tertiary	Miocene	P3647	Condi/Sander San Pablo	Contra Costa County	California	United States	North America	yes
V153902	153902 V	Mammalia	Teleoceras				Tertiary	Miocene	V99501	Contra Costa College	Contra Costa County	California	United States	North America	yes
V67532	67532 V	Mammalia	Megalyonyx				Tertiary	Miocene	V6358	Contra Canyon Crest	Contra Costa County	California	United States	North America	yes
V56080	56080 V	Mammalia	Hipparion				Tertiary	Miocene	V6500	Curtis	Contra Costa County	California	United States	North America	yes
V130479	130479 V	Mammalia					Tertiary	Miocene	V85014	Curtis Class	Contra Costa County	California	United States	North America	yes
V83394	83394 V	Osteichthyes					Tertiary	Miocene	V6938	Danville 1	Contra Costa County	California	United States	North America	yes
V83395	83395 V	Osteichthyes					Tertiary	Miocene	V6939	Danville 2	Contra Costa County	California	United States	North America	yes
V83396	83396 V	Osteichthyes					Tertiary	Miocene	V6940	Danville 3	Contra Costa County	California	United States	North America	yes
V111613	111613 V	Mammalia	Agriotherium				Tertiary	Miocene	V73148	Terrace's Bear	Contra Costa County	California	United States	North America	yes
V113939	113939 V	Mammalia					Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113940	113940 V	Chondrichthyes	Isurus				Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113941	113941 V	Mammalia	Pliohippus				Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113942	113942 V	Mammalia	Pliohippus				Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113943	113943 V	Mammalia	Neohipparion	leptode			Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113944	113944 V	Mammalia	Neohipparion				Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113945	113945 V	Mammalia					Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V113946	113946 V	Mammalia					Tertiary	Miocene	V75061	Dave's Sand	Contra Costa County	California	United States	North America	yes
V8979	8979 V	Mammalia					Tertiary	Miocene	V4038	Delta Point	Contra Costa County	California	United States	North America	yes
V70988	70988 V	Reptilia				PUBL	Cretaceous	Late Cretaceous	V6670	Delta Pumping Plant	Contra Costa County	California	United States	North America	yes
V29860	29860 V	Mammalia					Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V29861	29861 V	Mammalia	Equus	pacificus			Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V29862	29862 V	Mammalia	Bison	latifrons		FIG	Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V29863	29863 V	Mammalia	Bison	latifrons		PUBL	Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V29864	29864 V	Mammalia	Bison				Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	0000 0000 0812 3464
V29865	29865 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V34449	34449 V	Mammalia					Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V153896	153896 V	Mammalia	Equus	pacificus			Quaternary	Pleistocene	V3406	Diablo Summit Road	Contra Costa County	California	United States	North America	yes
V77673	77673 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V6108	Dismore Used Car Lot	Contra Costa County	California	United States	North America	yes
V49661	49661 V	Mammalia	Pliohippus				Tertiary	Miocene	V5807	Drom Drive	Contra Costa County	California	United States	North America	yes
M8191	8191 M	Polychaeta				FORAMINIFERA	Tertiary	Eocene	A1764	Dry Creek Rd	Contra Costa County	California	United States	North America	yes
M8192	8192 M	Polychaeta				FORAMINIFERA	Tertiary	Eocene	A1764	Dry Creek Rd	Contra Costa County	California	United States	North America	yes
M7046	7046 M	Polychaeta				FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40023	40023 M	Polychaeta	Gaudryina	pachecoensis			Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	0000 0000 0405 1452
M40024	40024 M	Polychaeta	Gaudryina	pachecoensis			Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40031	40031 M	Polychaeta	Dorothyia			FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40036	40036 M	Polychaeta	Robulus	triangularis		FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40052	40052 M	Polychaeta	Robulus	inornatus		FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40072	40072 M	Polychaeta	Margulinia	winniana		FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40075	40075 M	Polychaeta	Vaginulinopsis	mexicana	nudicostata		Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40095	40095 M	Polychaeta	Nodosaria	consobrina			Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40158	40158 M	Polychaeta	Uvergina	weaveri		FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	0000 0000 0405 1728
M40159	40159 M	Polychaeta	Uvergina	weaveri		FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40183	40183 M	Polychaeta	Eponides			FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40242	40242 M	Polychaeta	Discoecyclina			FORAMINIFERA	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44418	44418 M	Coccolithus	grandis			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44419	44419 M	Coccolithus	grandis			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44424	44424 M	Cyclonolothus	gemmaton			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44448	44448 M	Heliosphaera	semilunum	lophota		Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44457	44457 M	Rhabdosphaera	semiformis			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44473	44473 M	Zygrhabdithus	biljugatus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44480	44480 M	Micrantholithus	crenulatus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44481	44481 M	Micrantholithus	crenulatus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44482	44482 M	Micrantholithus	crenulatus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44488	44488 M	Micrantholithus	vesper			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44494	44494 M	Discoaster	deflandrei			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44500	44500 M	Discoaster	distinctus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44501	44501 M	Discoaster	elegans			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44502	44502 M	Discoaster	elegans			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44507	44507 M	Discoaster	lenticularis			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44508	44508 M	Discoaster	lodoensis			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44515	44515 M	Discoaster	tribrachiatulus			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M44529	44529 M	Sphenolithus	radians			Calcareous nanoplankton	Tertiary	Paleocene	A6665	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M23006	23006 M	Polychaeta	Robulus	mexicanus	martinezensis	FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35957	35957 M	Polychaeta	Cibicides	martinezensis		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35958	35958 M	Polychaeta	Dentalina	approximata		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35959	35959 M	Polychaeta	Dentalina	consobrina		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35960	35960 M	Polychaeta	Dentalina	consobrina		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35961	35961 M	Polychaeta	Globigobria	bulloides		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35962	35962 M	Polychaeta	Globoborallia	crassata		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35963	35963 M	Polychaeta	Globoborallia	crassata	densa	FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35964	35964 M	Polychaeta	Lagena	isabella	conscripta	FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35965	35965 M	Polychaeta	Lenticulina	convergens		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35966	35966 M	Polychaeta	Pseudoglandulina	conica		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35967	35967 M	Polychaeta	Pseudoglandulina	conica		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35968	35968 M	Polychaeta	Pseudoglandulina	conica		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35969	35969 M	Polychaeta	Robulus	inornatus		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35970	35970 M	Polychaeta	Robulus	inornatus		FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35979	35979 M	Polychaeta	Robulus	mexicanus	alticostatus	FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M35980	35980 M	Polychaeta	Robulus	mexicanus	alticostatus	FORAMINIFERA	Tertiary	Eocene	MF7617	E of Martinez	Contra Costa County	California	United States	North America	yes
M7049	7049 M	Polychaeta	Rhabdammina			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40000	40000 M	Polychaeta	Rhabdammina	eocenica		FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40001	40001 M	Polychaeta	Rhabdammina	eocenica		FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40005	40005 M	Polychaeta	Haplophragmoides	scitulum		FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40006	40006 M	Polychaeta	Haplophragmoides			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40007	40007 M	Polychaeta	Haplophragmoides			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40008	40008 M	Polychaeta	Haplophragmoides			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40009	40009 M	Polychaeta	Haplophragmoides			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40011	40011 M	Polychaeta	Cribrostomoides			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40012	40012 M	Polychaeta	Ammobaculites			FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40034	40034 M	Polychaeta	Silicosignolina	californica		FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40040	40040 M	Polychaeta	Trochammina	globigeriniformis		FORAMINIFERA	Tertiary	Paleocene	A6659	E side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40041															

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V17690	77690 V	Mammalia	Pliophipus	interpolatus			Tertiary	Miocene	V6741	Garrity Creek	Contra Costa County	California	United States	North America	yes
V77691	77691 V	Mammalia	Hypolagus				Tertiary	Miocene	V6741	Garrity Creek	Contra Costa County	California	United States	North America	yes
V95031	95031 V	Mammalia	Hypolagus				Tertiary	Miocene	V6741	Garrity Creek	Contra Costa County	California	United States	North America	yes
V153894	153894 V	Mammalia	Pliophippus				Tertiary	Miocene	V6741	Garrity Creek	Contra Costa County	California	United States	North America	yes
V46846	46846 V	Mammalia	Desmostylus				Tertiary	Miocene	V5724	Gerke	Contra Costa County	California	United States	North America	yes
V17569	37569 V	Mammalia	Desmostylus				Tertiary	Miocene	V37223	Gravel Bed	Contra Costa County	California	United States	North America	yes
M15548.1	16548.1 M	Polythalamia			FORAMINIFERA		Tertiary	Miocene	M6720	Grizzly Peak Blvd	Contra Costa County	California	United States	North America	yes
V31813	31813 V	Mammalia	Desmostylus	hesperus		PUBL	Tertiary	Miocene	V3215	Guthrie Quarry	Contra Costa County	California	United States	North America	yes
V46160	46160 V	Mammalia	Osteoborus				Tertiary	Miocene	V5681	Happy Valley 1	Contra Costa County	California	United States	North America	yes
V115856	115856 V	Mammalia	Hipparion				Tertiary	Miocene	V76129	Harper	Contra Costa County	California	United States	North America	yes
V38314	38314 V	Mammalia	Equus				Quaternary	Pleistocene	V4719	Heidorn	Contra Costa County	California	United States	North America	yes
V46102	40102 V	Mammalia				PUBL	Tertiary	Miocene	V50653	Hemlock Hills	Contra Costa County	California	United States	North America	yes
V8093	8093 V	Mammalia	Bison	bison	antiquus		Quaternary	Pleistocene	V302	Hercules	Contra Costa County	California	United States	North America	yes
V21427	21427 V	Mammalia					Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V91309	91309 V	Mammalia	Bison				Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V91310	91310 V	Mammalia					Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V93992	93992 V	Mammalia	Sylvilagus		Pilosa		Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V94020	94020 V	Mammalia	Peromyscus				Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V94021	94021 V	Mammalia	Sylvilagus				Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
V94022	94022 V	Mammalia	Sylvilagus				Quaternary	Pleistocene	V65288	Hercules 2	Contra Costa County	California	United States	North America	yes
M8200	8200 M	Polythalamia	Anomalina		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8201	8201 M	Polythalamia	Anomalina		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8202	8202 M	Polythalamia	Epistominia		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8203	8203 M	Polythalamia	Epistominia		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8204	8204 M	Polythalamia	Epistominia		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8205	8205 M	Polythalamia	Epistominia	mexicanus			Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8206	8206 M	Polythalamia	Gyrogonia		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8207	8207 M	Polythalamia	Margulinella	mexicana			Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8208	8208 M	Polythalamia	Nodogenerina		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8209	8209 M	Polythalamia	Pseudoglandulina		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8210	8210 M	Polythalamia	Robulus		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8211	8211 M	Polythalamia			FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M8213	8213 M	Polythalamia	Angulogerina		FORAMINIFERA		Tertiary	Paleocene	MF6709	Hewitt Oil Co. No. 1	Contra Costa County	California	United States	North America	yes
M40251	40														

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M45118	44514 M	Discoaster	septemradiatus	hypotype	Tertiary	Paleocene	A6666	Industrial Highway	Contra Costa County	California	United States	North America	yes	
M45118	45118 M	Chidpragmalthus	dubius	hypotype	Tertiary	Paleocene	A6666	Industrial Highway	Contra Costa County	California	United States	North America	yes	
M45162	45162 M	Rhabdospharea	tenuis	hypotype	Tertiary	Paleocene	A6666	Industrial Highway	Contra Costa County	California	United States	North America	yes	
M7092	7092 M	Polythalamia			Tertiary	Eocene	A6663		Contra Costa County	California	United States	North America	yes	
M40029	40029 M	Polythalamia	Dorothia	principensis	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40033	40033 M	Polythalamia	Schenckella	lampo	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40037	40037 M	Polythalamia	Spiroloculina	principensis	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40064	40064 M	Polythalamia	Robulus	willamsoni	hypotype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40088	40088 M	Polythalamia	Dentalina	spinoza	hypotype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40090	40090 M	Polythalamia	Dentalina	spinoza	paratype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40097	40097 M	Polythalamia	Nodoliferia	delicata	hypotype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40139	40139 M	Polythalamia	Bullimina	corrugata	hypotype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40140	40140 M	Polythalamia	Bullimina	garzansis	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40143	40143 M	Polythalamia	Bullimina	truncana	hypotype	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40150	40150 M	Polythalamia	Uvigerina	elongata	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40163	40163 M	Polythalamia	Pleurastomella	cristatus	hypotype	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40198	40198 M	Glyptothalamia	pseudobulloides	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M40224	40224 M	Polythalamia	Cibicides	martinezensis	paratype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes
M40227	40227 M	Polythalamia	Cibicides	ouachitensis	paratype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes
M40239	40239 M	Polythalamia	Cibicoides	venezuelana	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes
M45108	45108 M	Chidpragmalthus	cristatus	hypotype	Tertiary	Eocene	A6663	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M45109	45109 M	Chidpragmalthus	cristatus	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M45110	45110 M	Chidpragmalthus	cristatus	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M45111	45111 M	Chidpragmalthus	cristatus	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
M45196	45196 M	Discoaster	nonaradiatus	hypotype	Tertiary	Eocene	A6664	Interaction of Industrial Hwy & Hwy 20	Contra Costa County	California	United States	North America	yes	
V78224	78224 V	Mammalia			Tertiary	Miocene	V6787	James Whale	Contra Costa County	California	United States	North America	yes	
V43408	43408 V	Mammalia			Tertiary	Miocene	V5331	Jonas Hill Road	Contra Costa County	California	United States	North America	yes	
V32892	2892 V	Mammalia	Hipparion	forceli	FIG	Miocene	V3612	Kaiser Creek	Contra Costa County	California	United States	North America	yes	
V32925	32925 V	Mammalia	Hipparion	forceli	FIG	Miocene	V3612	Kaiser Creek	Contra Costa County	California	United States	North America	yes	
V34121	34121 V	Mammalia			Tertiary	Miocene	V3612	Kaiser Creek	Contra Costa County	California	United States	North America	yes	
V34122	34122 V	Mammalia			Tertiary	Miocene	V3612	Kaiser Creek	Contra Costa County	California	United States	North America	yes	
V94894	94894 V	Mammalia	Hipparion		Tertiary	Miocene	V3612	Kaiser Creek	Contra Costa County	California	United States	North America	yes	
M35721	35771 M	Polythalamia	Elphidium?	clarki	holotype	Tertiary	MF1017	Kellogg Creek	Contra Costa County	California	United States	North America	yes	
M35772	35772 M	Operculina		campi	holotype	Tertiary	MF1018	Kellogg Creek	Contra Costa County	California	United States	North America	yes	
M7779.1	7779.1 M	Polycystina			Tertiary	Eocene	A6653	Kellogg Rd	Contra Costa County	California	United States	North America	yes	
M7779.2	7779.2 M	Polycystina			Tertiary	Eocene	A6654	Kellogg Rd	Contra Costa County	California	United States	North America	yes	
V58220	58220 V	Mammalia			Tertiary	Miocene	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58221	58221 V	Mammalia	Epicyon	diablenis	PUBL	Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58222	58222 V	Mammalia	Epicyon	haydeni		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58223	58223 V	Mammalia	Hipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58224	58224 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58225	58225 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58226	58226 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58227	58227 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58228	58228 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58229	58229 V	Mammalia	Hipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58230	58230 V	Mammalia	Hipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58231	58231 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58232	58232 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58233	58233 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58234	58234 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58235	58235 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58236	58236 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58237	58237 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58238	58238 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58239	58239 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58240	58240 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58241	58241 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58242	58242 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58243	58243 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58244	58244 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58245	58245 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58246	58246 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58247	58247 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58248	58248 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58249	58249 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V67550	67550 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58251	58251 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58252	58252 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58253	58253 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58254	58254 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58255	58255 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58256	58256 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58257	58257 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V58258	58258 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V60473	60473 V	Mammalia	Procamelus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V60474	60474 V	Mammalia	Procamelus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V60475	60475 V	Mammalia	Neohipparion	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65407	65407 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65408	65408 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65409	65409 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65410	65410 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65411	65411 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65412	65412 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65631	65631 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V65632	65632 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V66055	66055 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V66056	66056 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V66057	66057 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V67539	67539 V	Mammalia	Mammuthus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V67541	67541 V	Mammalia	Mammuthus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V69417	69417 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V69418	69418 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71200	71200 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71201	71201 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71202	71202 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71203	71203 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71204	71204 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V71205	71205 V	Mammalia	Ungulata	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V76569	76569 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V77031	77031 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V77032	77032 V	Mammalia	Hipparion	trampasense	PUBL	Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V77033	77033 V	Mammalia	Procamelus	trampasense		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V94877	94877 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V94878	94878 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V94879	94879 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V94880	94880 V	Mammalia	Nannipus	tehonensis		Tertiary	V6107	Kendall-Mallory 1	Contra Costa County	California	United States	North America	yes	
V95913	95913 V	Reptilia												

[illegible]

V43283	32883 V	Mammalia	Gomphotherium	simpsoni		TYPE	Tertiary	Miocene	V3607	Las Trampas Creek	Contra Costa County	California	United States	North America	yes
V32914	32914 V	Mammalia	Gomphotherium	simpsoni		FIG	Tertiary	Miocene	V3607	Las Trampas Creek	Contra Costa County	California	United States	North America	yes
V44371	44371 V	Mammalia					Tertiary	Miocene	V5402	Las Trampas Creek 2	Contra Costa County	California	United States	North America	yes
V131795	131795 V	Reptilia	Geochelone				Tertiary	Miocene	V5402	Las Trampas Creek 2	Contra Costa County	California	United States	North America	yes
I11321	11321 I	Echinoidea	Clypeaster?	brewerianus		Hypotype Holotype	Tertiary	Miocene	1222-	Las Trampas Ridge	Contra Costa County	California	United States	North America	yes
I14836	14836 I	Bivalvia	Clinocardium	praebiduum			Tertiary	Miocene	1222-	Las Trampas Ridge	Contra Costa County	California	United States	North America	yes
V25203	92503 V	Reptilia	Clemmys	marmorata		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V92504	92504 V	Reptilia	Clemmys	marmorata		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93804	93804 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93805	93805 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93806	93806 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93807	93807 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93808	93808 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93809	93809 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93810	93810 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93811	93811 V	Mammalia	Perognathus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93930	93930 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93931	93931 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93932	93932 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93933	93933 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93934	93934 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93935	93935 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93936	93936 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93937	93937 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93938	93938 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93939	93939 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93940	93940 V	Mammalia	Microtus	californicus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93941	93941 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93942	93942 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93943	93943 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93944	93944 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93945	93945 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93946	93946 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93947	93947 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93948	93948 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93949	93949 V	Mammalia	Spermophilus	beecheyi		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93950	93950 V	Mammalia	Neotoma	fuscipes		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93951	93951 V	Mammalia	Scapanus	latimanus		PUBL PUBL	Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V93952	93952 V	Mammalia	Scapanus	latimanus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V93953	93953 V	Mammalia	Peromyscus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93954	93954 V	Mammalia	Sciurus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93955	93955 V	Mammalia	Sciurus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93956	93956 V	Mammalia	Sciurus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93957	93957 V	Mammalia	Sciurus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93958	93958 V	Mammalia	Sylvilagus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93959	93959 V	Mammalia	Sylvilagus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93960	93960 V	Mammalia	Sylvilagus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93961	93961 V	Mammalia	Sylvilagus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93962	93962 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93963	93963 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93964	93964 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93965	93965 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93966	93966 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93967	93967 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93968	93968 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93969	93969 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93970	93970 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93971	93971 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93972	93972 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93973	93973 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93974	93974 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93975	93975 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93976	93976 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93977	93977 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93978	93978 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93980	93980 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93981	93981 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V93982	93982 V	Mammalia	Thomomys	bottae		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V94319	94319 V	Reptilia				Ophidia Ophidia	Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V94320	94320 V	Reptilia					Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V97200	97200 V	Aves				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97403	97403 V	Osteichthyes	Gasterosteus	aculeatus		Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97404	97404 V	Aves				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97405	97405 V	Reptilia				Ophidia	Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V97406	97406 V	Chondrichthyes	Myliobatis				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes
V97409	97409 V	Chondrichthyes	Myliobatis			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97410	97410 V	Amphibia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97412	97412 V	Chondrichthyes	Myliobatis			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97425	97425 V	Chondrichthyes	Myliobatis			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97428	97428 V	Mammalia	Bison			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97429	97429 V	Mammalia	Bison			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V97430	97430 V	Mammalia	Equus			Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226124	226124 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226125	226125 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226126	226126 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226127	226127 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226128	226128 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226129	226129 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226130	226130 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226131	226131 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226132	226132 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226558	226558 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226559	226559 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226560	226560 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226561	226561 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226562	226562 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226563	226563 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226564	226564 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226565	226565 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226566	226566 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226567	226567 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226568	226568 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226569	226569 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226570	226570 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California	United States	North America	yes	
V226571	226571 V	Mammalia				Quaternary	Pleistocene	V71002	Lawlers Boundary	Contra Costa County	California				

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V26123	226123 V	Mammalia	Lepus		Quaternary	Pleistocene	V1201	Lone Tree Point 1	Contra Costa County	California	United States	North America	yes
V35645	35645 V	Mammalia	Bison		Quaternary	Pleistocene	V4005	Lone Tree Point 2	Contra Costa County	California	United States	North America	yes
V61413	61413 V	Osteichthyes	Cynoscion	nobilis	Tertiary	Miocene	V6211	Lone Tree Point 3	Contra Costa County	California	United States	North America	yes
V125278	125278 V	Mammalia			Mysticeti								
V11121	11121 V	Bivalvia	Modiolus	kirkensis	Tertiary	Eocene	V81095	Luther	Contra Costa County	California	United States	North America	yes
V11272	11272 V	Bivalvia	Leda	markleyensis	Tertiary	Eocene	V3081-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V11279	11279 V	Bivalvia	Malletia	packardii	Tertiary	Eocene	V3080-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V11280	11280 V	Bivalvia	Malletia	packardii	Tertiary	Eocene	V3080-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V11541	11541 V	Bivalvia	Schizothaerus	nuttallii	Tertiary	Miocene	V2042-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V11550	11550 V	Bivalvia	Modiolus	gabori	Tertiary	Miocene	V2040-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V11566	11566 V	Osteichthyes	Ostrea	bougiesii	Tertiary	Miocene	V2042-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80431	80431 V	Osteichthyes			Tertiary	Eocene	V6820-	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80432	80432 V	Osteichthyes			Tertiary	Eocene	V6820	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80433	80433 V	Osteichthyes			Tertiary	Eocene	V6821	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80435	80435 V	Chondrichthyes			Tertiary	Miocene	V6823	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80436	80436 V	Chondrichthyes			Tertiary	Miocene	V6824	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80437	80437 V	Chondrichthyes			Tertiary	Miocene	V6825	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80438	80438 V	Chondrichthyes			Tertiary	Miocene	V6825	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80439	80439 V	Osteichthyes			Tertiary	Miocene	V6825	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80440	80440 V	Aves			Tertiary	Miocene	V6825	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80441	80441 V	Osteichthyes			Tertiary	Miocene	V6826	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80442	80442 V	Mammalia			Tertiary	Miocene	V6826	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80443	80443 V	Chondrichthyes			Tertiary	Miocene	V6827	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80444	80444 V	Aves			Tertiary	Miocene	V6827	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80445	80445 V	Osteichthyes			Tertiary	Miocene	V6827	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80446	80446 V	Osteichthyes			Tertiary	Miocene	V6827	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80447	80447 V	Chondrichthyes			Tertiary	Miocene	V6827	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80448	80448 V	Osteichthyes			Tertiary	Miocene	V6828	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80449	80449 V	Chondrichthyes			Tertiary	Miocene	V6828	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80450	80450 V	Chondrichthyes			Tertiary	Miocene	V6829	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80451	80451 V	Osteichthyes			Tertiary	Miocene	V6829	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80452	80452 V	Osteichthyes			Tertiary	Miocene	V6829	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80453	80453 V	Osteichthyes			Tertiary	Miocene	V6830	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80454	80454 V	Osteichthyes			Tertiary	Miocene	V6830	Markley Canyon 10	Contra Costa County	California	United States	North America	yes
V80455	80455 V	Osteichthyes			Tertiary	Miocene	V6831	Markley Canyon	Contra Costa County	California	United States	North America	yes
V80456	80456 V	Chondrichthyes			Tertiary	Miocene	V6831	Markley Canyon 11	Contra Costa County	California	United States	North America	yes
V80457	80457 V	Chondrichthyes			Tertiary	Miocene	V6832	Markley Canyon 12	Contra Costa County	California	United States	North America	yes
V80458	80458 V	Osteichthyes			Tertiary	Miocene	V6832	Markley Canyon 12	Contra Costa County	California	United States		

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M40151	40151 M	Polythalamia	Uvigerina	gardnerae		FORAMINIFERA	hypotype	Tertiary	Eocene	A6691	Muir Station	Contra Costa County	California	United States	North America		yes
M40152	40152 M	Polythalamia	Uvigerina	gardnerae	pachecoensis	FORAMINIFERA	holotype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America	0000 0000 0405 1725	yes
M40153	40153 M	Polythalamia	Uvigerina	gardnerae	pachecoensis	FORAMINIFERA	paratype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America		yes
M40154	40154 M	Polythalamia	Uvigerina	gardnerae	pachecoensis	FORAMINIFERA	paratype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America		yes
M40155	40155 M	Polythalamia	Uvigerina	gardnerae		FORAMINIFERA	hypotype	Tertiary	Eocene	A6691	Muir Station	Contra Costa County	California	United States	North America		yes
M40156 M	40156 M	Polythalamia	Uvigerina	garzaensis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6689	Muir Station	Contra Costa County	California	United States	North America		yes
M40157	40157 M	Polythalamia	Uvigerina	yazooensis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6689	Muir Station	Contra Costa County	California	United States	North America		yes
M40160	40160 M	Polythalamia	Uvigerina			FORAMINIFERA	hypotype	Tertiary	Eocene	A6674	Muir Station	Contra Costa County	California	United States	North America		yes
M40162	40162 M	Polythalamia	Pleurastomella	acuta		FORAMINIFERA	hypotype	Tertiary	Eocene	A6688	Muir Station	Contra Costa County	California	United States	North America		yes
M40166	40166 M	Polythalamia	Valvulineria	chiriana		FORAMINIFERA	hypotype	Tertiary	Eocene	A6689	Muir Station	Contra Costa County	California	United States	North America		yes
M40170	40170 M	Polythalamia	Gyrodinella	orbicularis	obliquata	FORAMINIFERA	hypotype	Tertiary	Eocene	A6680	Muir Station	Contra Costa County	California	United States	North America		yes
M40171	40171 M	Polythalamia	Gyrodinella	solidaria	obliquata	FORAMINIFERA	paratype	Tertiary	Eocene	A6680	Muir Station	Contra Costa County	California	United States	North America		yes
M40176	40176 M	Polythalamia	Eponides	lodoensis	lodoensis	FORAMINIFERA	paratype	Tertiary	Eocene	A6680	Muir Station	Contra Costa County	California	United States	North America		yes
M40179	40179 M	Polythalamia	Parrella			FORAMINIFERA	hypotype	Tertiary	Eocene	A6683	Muir Station	Contra Costa County	California	United States	North America		yes
M40181	40181 M	Polythalamia	Eponides	umbonata		FORAMINIFERA	hypotype	Tertiary	Eocene	A6688	Muir Station	Contra Costa County	California	United States	North America		yes
M40186	40186 M	Polythalamia	Siphonina			FORAMINIFERA	hypotype	Tertiary	Eocene	A6667	Muir Station	Contra Costa County	California	United States	North America		yes
M40187 M	40187 M	Polythalamia	Cancris	malloryi		FORAMINIFERA	paratype	Tertiary	Eocene	A6689	Muir Station	Contra Costa County	California	United States	North America	0000 0000 0405 0933	yes
M40188	40188 M	Polythalamia	Cancris	malloryi		FORAMINIFERA	paratype	Tertiary	Eocene	A6689	Muir Station	Contra Costa County	California	United States	North America		yes
M40189	40189 M	Polythalamia	Asterigerina	crassiformis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6688	Muir Station	Contra Costa County	California	United States	North America		yes
M40190	40190 M	Polythalamia	Asterigerina	crassiformis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6688	Muir Station	Contra Costa County	California	United States	North America		yes
M40192	40192 M	Polythalamia	Cassidulina	globosa		FORAMINIFERA	hypotype	Tertiary	Eocene	A6688	Muir Station	Contra Costa County	California	United States	North America		yes
M40196	40196 M	Polythalamia	Pullenia			FORAMINIFERA	hypotype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America		yes
M40197	40197 M	Polythalamia	Globigerina	trilepta		FORAMINIFERA	hypotype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America		yes
M40199	40199 M	Polythalamia	Globigerina	triloculoides		FORAMINIFERA	hypotype	Tertiary	Eocene	A6685	Muir Station	Contra Costa County	California	United States	North America		yes
M40200	40200 M	Polythalamia	Globigerina	triloculoides		FORAMINIFERA	hypotype	Tertiary	Eocene	A6680	Muir Station	Contra Costa County	California	United States	North America		yes
M40201	40201 M	Polythalamia	Globorotalia	argonensis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6671	Muir Station	Contra Costa County	California	United States	North America		yes
M40209	40209 M	Polythalamia	Anomalina	caninarensis		FORAMINIFERA	hypotype	Tertiary	Eocene	A6686	Muir Station	Contra Costa County	California	United States	North America		yes
M40213	40213 M	Polythalamia	Anomalina	regina	minor	FORAMINIFERA	holotype	Tertiary	Eocene	A6690	Muir Station	Contra Costa County	California	United States	North America	0000 0000 0405 0905	yes
M40214	40214 M	Polythalamia	Anomalina	regina	minor	FORAMINIFERA	holotype	Tertiary	Eocene	A6680	Muir Station	Contra Costa County	California	United States	North America		yes
M40215																	

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V42454	40354 V	Mammalia	Plihippuss			Tertiary	Miocene	V3830	Oliveria Quarry	Contra Costa County	California	United States	North America	yes
V42848	42848 V	Mammalia	Pliohippus			Tertiary	Miocene	V3830	Oliveria Quarry	Contra Costa County	California	United States	North America	yes
V95033	95033 V	Reptilia			Emydinæ	Tertiary	Miocene	V3830	Oliveria Quarry	Contra Costa County	California	United States	North America	yes
V95034	95034 V	Mammalia	Pliohippus			Tertiary	Miocene	V3830	Oliveria Quarry	Contra Costa County	California	United States	North America	yes
V95035	95035 V	Mammalia	Hypolagus			Tertiary	Miocene	V3830	Oliveria Quarry	Contra Costa County	California	United States	North America	yes
V19640	10640 V	Mammalia	Nannippus	tehonensis		Tertiary	Miocene	V1001	Orinda 1	Contra Costa County	California	United States	North America	yes
V94873	94873 V	Mammalia	Nannippus	tehonensis		Tertiary	Miocene	V1001	Orinda 1	Contra Costa County	California	United States	North America	yes
V94874	94874 V	Mammalia	Nannippus	tehonensis		Tertiary	Miocene	V1001	Orinda 1	Contra Costa County	California	United States	North America	yes
V35464	35464 V	Mammalia				Tertiary	Miocene	V4003	Orinda Crossroads	Contra Costa County	California	United States	North America	yes
V36674	36674 V	Mammalia				Tertiary	Miocene	V4104	Orinda Crossroads 2	Contra Costa County	California	United States	North America	yes
V138710	138710 V	Mammalia	Gomphotherium	simpsongi		Tertiary	Miocene	V92089	Orinda Gomphother	Contra Costa County	California	United States	North America	yes
V45285	45285 V	Mammalia	Pliohippus			Tertiary	Miocene	V5603	Orinda N 1	Contra Costa County	California	United States	North America	yes
V45297	45297 V	Mammalia	Nannippus			Tertiary	Miocene	V5604	Orinda N 2	Contra Costa County	California	United States	North America	yes
V45330	45330 V	Mammalia			Antilocaprinæ	Tertiary	Miocene	V5604	Orinda N 2	Contra Costa County	California	United States	North America	yes
V39662	39662 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39663	39663 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39664	39664 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39665	39665 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39666	39666 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39667	39667 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39668	39668 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39669	39669 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39670	39670 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39671	39671 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39672	39672 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39673	39673 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39674	39674 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39675	39675 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39676	39676 V	Mammalia			Merycodus	Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39677	39677 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39678	39678 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39679	39679 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39680	39680 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39681	39681 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39682	39682 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39683	39683 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39684	39684 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39685	39685 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39686	39686 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39687	39687 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39688	39688 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39689	39689 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39693	39693 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39694	39694 V	Mammalia	Indarctos			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39695	39695 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39696	39696 V	Mammalia	Dipoides			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39697	39697 V	Mammalia	Dipoides			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39933	39933 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39934	39934 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39935	39935 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39936	39936 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39975	39975 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V39976	39976 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40031	40031 V	Mammalia	Dipoides			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40032	40032 V	Mammalia	Vulpes			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40033	40033 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40203	40203 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40204	40204 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40205	40205 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40285	40285 V	Mammalia	Equus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40286	40286 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40287	40287 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40288	40288 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40294	40294 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40295	40295 V	Mammalia	Osteichthyes			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40296	40296 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40297	40297 V	Mammalia	Dipoides			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40298	40298 V	Mammalia	Dipoides			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40299	40299 V	Mammalia	Indarctos			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40300	40300 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40301	40301 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40302	40302 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40402	40402 V	Mammalia	Mammut			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40403	40403 V	Mammalia	Mammut			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40404	40404 V	Mammalia			Antilocaprinæ	Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40405	40405 V	Mammalia			Antilocaprinæ	Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40406	40406 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40407	40407 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40981	40981 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40982	40982 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40983	40983 V	Mammalia				Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40984	40984 V	Mammalia	Hypolagus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V40985	40985 V	Mammalia	Hypolagus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V41112	41112 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V41556	41556 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V43240	43240 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V43241	43241 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V43242	43242 V	Mammalia	Pliohippus			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V44629	44629 V	Mammalia	Gomphotherium			Tertiary	Miocene	V5017	Orinda School House	Contra Costa County	California	United States	North America	yes
V11008	11008 V	Echinoidea	Astroradix	tumidus		Hypotype	Miocene	482	Oyster Point	Contra Costa County	California	United States	North America	yes
V11504	11504 V	Bivalvia	Dosinia	arnoldi		Holotype	Miocene	482	Oyster Point	Contra Costa County	California	United States	North America	yes
V11507	11507 V	Bivalvia	Dosinia	arnoldi		Paratype	Miocene	482	Oyster Point	Contra Costa County	California	United States	North America	yes
V11674	11674 V	Bivalvia	Semele	diaboli		Holotype	Eocene	469	Oyster Point	Contra Costa County	California	United States	North America	yes
V34625	34625 V	Echinoidea	Astroradix	antisselli		Hypotype	Miocene	482	Oyster Point	Contra Costa County	California	United States	North America	yes
V34626	34626 V	Echinoidea	Astroradix	antisselli		Hypotype	Miocene	482	Oyster Point	Contra Costa County	California	United States	North America	yes
V119071	119071 V	Mammalia	Mammuth	americanum		Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V147539	147539 V	Mammalia	Mammuth			Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V147540	147540 V	Mammalia	Equus			Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V149192	149192 V	Mammalia	Megalonyx	jeffersonii		Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V153920	153920 V	Mammalia	Mammuthus			Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190480	190480 V	Mammalia				Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190481	190481 V	Mammalia				Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190482	190482 V	Mammalia	Mammuthus			Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190483	190483 V	Mammalia	Megalonyx	jeffersonii		Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190485	190485 V	Mammalia				Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190486	190486 V	Mammalia	Camelops	hesternus		Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190487	190487 V	Mammalia	Paramylodon	harlani		Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190488	190488 V	Mammalia				Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes
V190489	190489 V	Mammalia				Quaternary	Pleistocene	V77117	Pacheco 1	Contra Costa County	California	United States	North America	yes

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V195559	195559 V	Amphibia	Ambystoma		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195560	195560 V	Amphibia	Ambystoma		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195561	195561 V	Amphibia	Ambystoma		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195562	195562 V	Amphibia	Ambystoma		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195563	195563 V	Amphibia	Taricha		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195564	195564 V	Amphibia	Taricha		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195565	195565 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195566	195566 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195567	195567 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195568	195568 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195569	195569 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195570	195570 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195571	195571 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195572	195572 V	Amphibia	Pseudacris		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195573	195573 V	Amphibia	Rana		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195574	195574 V	Amphibia	Rana		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195575	195575 V	Amphibia	Rana		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
V195576	195576 V	Amphibia	Rana		Quaternary	Pleistocene	V78027	Pacheco 2	Contra Costa County	California	United States	North America	yes
M7060	7060 M	Polythalamia			Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40027	40027 M	Polythalamia	Gaudryina		Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40108	40108 M	Polythalamia	Palma	primitiva	Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40112	40112 M	Polythalamia	Lagena	hexagona	Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40115	40115 M	Polythalamia	Glyptothalamia	landesi	Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40116	40116 M	Polythalamia	Enantiomarginulina		Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M40210	40210 M	Polythalamia	Anomalina	dorri	Tertiary	Paleocene	A6661	Pacheco Rd overpass	Contra Costa County	California	United States	North America	yes
M22916	22916 M	Polythalamia			Tertiary	Eocene	MF7562	Pacheco syncline	Contra Costa County	California	United States	North America	yes
M22919	22919 M	Polythalamia			Tertiary	Eocene	MF7565	Pacheco syncline	Contra Costa County	California	United States	North America	yes
M22920	22920 M	Polythalamia			Tertiary	Eocene	MF7565	Pacheco syncline	Contra Costa County	California	United States	North America	yes
V39550	39550 V	Mammalia	Dipoides		Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V39964	39964 V	Mammalia			Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V40206	40206 V	Mammalia			Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V40207	40207 V	Reptilia			Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V40208	40208 V	Mammalia			Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V42300	42300 V	Mammalia	Hypolagus		Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V44930	44930 V	Mammalia	Hypolagus		Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V44931	44931 V	Mammalia	Peromyscus		Tertiary	Miocene	V5018	Palos Colorado	Contra Costa County	California	United States	North America	yes
V40949	40949 V	Mammalia	Bison		Quaternary	Pleistocene	V5124	Parker	Contra Costa County	California	United States	North America	yes
I15612	15612 I	Bivalvia	Venericardia	domingenica	Paratype	Eocene	A1003	Pine Canyon	Contra Costa County	California	United States	North America	yes
I15613	15613 I	Bivalvia	Venericardia	domingenica	Paratype	Eocene	A1003	Pine Canyon	Contra Costa County	California	United States	North America	yes
I15751	15751 I	Scaphopoda	Dentalium	calafium	Synotype	Eocene	A1003	Pine Canyon	Contra Costa County	California	United States	North America	yes
V2246	2246 V				Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V2247	2247 V				Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V2346	2346 V	Mammalia			Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V8102	8102 V	Mammalia			Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V11218	11218 V	Mammalia	Neochipparian		Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V114745	114745 V	Mammalia	Teleoceras		Tertiary	Miocene	V6552	Pinole	Contra Costa County	California	United States	North America	yes
V10972	10972 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10973	10973 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10974	10974 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10976	10976 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10977	10977 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10978	10978 V	Mammalia	Equus	pacificus	Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10979	10979 V	Mammalia	Equus	pacificus	Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10980	10980 V	Mammalia	Equus	pacificus	Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10981	10981 V	Mammalia	Equus	pacificus	Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10982	10982 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V10984	10984 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	0000 0000 0313 2458
V10985	10985 V	Mammalia	Equus		Quaternary	Pleistocene	V65660	Pinole Beach	Contra Costa County	California	United States	North America	yes
V2006	2006 V				Tertiary	Miocene		-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V19074	19074 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V20806	20806 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22083	22083 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22084	22084 V	Mammalia	Sphenophalos		Tertiary	Miocene		-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22085	22085 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22086	22086 V	Mammalia			Tertiary	Miocene		-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22087	22087 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22088	22088 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22090	22090 V	Mammalia			Equinae	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22091	22091 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22092	22092 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22094	22094 V	Mammalia	Borophagus	parvus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22095	22095 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22096	22096 V	Mammalia			Equinae	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22097	22097 V	Mammalia				Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22110	22110 V	Mammalia	Megalonyx	leptostomus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22322	22322 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22323	22323 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22554	22554 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22555	22555 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22556	22556 V	Mammalia				Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22557	22557 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22559	22559 V	Mammalia				Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22560	22560 V	Osteichthyes	Smilodonichthys	rastrous	Tertiary	Miocene		-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22561	22561 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22562	22562 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22563	22563 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22564	22564 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22565	22565 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22566	22566 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22567	22567 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22568	22568 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22569	22569 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22570	22570 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22571	22571 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22572	22572 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22573	22573 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22574	22574 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22576	22576 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22577	22577 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22615	22615 V	Mammalia	Pliohippus	interpolatus	FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22616	22616 V	Mammalia	Pliohippus			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22921	22921 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22922	22922 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22923	22923 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22924	22924 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22925	22925 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22926	22926 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22927	22927 V	Mammalia	Sphenophalos		FIG	Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes
V22928	22928 V	Mammalia	Sphenophalos			Tertiary	Miocene	-2572 Pinole Junction 1	Contra Costa County	California	United States	North America	yes

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V38232	38232 V	Mammalia	Tapirus	merriami		FIG	Quaternary	Pleistocene	V4505	Port Chicago	Contra Costa County	California	United States	North America	0000 0000 1211 0069	yes	
V38233	38233 V	Mammalia	Cynomys	thoides			Quaternary	Pleistocene	V4505	Port Chicago	Contra Costa County	California	United States	North America		yes	
V15597	15597 V	Mammalia	Uvigerina	garzaensis			Quaternary	Pleistocene	-527	Quarry on Glenchiaro Ranch	Contra Costa County	California	United States	North America		yes	
M178	178 M	Polychaeta					Tertiary	Eocene	A4501							yes	
M7059	7059 M	Polychaeta				FORAMINIFERA	Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M16240	16240 M	Polychaeta	Pseudocavulina	petrosa			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40002	40002 M	Polychaeta	Bathysiphon	eocenica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40014	40014 M	Polychaeta	Spiroplectamina	adamsi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40028	40028 M	Polychaeta	Pseudocavulina	petrosa			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40044	40044 M	Polychaeta	Robulus	platolimbatus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40047	40047 M	Polychaeta	Robulus	convergens			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40051	40051 M	Polychaeta	Robulus	inornatus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40059	40059 M	Polychaeta	Robulus	vortex			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40069	40069 M	Polychaeta	Planularia				Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40070	40070 M	Polychaeta	Planularia				Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40077	40077 M	Polychaeta	Vaginulinopsis	saunderi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40079	40079 M	Polychaeta	Vaginulinopsis	subaculeata	tuberculata		Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40080	40080 M	Polychaeta	Vaginulinopsis	truncana			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40092	40092 M	Polychaeta	Dentolina			FORAMINIFERA	Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40093	40093 M	Polychaeta	Nodosaria	alternata			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40102	40102 M	Polychaeta	Pseudoglandulina	conica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40103	40103 M	Polychaeta	Pseudoglandulina	conica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40104	40104 M	Polychaeta	Saracenaria	triangularis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40106	40106 M	Polychaeta	Vaginulina	barcensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40107	40107 M	Polychaeta	Vaginulina	suturalis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40109	40109 M	Polychaeta	Vaginulina	inversa			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40113	40113 M	Polychaeta	Lagena			FORAMINIFERA	Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40128	40128 M	Polychaeta	Uvigerina	laimingi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 1726	yes	
M40129	40129 M	Polychaeta	Uvigerina	laimingi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40130	40130 M	Polychaeta	Uvigerina	laimingi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40132	40132 M	Polychaeta	Nodosaria	sagittensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40133	40133 M	Polychaeta	Nodogenerina	sagittensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40145	40145 M	Polychaeta	Bulimina	kleinipelli			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 0926	yes	
M40146	40146 M	Polychaeta	Bulimina	kleinipelli			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40173	40173 M	Polychaeta	Eponides	beisseli			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40174	40174 M	Polychaeta	Eponides	lodensis	martini		Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 1437	yes	
M40175	40175 M	Polychaeta	Eponides	lodensis	martini		Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40178	40178 M	Polychaeta	Eponides	mexicana			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40182	40182 M	Polychaeta	Eponides	waltonensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40184	40184 M	Polychaeta	Coelites	reticulatus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40185	40185 M	Polychaeta	Siphonina			FORAMINIFERA	Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40189	40189 M	Polychaeta	Allogomphina	trochoides			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40194	40194 M	Polychaeta	Allogomphina	trochoides			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40202	40202 M	Polychaeta	Globorotalia	membranacea			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40203	40203 M	Polychaeta	Globorotalia	membranacea			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40204	40204 M	Polychaeta	Globorotalia	californica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 1469	yes	
M40205	40205 M	Polychaeta	Globorotalia	californica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40206	40206 M	Polychaeta	Globorotalia	californica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40207	40207 M	Polychaeta	Globorotalia	californica			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40208	40208 M	Polychaeta	Globorotalia			FORAMINIFERA	Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40211	40211 M	Polychaeta	Anomalina	dorri	aragonensis		Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40228	40228 M	Polychaeta	Cibicides	pachecensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 0961	yes	
M40229	40229 M	Polychaeta	Cibicides	pachecensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40232	40232 M	Polychaeta	Cibicides	midwayensis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40237	40237 M	Polychaeta	Cibicides	durhami			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America	0000 0000 0405 0965	yes	
M40240	40240 M	Polychaeta	Cibicides	durhami			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M40241	40241 M	Polychaeta	Cibicides	distichus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44444	44444 M		Ellipsolithus	distichus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44445	44445 M		Ellipsolithus	distichus			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44475	44475 M		Brauriodosphaera	bigelowi			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44484	44484 M		Micrantholithus	pinguis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44485	44485 M		Micrantholithus	pinguis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44486	44486 M		Micrantholithus	pinguis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M44487	44487 M		Micrantholithus	pinguis			Tertiary	Paleocene	A6658	Railroad cut, Selby	Contra Costa County	California	United States	North America		yes	
M57153	57153 V	Gastropoda	Buccycon	canaliculatus			Quaternary	Pleistocene	P18199	Ranch 99	Contra Costa County	California	United States	North America		yes	
V121943	212943 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V91219	Regency	Contra Costa County	California	United States	North America		yes	
V39809	39809 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V5040	Relief Hill	Contra Costa County	California	United States	North America		yes	
V44926	44926 V	Mammalia				Pilosa	Tertiary	Miocene	V5505	Rheem	Contra Costa County	California	United States	North America		yes	
V139449	139449 V	Mammalia	Peromyscus	pilcoenicus			Tertiary	Miocene	V5505	Rheem	Contra Costa County	California	United States	North America		yes	
V139450	139450 V	Mammalia	Peromyscus	pilcoenicus			Tertiary	Miocene	V5505	Rheem	Contra Costa County	California	United States	North America		yes	
I11584	11584 I	Bivalvia	Pecten	crassiradiatus			Holotype	Tertiary	Miocene	467-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I11590	11590 I	Gastropoda	Natica	kirkensis			Paratype	Tertiary	Miocene	467-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I11591	11591 I	Gastropoda	Natica	kirkensis			Holotype	Tertiary	Miocene	467-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I11801	11801 I	Bivalvia	Arca	clarki			Holotype	Tertiary	Eocene	733-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I12036	12036 I	Anthozoa	Balanophyllia	variabilis			Cotype	Tertiary	Eocene	714-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I12037	12037 I	Anthozoa	Balanophyllia	variabilis			Cotype	Tertiary	Eocene	714-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I12038	12038 I	Anthozoa	Balanophyllia	variabilis			Cotype	Tertiary	Eocene	714-	Riggs Canyon	Contra Costa County	California	United States	North America		yes
I51129	51129 I	Echinoidea	Scutella	brewerianus			Tertiary	Miocene	467-	Riggs Canyon	Contra Costa County	California	United States	North America		yes	
V156037	156037 V	Osteichthyes				Actinopterygii	Quaternary	Pleistocene	V91184	Riverview Fish skull	Contra Costa County	California	United States	North America		yes	
V70944	70944 V	Mammalia	Hipparchion				Tertiary	Miocene	V6580	Roundcut Canyon	Contra Costa County	California	United States	North America		yes	
V70945	70945 V	Mammalia	Hipparchion				Tertiary	Miocene	V6580	Roundcut Canyon	Contra Costa County	California	United States	North America		yes	
I11460	11460 I	Bivalvia	Mulinia	pabloensis			Hypotype	Tertiary	Miocene	39-	Rocky Ridge	Contra Costa County	California	United States	North America		yes
I11522	11522 I	Bivalvia	Panope	generosa			Hypotype	Tertiary	Miocene	39-	Rocky Ridge	Contra Costa County	California	United States	North America		yes
I11546	11546 I	Bivalvia	Mytilus	trampasensis			Cotype	Tertiary	Miocene	39-	Rocky Ridge	Contra Costa County	California	United States	North America		yes
V33030	33030 V	Mammalia					Tertiary	Miocene	V3644	Rocky Ridge 2	Contra Costa County	California	United States	North America		yes	
V33031	33031 V	Mammalia					Tertiary	Miocene	V3644	Rocky Ridge 2	Contra Costa County	California	United States	North America		yes	
V33032	33032 V	Mammalia					Tertiary	Miocene	V3644	Rocky Ridge 2	Contra Costa County	California	United States	North America		yes	
V33002	33002 V	Mammalia	Desmostylus				Tertiary	Miocene	V3641	Rocky Ridge 3	Contra Costa County	California	United States	North America		yes	
V10975	10975 V	Mammalia					Quaternary	Pleistocene	V6642	Rodeo 2	Contra Costa County	California	United States	North America		yes	
V10986	10986 V	Mammalia					Quaternary	Pleistocene	V6642	Rodeo 2	Contra Costa County	California	United States	North America		yes	
V75860	75860 V	Aves	Aechmophorus	occidentalis			Quaternary	Pleistocene	V6642	Rodeo 2	Contra Costa County	California	United States	North America		yes	
V1352	1352 V	Mammalia	Hesperocyon	californicus		TYPE	Quaternary	Pleistocene	V65399	Rodeo 2	Contra Costa County	California	United States	North America		yes	
V1572	1572 V	Mammalia	Mammuthus	columbi			Quaternary	Pleistocene	-524	Rodeo Oyster Bed	Contra Costa County	California	United States	North America		yes	
V35816	35816 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V4014	Rodeo-Pecten Point	Contra Costa County	California	United States	North America		yes	
V41572	41572 V	Mammalia	Camelops				Quaternary	Pleistocene	V4014	Rodeo-Pecten Point	Contra Costa County	California					

[illegible]

M49382	49382 M	Polycystina	Clathrocylas	universa	grandis var.	Radiolarian	holotype	Tertiary	Eocene	A2845	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49385	49385 M	Polycystina	Clathrocylas	universa	undella	Radiolarian	syntype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49390	49390 M	Polycystina	Phormocyrtis	proxima		Radiolarian	syntype	Tertiary	Eocene	A2845	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49395	49395 M	Polycystina	Anthocyrtidium	pupa		Radiolarian	syntype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49399	49399 M	Polycystina	Dictyocephalus	pulcherrimus	pulcherrimus	Radiolarian	syntype	Tertiary	Eocene	A2845	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49403	49403 M	Polycystina	Dictyocephalus	pulcherrimus	curtis	Radiolarian	syntype	Tertiary	Eocene	A2847	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49404	49404 M	Polycystina	Dictyocephalus	pulcherrimus	curtis	Radiolarian	syntype	Tertiary	Eocene	A2847	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49410	49410 M	Polycystina	Theocyrtis	diablonis		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49417	49417 M	Polycystina	Lophophena	auriculolepis		Radiolarian	syntype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49420	49420 M	Polycystina	Calocyclus	sempolita	sempolita	Radiolarian	syntype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49431	49431 M	Polycystina	Lophoncus	titanathericerias		Radiolarian	syntype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49432	49432 M	Polycystina	Lophoncus	titanathericerias		Radiolarian	syntype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49435	49435 M		Zygospiris	duplex			holotype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49439	49439 M	Polycystina	Gorgospiris	lamellipes		Radiolarian	holotype	Tertiary	Eocene	A2843	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49442	49442 M	Polycystina	Gorgospiris	cystophora	cystophora	Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49443	49443 M	Polycystina	Hexaspiris	markleyensis		Radiolarian	holotype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49447	49447 M	Polycystina	Pentaspiris	paradoxa		Radiolarian	holotype	Tertiary	Eocene	A2845	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49449	49449 M	Polycystina	Cantharospiris	macropodus		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49450	49450 M	Polycystina	Gorgospiris	hexapodalia		Radiolarian	holotype	Tertiary	Eocene	A2842	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49451	49451 M	Polycystina	Lithocampe	minuta		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49452	49452 M	Polycystina	Lithonira	elizabethae		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49454	49454 M		Coscinodiscophyceae	Pixilla	intermedia	Diatom	hypotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49455	49455 M	Polycystina	Lithomelissa	acutispina		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49456	49456 M	Polycystina	Lithomelissa	bifurcata		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49457	49457 M	Polycystina	Archicorys	urceolata		Radiolarian	holotype	Tertiary	Eocene	A2840	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49459	49459 M	Polycystina	Triplidium	longipes	longipes	Radiolarian	holotype	Tertiary	Eocene	A2845	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49460	49460 M	Polycystina	Triplidium	longipes	longipes	Radiolarian	holotype	Tertiary	Eocene	A2847	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49461	49461 M	Polycystina	Bathrocalpis	campanula		RADIOLARIA	holotype	Tertiary	Eocene	A2843	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
M49462	49462 M	Polycystina	Tripcyrtis	curtidiscus		Radiolarian	holotype	Tertiary	Eocene	A2844	S of Antioch, Mt Diablo Area Contra Costa County	California	United States	North America	yes
V39974	39974 V	Mammalia	Telecearcus					Tertiary	Miocene	V5048	Sacramento Northern R.R. Contra Costa County	California	United States	North America	yes
V30358	30358 V	Mammalia	Nannippus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V30385	30385 V	Mammalia	Pliolophus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V30386	30386 V	Mammalia	Pliolophus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V32111	32111 V	Aves				Anserinae	FIG	Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	0000 0000 0704 0796
V32882	32882 V	Mammalia					FIG	Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V34521	34521 V	Mammalia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V36475	36475 V		Osteichthyes					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V37535	37535 V	Mammalia	Platimodon	primitivus			PUBL	Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V37536	37536 V	Mammalia	Hypolagus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V37557	37557 V	Osteichthyes						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V37558	37558 V	Osteichthyes						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V37559	37559 V	Osteichthyes						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V38164	38164 V	Mammalia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V38216	38216 V	Aves	Ardea					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V39511	39511 V	Mammalia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V40860	40860 V	Osteichthyes					FIG	Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V41662	41662 V	Amphibia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V46717 V	46717 V	Aves						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V77503	77503 V	Mammalia	Ptiloscomys					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V77631	77631 V	Mammalia	Bensonomyx	lufkni				Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V84818	84818 V	Amphibia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V86153	86153 V	Reptilia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92146	92146 V	Mammalia	Hypolagus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92147	92147 V	Osteichthyes						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92148	92148 V	Mammalia	Hypolagus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92149	92149 V	Osteichthyes						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92150	92150 V	Mammalia	Hypolagus					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92151	92151 V	Mammalia	Ptiloscomys					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92152	92152 V	Reptilia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92153	92153 V	Reptilia	Geochelone					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92154	92154 V	Mammalia	Bensonomyx					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V92155	92155 V	Aves	Bucephala				FIG	Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V95876	95876 V	Reptilia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V132088	132088 V	Reptilia	Geochelone					Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V158706	158706 V	Reptilia						Tertiary	Miocene	V3303	Saint Mary's Banks Contra Costa County	California	United States	North America	yes
V38099	38099 V	Mammalia						Quaternary	Pleistocene	V4921	San Miguel 1 Contra Costa County	California	United States	North America	yes
V39220	39220 V	Mammalia	Bison	latifrons				Quaternary	Pleistocene	V4921	San Miguel 1 Contra Costa County	California	United States	North America	yes
M35099	35099 M	Ostracoda	Cypridopsis	pilocenica		OSTRACODA	holotype	Tertiary	Miocene	Mf7263	587 San Pablo Creek Valley Contra Costa County	California	United States	North America	yes
M21890	21890 M	Polythalamia	Bolivina	parva		FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21891	21891 M	Polythalamia	Bolivina			FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21892	21892 M	Polythalamia	Bullimina	montereyana	montereyana	FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21893	21893 M	Polythalamia	Bullimina	montereyana	delmontensis	FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21895	21895 M	Polythalamia	Bulliminella	dubia		FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21898	21898 M	Polythalamia	Bulliminella	curta		FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21907	21907 M	Polythalamia	Pulvinulinella			FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21911	21911 M	Polythalamia	Dorothyella			FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M21916	21916 M	Polythalamia	Globigerina	bulloides		FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M22376	22376 M	Polythalamia	Virgulina	californiensis	ticensis			Tertiary	Miocene	Mf7917	San Pablo Dam Contra Costa County	California	United States	North America	yes
M22377	22377 M	Polythalamia	Virgulina	schreibersiana		FORAMINIFERA		Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M22378	22378 M	Polythalamia	Virgulina	micenica				Tertiary	Miocene	Mf7917	San Pablo Dam Contra Costa County	California	United States	North America	yes
M23379	23379 M	Polythalamia	Virgulina	californiensis	ticensis			Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M35928	35928 M	Polythalamia	Bolivina	ticensis		FORAMINIFERA	holotype	Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M35929	35929 M	Polythalamia	Suggrunda	californica		FORAMINIFERA	holotype	Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
M35930	35930 M	Polythalamia	Pulvinulinella	gyroidiniformis		FORAMINIFERA	hypotype	Tertiary	Miocene	Mf7263	San Pablo Dam Contra Costa County	California	United States	North America	yes
V29854	29854 V	Mammalia	Desmostylus				FIG	Tertiary	Miocene	V3408	San Pablo Dam Contra Costa County	California	United States	North America	yes
V59871	59871 V	Mammalia	Desmostylus	hesperus			PUBL	Tertiary	Miocene	V3408	San Pablo Dam Contra Costa County	California	United States	North America	yes
V57544	57544 V	Mammalia	Mammuthus					Tertiary	Miocene	V6029	San Pablo Dam Road Contra Costa County	California	United States	North America	yes
V34691	34691 V	Mammalia	Bison					Quaternary	Pleistocene	V3927	San Ramon Creek Contra Costa County	California	United States	North America	yes
V64040	64040 V	Mammalia	Hypolagus					Tertiary	Miocene	V6310	San Ramon Valley 1 Contra Costa County	California	United States	North America	yes
V64127	64127 V	Mammalia						Tertiary	Miocene	V6310	San Ramon Valley 1 Contra Costa County	California	United States	North America	yes
V21278	21278 V	Mammalia	Mammuthus					Quaternary	Pleistocene	V65254	Sand Mound Slough Contra Costa County	California	United States	North America	yes
V41287	21287 V	Mammalia	Mammuthus	columbi				Quaternary	Pleistocene	V65254	Sand Mound Slough Contra Costa County	California	United States	North America	yes
V40488	40488 V	Mammalia	Hippariion					Tertiary	Pliocene	V5507	Santa Maria Church Contra Costa County	California	United States	North America	yes
V49667	49667 V	Mammalia	Sciurus					Tertiary	Pliocene	V48135	Sciurus Contra Costa County	California	United States	North America	yes
V95932	95932 V	Mammalia						Tertiary	Miocene	V5314	Scow Canyon Contra Costa County	California	United States	North America	yes
V55797	55797 V	Mammalia	Pseudaelurus					Tertiary	Miocene	V5926	Selb Contra Costa County	California	United States	North America	yes
V55798	55798 V	Mammalia	Marctylus			Talpinae		Tertiary	Miocene	V5926	Selb Contra Costa County	California	United States	North America	yes
V55799	55799 V	Mammalia	Marctylus	major			PUBL	Tertiary	Miocene	V5926	Selb Contra Costa County	California	United States	North America	yes
V55800	55800 V	Mammalia	Nannippus	tehonensis				Tertiary	Miocene	V5926	Selb Contra Costa County	California	United States	North America	yes
V55801	55801 V	Mammalia													

V55811	55811 V	Mammalia	Nannippus			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55812	55812 V	Reptilia				Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55813	55813 V	Reptilia				Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55818	55818 V	Mammalia			Gliroidea	Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55819	55819 V	Mammalia	Nannippus			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55882	55882 V	Mammalia				Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55883	55883 V	Mammalia	Hipparion			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55884	55884 V	Mammalia				Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V55885	55885 V	Mammalia	Nannippus			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V56282	56282 V	Mammalia	Hipparion			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V89802	89802 V	Mammalia	Ustatochoerus			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V94875	94875 V	Mammalia	Nannippus			Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V94876	94876 V	Mammalia			Equinae	Tertiary	Miocene	V5926	Selb	Contra Costa County	California	United States	North America	yes
V161687	161687 V	Artihosa	Desmophyllus	crista	Galli	Tertiary	Paleocene	A4384	Selby 1	Contra Costa County	California	United States	North America	yes
V12777	12777 V	Mammalia	Allodermus	kernensis		Tertiary	Miocene	V5321	Selby 1	Contra Costa County	California	United States	North America	yes
M21669	21669 M	Polythalamia	Nonion	montereyanum	carmeloensis	Tertiary	Miocene	Mf7238	Selby Smelter	Contra Costa County	California	United States	North America	yes
V41165	41165 V	Mammalia	Desmostylus			Tertiary	Miocene	V5202	Selby Smelter	Contra Costa County	California	United States	North America	yes
V82990	82990 V	Mammalia				Tertiary	Miocene	V5202	Selby Smelter	Contra Costa County	California	United States	North America	yes
M8170	8170 M	Polythalamia				Tertiary	Paleocene	A1716	Selby Station	Contra Costa County	California	United States	North America	yes
M8171	8171 M	Polythalamia				Tertiary	Miocene	A1716	Selby Station	Contra Costa County	California	United States	North America	yes
V113311	113311 V	Mammalia	Gomphotherium	angustidens		Tertiary	Miocene	V75017	Shady Picnic Area	Contra Costa County	California	United States	North America	yes
V74814	74814 V	Mammalia	Bison			Quaternary	Pleistocene	V6628	Shell Oil	Contra Costa County	California	United States	North America	yes
I30417	30417 I	Gastropoda	Siphonalia	carquinensis		Tertiary	Paleocene	A1452	Shell Oil Tank Farm	Contra Costa County	California	United States	North America	yes
V26733	26733 V	Mammalia	Nannippus	tehonensis		FIG	Miocene	V2403	Shell Ridge 2	Contra Costa County	California	United States	North America	yes
V177574	177574 V	Mammalia				Tertiary	Miocene	V99786	Shell Ridge Cetacean	Contra Costa County	California	United States	North America	yes
I11009	11009 I	Echinoidea	Hemistaster	alamedensis		Holotype	Cretaceous	31400	Shepherd's Canyon	Contra Costa County	California	United States	North America	yes
I11014	11014 I	Echinoidea	Catopygus?	californicus		Holotype	Late Cretaceous	31400	Shepherd's Canyon	Contra Costa County	California	United States	North America	yes
V19821	19821 V	Mammalia	Pliauchenia			PUBL	Miocene	-707	Siesta Valley 1	Contra Costa County	California	United States	North America	yes
V33061	33061 V	Mammalia	Gomphotherium			PUBL	Miocene	V3652	Siesta Valley 2	Contra Costa County	California	United States	North America	yes
V45292	45292 V	Mammalia	Pliohippus			Tertiary	Miocene	V3652	Siesta Valley 2	Contra Costa County	California	United States	North America	yes
V38117	38117 V	Mammalia	Mammut			Tertiary	Miocene	V4604	Siesta Valley 3	Contra Costa County	California	United States	North America	yes
V38118	38118 V	Mammalia	Merycodus			Tertiary	Miocene	V4604	Siesta Valley 3	Contra Costa County	California	United States	North America	yes
V38119	38119 V	Mammalia				Tertiary	Miocene	V4604	Siesta Valley 3	Contra Costa County	California	United States	North America	yes
V94890	94890 V	Mammalia	Hypolagus			Tertiary	Miocene	V4604	Siesta Valley 3	Contra Costa County	California	United States	North America	yes
N81267	81267 V	Mammalia				Tertiary	Miocene	V68113	Siesta Valley 4	Contra Costa County	California	United States	North America	yes
V82736	82736 V	Mammalia				Tertiary	Miocene	V68113	Siesta Valley 4	Contra Costa County	California	United States	North America	yes
V114543	114543 V	Mammalia	Pliohippus			FIG	Miocene	V75231	Siesta Valley 5	Contra Costa County	California	United States	North America	yes
M21902	21902 M	Polythalamia	Cyclammina	cancelata	obesa	Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21905	21905 M	Polythalamia	Cyclammina	clarki		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21910	21910 M	Polythalamia	Cyclammina	incisa		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21912	21912 M	Polythalamia	Robulus	warnani		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21915	21915 M	Polythalamia	patens			Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21917	21917 M	Polythalamia	Glandulina	laevigata		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21918	21918 M	Polythalamia	Gaudryina	trinitatis		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21919	21919 M	Polythalamia	Gaudryina	atlantica		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21920	21920 M	Polythalamia	Reophax	piliulifer		Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21926	21926 M	Polythalamia	Textularia	laevigata		Tertiary	Miocene	Mf7266	Sobranite	Contra Costa County	California	United States	North America	yes
M22370	22370 M	Polythalamia	Verneulinina			Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M22373	22373 M	Polythalamia	Verneulinina			Tertiary	Miocene	Mf7265	Sobranite	Contra Costa County	California	United States	North America	yes
M21886	21886 M	Polythalamia	Bathysiphon			Tertiary	Miocene	Mf7522	Sobranite Anticline	Contra Costa County	California	United States	North America	yes
M21899	21899 M	Polythalamia	Clavulina	communis		Tertiary	Miocene	Mf7522	Sobranite Anticline	Contra Costa County	California	United States	North America	yes
M21900	21900 M	Polythalamia	Clavulina	flintiana		Tertiary	Miocene	Mf7522	Sobranite Anticline	Contra Costa County	California	United States	North America	yes
M21901	21901 M	Polythalamia	Clavulina	patens		Tertiary	Miocene	Mf7522	Sobranite Anticline	Contra Costa County	California	United States	North America	yes
M21909	21909 M	Polythalamia	Epistominia	ramonensis		Tertiary	Miocene	Mf7522	Sobranite Anticline	Contra Costa County	California	United States	North America	yes
I14405	14405 I	Gastropoda	Tejonia	moragali		Hypotype	Eocene	A1307	Somerville	Contra Costa County	California	United States	North America	yes
P1944	1944 P	Magnoliopsida	Alnus	corrallina		FIG	Miocene	PA969	South Mt. Diablo General	Contra Costa County	California	United States	North America	yes
P1945	1945 P	Magnoliopsida	Alnus	corrallina		FIG	Miocene	PA969	South Mt. Diablo General	Contra Costa County	California	United States	North America	yes
P1955	1955 P	Magnoliopsida	Betula	parcedentata		FIG	Miocene	PA969	South Mt. Diablo General	Contra Costa County	California	United States	North America	yes
P1956	1956 P	Magnoliopsida	Equisetum			FIG	Miocene	PA969	South Mt. Diablo General	Contra Costa County	California	United States	North America	yes
P1958	1958 P	Magnoliopsida	Alnus	corrallina		FIG	Miocene	PA969	South Mt. Diablo General	Contra Costa County	California	United States	North America	yes
P330	330 P	Magnoliopsida	Populus	alexanderi		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P332	332 P	Magnoliopsida	Populus	prefontontii		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P336	336 P	Magnoliopsida	Salix	coalingensis		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P339	339 P	Magnoliopsida	Salix			Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P354	354 P	Magnoliopsida	Quercus	hannibali		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P355	355 P	Magnoliopsida	Quercus	hannibali		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P356	356 P	Magnoliopsida	Quercus	hannibali		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P360	360 P	Magnoliopsida	Quercus	orindensis		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P361	361 P	Magnoliopsida	Quercus	orindensis		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P362	362 P	Magnoliopsida	Quercus	orindensis		ctotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P388	388 P	Magnoliopsida	Prunus	merriami		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P394	394 P	Magnoliopsida	Rhus			Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1596	1596 P	Liliopsida	Typha	lesqueuxii		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1597	1597 P	Liliopsida	Poaetes			Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1598	1598 P	Magnoliopsida	Populus	parcedentata		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1599	1599 P	Magnoliopsida	Populus	parcedentata		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1600	1600 P	Magnoliopsida	Populus	alexanderi		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1601	1601 P	Magnoliopsida	Populus	prefontontii		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1602	1602 P	Magnoliopsida	Populus	prefontontii		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1603	1603 P	Magnoliopsida	Populus	prefontontii		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1604	1604 P	Magnoliopsida	Populus	washeensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1605	1605 P	Magnoliopsida	Salix	hesperia		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1606	1606 P	Magnoliopsida	Salix	hesperia		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1607	1607 P	Magnoliopsida	Salix	wildcatensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1608	1608 P	Magnoliopsida	Salix	wildcatensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1609	1609 P	Magnoliopsida	Alnus	merriami		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1610	1610 P	Magnoliopsida	Alnus	merriami		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1611	1611 P	Magnoliopsida	Castanopsis	perplexa		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1612	1612 P	Magnoliopsida	Castanopsis	perplexa		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1613	1613 P	Magnoliopsida	Quercus	bockeei		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1614	1614 P	Magnoliopsida	Quercus	declinata		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1615	1615 P	Magnoliopsida	Quercus	declinata		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1616	1616 P	Magnoliopsida	Quercus	declinata		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1617	1617 P	Magnoliopsida	Quercus	orindensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1618	1618 P	Magnoliopsida	Quercus	orindensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1619	1619 P	Magnoliopsida	Quercus	orindensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1620	1620 P	Magnoliopsida	Quercus	orindensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1621	1621 P	Magnoliopsida	Quercus	orindensis		pleistotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1622	1622 P	Magnoliopsida	Quercus	orindensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1623	1623 P	Magnoliopsida	Quercus	orindensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1624	1624 P	Magnoliopsida	Quercus	moragensis		paratype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1625	1625 P	Magnoliopsida	Quercus	moragensis		paratype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1626	1626 P	Magnoliopsida	Quercus	moragensis		holotype	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1627	1627 P	Magnoliopsida	Quercus	moragensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1628	1628 P	Magnoliopsida	Quercus	moragensis		Tertiary	Miocene		162 St. Marys College	Contra Costa County	California	United States	North America	yes
P1629	1629 P	Magnoliopsida	Quercus											

P1633	1633 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1634	1634 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1635	1635 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1636	1636 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1637	1637 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1638	1638 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1639	1639 P	Magnoliopsida	Quercus	wislizenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1640	1640 P	Magnoliopsida	Celtis	kansana		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1642	1642 P	Magnoliopsida	Dendromecon	reticulata		holotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1643	1643 P	Magnoliopsida	Mahonia	marginata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1644	1644 P	Magnoliopsida	Mahonia	marginata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1645	1645 P	Magnoliopsida	Umbellularia	salicifolia			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1646	1646 P	Magnoliopsida	Umbellularia	salicifolia			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1647	1647 P	Magnoliopsida	Umbellularia	salicifolia			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1648	1648 P	Magnoliopsida	Platanus	paucidentata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1649	1649 P	Magnoliopsida	Amelanchier				Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1650	1650 P	Magnoliopsida	Cercocarpus	cuneatus			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1652	1652 P	Magnoliopsida	Lyonothamnus	mohaveensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1653	1653 P	Magnoliopsida	Lyonothamnus	mohaveensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1654	1654 P	Magnoliopsida	Lyonothamnus	mohaveensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1655	1655 P	Magnoliopsida	Photinia	sonomensis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1656	1656 P	Magnoliopsida	Photinia	sonomensis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1657	1657 P	Magnoliopsida	Prunus	morangensis		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1658	1658 P	Magnoliopsida	Prunus	morangensis		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1659	1659 P	Magnoliopsida	Prunus	morangensis		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1660	1660 P	Magnoliopsida	Prunus	prefasciculata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1661	1661 P	Magnoliopsida	Prunus	prefasciculata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1662	1662 P	Magnoliopsida	Acer	bolanderi			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1663	1663 P	Magnoliopsida	Acer	bolanderi			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1664	1664 P	Magnoliopsida	Rhus	franciscana		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1665	1665 P	Magnoliopsida	Rhus	franciscana		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1666	1666 P	Magnoliopsida	Rhus	morangensis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1667	1667 P	Magnoliopsida	Rhus	morangensis		ctotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1668	1668 P	Magnoliopsida	Rhus	prelaurina			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1669	1669 P	Magnoliopsida	Sapindus	oklahomensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1670	1670 P	Magnoliopsida	Sapindus	oklahomensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1671	1671 P	Magnoliopsida	Sapindus	oklahomensis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1672	1672 P	Magnoliopsida	Berchemia	multinervis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1673	1673 P	Magnoliopsida	Berchemia	multinervis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1674	1674 P	Magnoliopsida	Ceanothus	prespinosus			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1675	1675 P	Magnoliopsida	Ceanothus	prespinosus		holotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1676	1676 P	Magnoliopsida	Ceanothus	prespinosus			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1677	1677 P	Magnoliopsida	Rhamnus	morangensis		holotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1678	1678 P	Magnoliopsida	Rhamnus	precalfornica			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1679	1679 P	Magnoliopsida	Rhamnus	precalfornica			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1680	1680 P	Magnoliopsida	Fremontodendron	lobata		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1681	1681 P	Magnoliopsida	Fremontodendron	lobata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1682	1682 P	Magnoliopsida	Cornus	ovalis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1683	1683 P	Magnoliopsida	Cornus	ovalis			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1684	1684 P	Magnoliopsida	Nyssa	elaenoides		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1685	1685 P	Magnoliopsida	Castanopsis	perplexa			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1686	1686 P	Magnoliopsida	Arbutus	matthesii			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1687	1687 P	Magnoliopsida	Arctostaphylos			holotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1688	1688 P	Magnoliopsida	Fraixinus	caudata			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P1689	1689 P	Magnoliopsida	Berchemia	multinervis		plesiotype	Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
P31651	31651 P	Magnoliopsida	Chamaebatia	prefoliolosa			Tertiary	Miocene	162 St. Marys College	Contra Costa County	California	United States	North America	yes	
V69311	69311 V	Osteichthyes					Tertiary	Miocene	V6502	Stan's Fish	Contra Costa County	California	United States	North America	yes
V76629	76629 V	Osteichthyes					Tertiary	Miocene	V6502	Stan's Fish	Contra Costa County	California	United States	North America	yes
I31266	31266 I	Bivalvia	Periploma	stewartvilleensis			Tertiary	Paleocene	3148-	Stewartville	Contra Costa County	California	United States	North America	yes
I31302	31302 I	Bivalvia	Periploma	stewartvilleensis			Tertiary	Paleocene	3148-	Stewartville	Contra Costa County	California	United States	North America	yes
I31379	31379 I	Echinoidea	Schizaster	diaboloensis			Tertiary	Paleocene	3148-	Stewartville	Contra Costa County	California	United States	North America	yes
I31228	31228 I	Gastropoda	Architectonica				Tertiary	Paleocene	3155-	Stewartville	Contra Costa County	California	United States	North America	yes
I31363	31363 I	Bivalvia	Modiolus?	reganosenis			Tertiary	Paleocene	3155-	Stewartville	Contra Costa County	California	United States	North America	yes
V71671	71671 V	Mammalia	Chondrichthys				Tertiary	Miocene	V65123	Stewartville	Contra Costa County	California	United States	North America	yes
V131500	131500 V	Mammalia	Miomastodon				Tertiary	Miocene	V85096	Stone Valley NE	Contra Costa County	California	United States	North America	yes
I14983	14983 I	Cephalopoda	Ancanthoceras	lecontei			Tertiary	Cretaceous	A3823	Straight of Carquinez	Contra Costa County	California	United States	North America	yes
V40088	40088 V	Mammalia					Tertiary	Pliocene	V5102	Sugarloaf Hill 1	Contra Costa County	California	United States	North America	yes
V40105	40105 V	Mammalia	Capromeryx				Tertiary	Pliocene	V5103	Sugarloaf Hill 2	Contra Costa County	California	United States	North America	yes
I11571	11571 I	Bivalvia	Pinna	alamedensis		Plesiotype	Tertiary	Miocene	1485-	Sycamore Canyon	Contra Costa County	California	United States	North America	yes
I12326	12326 I	Bivalvia	Chione	pabloensis		Holotype	Tertiary	Miocene	1485-	Sycamore Canyon	Contra Costa County	California	United States	North America	yes
I12327	12327 I	Bivalvia	Chione	pabloensis		Holotype	Tertiary	Miocene	1485-	Sycamore Canyon	Contra Costa County	California	United States	North America	yes
I199028	199028 I	Bivalvia	Schizothorus				Tertiary	Miocene	1485-	Sycamore Canyon	Contra Costa County	California	United States	North America	yes
V33529	33529 V	Mammalia	Pliohippus				Tertiary	Miocene	V3716	Sycamore Creek 1	Contra Costa County	California	United States	North America	yes
V37660	37660 V	Mammalia	Nannippus				Tertiary	Miocene	V3716	Sycamore Creek 1	Contra Costa County	California	United States	North America	yes
V13930	13930 V	Mammalia	Hipparion			TYPE	Tertiary	Miocene	-708	Tassajara	Contra Costa County	California	United States	North America	yes
V09652	09652 V	Mammalia					Tertiary	Miocene	V5726	Tassajara School	Contra Costa County	California	United States	North America	yes
V22341	22341 V	Mammalia	Pliohippus			FIG	Tertiary	Miocene	V1603	Tice Valley	Contra Costa County	California	United States	North America	yes
M23832	23832 M	Polychalamea					Tertiary	Eocene	MF8068	Tidewater Bethel Is. Corral, B.	Contra Costa County	California	United States	North America	yes
V138727	138727 V	Mammalia	Scapanus	mesolatinus		TYPE	Tertiary	Pliocene	V91216	Timbercreek	Contra Costa County	California	United States	North America	yes
V138728	138728 V	Mammalia				PUBL	Tertiary	Pliocene	V91216	Timbercreek	Contra Costa County	California	United States	North America	yes
V138729	138729 V	Mammalia				PUBL	Tertiary	Pliocene	V91216	Timbercreek	Contra Costa County	California	United States	North America	yes
V38172	38172 V	Mammalia	Equus				Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42984	42984 V	Mammalia					Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42985	42985 V	Mammalia	Equus				Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42986	42986 V	Mammalia	Camelops				Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42987	42987 V	Mammalia					Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42988	42988 V	Mammalia					Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42989	42989 V	Mammalia					Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42990	42990 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V42991	42991 V	Mammalia	Thomomys				Quaternary	Pleistocene	V5302	Torney A	Contra Costa County	California	United States	North America	yes
V38173	38173 V	Mammalia					Tertiary	Miocene	V4616	Torney B	Contra Costa County	California	United States	North America	yes
V37576	37576 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V35984	35984 V	Mammalia	Mammuthus				Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V45265	45265 V	Mammalia	Mammuthus	americanum			Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V45266	45266 V	Mammalia	Mammuthus	americanum			Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V45267	45267 V	Mammalia	Mammuthus	americanum			Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V45268	45268 V	Mammalia	Camelops				Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
V45269	45269 V	Mammalia	Camelops				Quaternary	Pleistocene	V3428	Union Oil	Contra Costa County	California	United States	North America	yes
M40246	40246 M	Polychalamea					Tertiary	Eocene	MF6704	Unknown	Contra Costa County	California	United States	North America	yes
M40247	40247 M	Polychalamea					Tertiary	Eocene	MF6704	Unknown	Contra Costa County	California	United States	North America	yes
V34996	34996 V	Mammalia					Tertiary	Cretaceous	A261	Vallejo Junction	Contra Costa County	California	United States	North America	yes
I33958	33958 I	Gastropoda	Turritella	pachecoensis		Hypotype	Tertiary	Paleocene	A1400	Vine Hill	Contra Costa County	California	United States	North America	yes
I33959	33959 I	Gastropoda	Turritella	pachecoensis		Hypotype	Tertiary	Paleocene	A1400	Vine Hill	Contra Costa County	California	United States	North America	yes
I33960															

I1020	11020 I	Echinoidea	Spatangus	pachecoensis			Topotype	Tertiary	Eocene	D9877	Vine Hill Station	Contra Costa County	California	United States	North America	yes
M7050	7050 M	Polythalamia	Ammodiscoides			FORAMINIFERA	hypotype	Tertiary	Paleocene	A6660	W side of rd to Selby	Contra Costa County	California	United States	North America	yes
M4004	4004 M	Polythalamia	Haplophragmoides			FORAMINIFERA	hypotype	Tertiary	Paleocene	A6660	W side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40010	40010 M	Polythalamia	Vaginulinidae			FORAMINIFERA	hypotype	Tertiary	Paleocene	A6660	W side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40019	40019 M	Polythalamia	Silicosigmolinia	californica		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6660	W side of rd to Selby	Contra Costa County	California	United States	North America	yes
M40035	40035 M	Polythalamia						Tertiary	Paleocene	A6660	W side of rd to Selby	Contra Costa County	California	United States	North America	yes
V24111	24111 V	Mammalia						Tertiary	Miocene		-303 Walnut Creek 2	Contra Costa County	California	United States	North America	yes
V40106	40106 V	Mammalia	Capromeryx					Tertiary	Pliocene	V5104	Walnut Creek Se 1	Contra Costa County	California	United States	North America	yes
V57981	57981 V	Mammalia	Hoplorhin					Tertiary	Miocene	V6033	Weber	Contra Costa County	California	United States	North America	yes
V58202	58202 V	Mammalia	Mammuthus					Tertiary	Miocene	V6033	Weber	Contra Costa County	California	United States	North America	yes
V63744	63744 V	Mammalia						Tertiary	Miocene	V6239	Whitten	Contra Costa County	California	United States	North America	yes
M35095	35095 M	Ostracoda	Cyclocypris	californica		OSTRACODA	holotype	Tertiary	Pliocene		589 Wildcat Canyon	Contra Costa County	California	United States	North America	yes
M35100	35100 M	Ostracoda	Candona	candida	depressa var.	OSTRACODA	holotype	Tertiary	Pliocene		589 Wildcat Canyon	Contra Costa County	California	United States	North America	yes
M35738	35738 M	Ostracoda	Candona	gracilis		OSTRACODA	holotype	Tertiary	Pliocene		589 Wildcat Canyon	Contra Costa County	California	United States	North America	yes
V75979	75979 V	Mammalia	Bison					Quaternary	Recent	V6643	Wildcat Canyon	Contra Costa County	California	United States	North America	yes
M35098	35098 M		Erpetocypris	lata		Ostracode	holotype	Tertiary	Pliocene		585 Wildcat Canyon Caves	Contra Costa County	California	United States	North America	yes
V35998	35998 V	Mammalia	Equus	simplicidens			FIG	Tertiary	Pliocene	V4017	Willow Pass	Contra Costa County	California	United States	North America	yes
V38171	38171 V	Mammalia						Tertiary	Miocene	V4614	Willow Pass E	Contra Costa County	California	United States	North America	yes
V42156	42156 V	Mammalia	Gomphotherium					Tertiary	Miocene	V5224	Willis Pit	Contra Costa County	California	United States	North America	yes
I12014	12014 I	Anthozoa	Trochocyathus	pergranulatus			Cotype	Tertiary	Miocene	484-	Windy Point	Contra Costa County	California	United States	North America	yes
I12015	12015 I	Anthozoa	Trochocyathus	pergranulatus			Cotype	Tertiary	Miocene	484-	Windy Point	Contra Costa County	California	United States	North America	yes
I10046	10046 I	Bivalvia	Pharella	alta			Plastoparatype	Cretaceous		D9860		Contra Costa County	California	United States	North America	yes
I10061	10061 I	Echinoidea	Astrodapis	tumidus	cierboensis		Holotype	Tertiary	Miocene	522-		Contra Costa County	California	United States	North America	yes
I10062	10062 I	Echinoidea	Astrodapis	cierboensis			Hypotype	Tertiary	Miocene	526-		Contra Costa County	California	United States	North America	yes
I10063	10063 I	Echinoidea	Scutella	pablosensis			Holotype	Tertiary	Miocene	232-		Contra Costa County	California	United States	North America	yes
I10065	10065 I	Echinoidea	Astrodes	altus			Holotype	Tertiary	Miocene	1950-		Contra Costa County	California	United States	North America	yes
I10166	10166 I	Gastropoda	Lymnaea	contractosa			Holotype?	Tertiary	Pliocene	IP12002		Contra Costa County	California	United States	North America	yes
I10315	10315 I	Bivalvia	Meekia	navis			Hypotype	Cretaceous	Late Cretaceous	2609-		Contra Costa County	California	United States	North America	yes
I10618	10618 I	Bivalvia	Psidium	occidentale			Syntype	Tertiary	Miocene	753-		Contra Costa County	California	United States	North America	yes
I10740	10740 I	Malacostraca	Cancer	danai			Holotype	Tertiary	Miocene	D3800		Contra Costa County	California	United States	North America	yes
I11002	11002 I	Echinoidea	gabbii				Hypotype	Tertiary	Pliocene	1742-		Contra Costa County	California	United States	North America	yes
I11003	11003 I	Astrodapis	Astrodapis	major			Cotype	Tertiary	Pliocene	1742-		Contra Costa County	California	United States	North America	yes
I11004	11004 I	Echinoidea	Astrodapis	whitneyi			Hypotype	Tertiary	Miocene	1227-		Contra Costa County	California	United States	North America	yes
I11005	11005 I	Echinoidea	Scutella	gabbii	tenuis		Holotype	Tertiary	Miocene	D9872		Contra Costa County	California	United States	North America	yes
I11006	11006 I	Echinoidea	Astrodapis	tumidus			Hypotype	Tertiary	Miocene	56-		Contra Costa County	California	United States	North America	yes
I11007	11007 I	Echinoidea	Scutella	gabbii			Hypotype	Tertiary	Miocene	1478-		Contra Costa County	California	United States	North America	yes
I11022	11022 I	Echinoidea	Hesperia		gibbosus		Holotype	Tertiary	Miocene	525-		Contra Costa County	California	United States	North America	yes
I11026	11026 I	Echinoidea	Schizaster	lecontei			Holotype	Tertiary	Paleocene	337-		Contra Costa County	California	United States	North America	yes
I11029	11029 I	Echinoidea	Scutaster	andersoni			Holotype	Tertiary	Eocene?	424-		Contra Costa County	California	United States	North America	yes
I11036	11036 I	Echinoidea	Astrodapis	whitneyi			Hypotype	Tertiary	Miocene	1227-		Contra Costa County	California	United States	North America	yes
I11106	11106 I	Bivalvia	Spisula	occidentalis			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11107	11107 I	Bivalvia	Spisula	californica			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11108	11108 I	Bivalvia	Callicardia	californica			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11109	11109 I	Bivalvia	Leda	pulchrisnuosa			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11110	11110 I	Bivalvia	Yoldia	cooperi	tenuissima		Holotype	Tertiary	Oligocene	798-		Contra Costa County	California	United States	North America	yes
I11111	11111 I	Bivalvia	Pandora	acutirostrata			Holotype	Tertiary	Oligocene	1132-		Contra Costa County	California	United States	North America	yes
I11112	11112 I	Bivalvia	Pandora	acutirostrata			Paratype	Tertiary	Oligocene	1132-		Contra Costa County	California	United States	North America	yes
I11113	11113 I	Bivalvia	Callicardia	californica			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11114	11114 I	Bivalvia	Mya	incognita			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11116	11116 I	Bivalvia	Macrocallista?	incognita			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11117	11117 I	Bivalvia	Spisula	ramonensis			Hypotype	Tertiary	Oligocene	1458-		Contra Costa County	California	United States	North America	yes
I11118	11118 I	Bivalvia	Spisula	albana			Holotype	Tertiary	Oligocene	1687-		Contra Costa County	California	United States	North America	yes
I11119	11119 I	Bivalvia	Spisula	ramonensis	var. ramonensis		Holotype	Tertiary	Oligocene	1461-		Contra Costa County	California	United States	North America	yes
I11120	11120 I	Bivalvia	Metis	rostellata			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11122	11122 I	Bivalvia	Modiolus	pittsburgensis			Holotype	Tertiary	Miocene	1895-		Contra Costa County	California	United States	North America	yes
I11123	11123 I	Bivalvia	Chione	lineolata			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11124	11124 I	Bivalvia	Chione	mediostriata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11125	11125 I	Bivalvia	Chione	mediostriata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11126	11126 I	Bivalvia	Chione	lineolata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11128	11128 I	Bivalvia	Tellina	tenuilineata			Paratype	Tertiary	Miocene	1175-		Contra Costa County	California	United States	North America	yes
I11129	11129 I	Bivalvia	Pitar	lorenzana			Holotype	Tertiary	Oligocene	1686-		Contra Costa County	California	United States	North America	yes
I11130	11130 I	Bivalvia	Tellina	tenuilineata			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11132	11132 I	Bivalvia	Solen	curtus			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11133	11133 I	Bivalvia	Solen	gravidus			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11137	11137 I	Bivalvia	Antigona	anglica			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11138	11138 I	Bivalvia	Pecten	gabbii			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11139	11139 I	Bivalvia	Pecten	gabbii			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11140	11140 I	Bivalvia	Periploma	undulata			Paratype	Tertiary	Oligocene	1309-		Contra Costa County	California	United States	North America	yes
I11141	11141 I	Bivalvia	Periploma	undulata			Holotype	Tertiary	Oligocene	1309-		Contra Costa County	California	United States	North America	yes
I11142	11142 I	Bivalvia	Antigona	mathewsonii			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11143	11143 I	Bivalvia	Antigona	mathewsonii			Hypotype	Tertiary	Oligocene	IP12049		Contra Costa County	California	United States	North America	yes
I11145	11145 I	Bivalvia	Dosinia	mathewsonii			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11148	11148 I	Bivalvia	Dosinia	mathewsonii			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11149	11149 I	Bivalvia	Dosinia	mathewsonii			Homeotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11150	11150 I	Bivalvia	Glycymeris	buwaldi			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11152	11152 I	Gastropoda	Molopophorus	biplicatus			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11153	11153 I	Bivalvia	Mytilus	arnoldi			Holotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes
I11154	11154 I	Bivalvia	Malletia	packardii			Holotype	Tertiary	Oligocene	2033-		Contra Costa County	California	United States	North America	yes
I11155	11155 I	Bivalvia	Macrocallista	weaveri			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11158	11158 I	Gastropoda	Molopophorus	biplicatus			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11161	11161 I	Gastropoda	Pisiporopissolax	merceri			Hypotype	Tertiary	Oligocene	2033-		Contra Costa County	California	United States	North America	yes
I11163	11163 I	Bivalvia	Yoldia	cooperi	tenuissima		Paratype	Tertiary	Oligocene	2754-		Contra Costa County	California	United States	North America	yes
I11165	11165 I	Bivalvia	Cardium	kirkensis			Holotype	Tertiary	Oligocene	2033-		Contra Costa County	California	United States	North America	yes
I11167	11167 I	Bivalvia	Leda	ramonensis			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11168	11168 I	Bivalvia	Thracia	condoni			Hypotype	Tertiary	Oligocene	517-		Contra Costa County	California	United States	North America	yes
I11170	11170 I	Bivalvia	Yoldia	cooperi	tenuissima		Paratype	Tertiary	Oligocene	1309-		Contra Costa County	California	United States	North America	yes
I11171	11171 I	Bivalvia	Diplodonta	californica			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11172	11172 I	Bivalvia	Arca	mediaimpressa			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11173	11173 I	Bivalvia	Dosinia	mathewsonii			Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11174	11174 I	Bivalvia	Arca	mediaimpressa			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11175	11175 I	Bivalvia	Halonanus	horni	elus		Hypotype	Tertiary	Paleocene	3579-		Contra Costa County	California	United States	North America	yes
I11178	11178 I	Bivalvia	Chione	cryptolineata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11179	11179 I	Bivalvia	Chione	cryptolineata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11180	11180 I	Bivalvia	Chione	cryptolineata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11181	11181 I	Bivalvia	Chione	mediostriata			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11182	11182 I	Bivalvia	Chione	mediostriata			Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11183	11183 I	Bivalvia	Glycymeris	tenuimbricata			Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
I11184	11184 I	Bivalvia	Nucula	bilida			Holotype	Tertiary	Oligocene	331-						

11198	11198 I	Bivalvia	Cardium	dickersoni	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11199	11199 I	Bivalvia	Acila	muta	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11200	11200 I	Bivalvia	Acila	muta	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11202	11202 I	Bivalvia	Pecten	alternilineatus	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11203	11203 I	Bivalvia	Pecten	alternilineatus	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11204	11204 I	Bivalvia	Anomia	inconspicua	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11205	11205 I	Bivalvia	Anomia	inconspicua	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11206	11206 I	Bivalvia	Leda	elongorostata	Holotype	Tertiary	Oligocene	2755-	Contra Costa County	California	United States	North America	yes
11207	11207 I	Bivalvia	Cardium	dickersoni	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11209	11209 I	Gastropoda	Cardium	mathewsoni	Hypotype	Tertiary	Eocene	1173-	Contra Costa County	California	United States	North America	yes
11210	11210 I	Gastropoda	Bursa	mathewsoni	Hypotype	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes
11212	11212 I	Gastropoda	Natica	recluziana	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11213	11213 I	Maxillopoda	Balanus	sp. A	Hypotype	Tertiary	Oligocene	1162-	Contra Costa County	California	United States	North America	yes
11214	11214 I	Gastropoda	Searlesia	dalli	Paratype	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes
11215	11215 I	Gastropoda	Searlesia	dalli	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes	
11216	11216 I	Maxillopoda	Balanus	sp. B	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11218	11218 I	Gastropoda	Cylichna	ramonenis	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11221	11221 I	Gastropoda	Columbella	tenuilinata	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11222	11222 I	Gastropoda	Chrysodomus?	pulcherrimus	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11225	11225 I	Gastropoda	Potamides	branneri	Paratype	Tertiary	Oligocene	52-	Contra Costa County	California	United States	North America	yes
11226	11226 I	Gastropoda	Fusinus	heconi	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11227	11227 I	Scaphopoda	Dentalium	radolinneata	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11228	11228 I	Gastropoda	Calliostoma	lawsoni	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11229	11229 I	Gastropoda	Potamides	branneri	Holotype	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes
11230	11230 I	Gastropoda	Potamides	branneri	Paratype	Tertiary	Oligocene	52-	Contra Costa County	California	United States	North America	yes
11231	11231 I	Gastropoda	Calliostoma	lawsoni	Tertiary	Oligocene	331-	Contra Costa County	California	United States	North America	yes	
11232	11232 I	Gastropoda	Turris	altuscolus	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11233	11233 I	Gastropoda	Perse	corrugatum	Holotype	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes
11234	11234 I	Gastropoda	Murex	sobrantensis	Holotype	Tertiary	Oligocene	1164-	Contra Costa County	California	United States	North America	yes
11235	11235 I	Gastropoda	Cancelaria	andersoni	Holotype	Tertiary	Oligocene	1309-	Contra Costa County	California	United States	North America	yes
11236	11236 I	Gastropoda	Cancelaria	ramonenis	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11237	11237 I	Gastropoda	Cancelaria	ramonenis	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11238	11238 I	Gastropoda	Cyathella	californica	Holotype	Tertiary	Oligocene	76-	Contra Costa County	California	United States	North America	yes
11239	11239 I	Agasoma	Agasoma	acuminatum	Hypotype	Tertiary	Oligocene	1310-	Contra Costa County	California	United States	North America	yes
11240	11240 I	Gastropoda	Epitonium	ventricosum	Holotype	Tertiary	Miocene	1165-	Contra Costa County	California	United States	North America	yes
11244	11244 I	Gastropoda	Mioleptina	sp.	Hypotype	Tertiary	Miocene	1165-	Contra Costa County	California	United States	North America	yes
11246	11246 I	Gastropoda	Thais	Thais	Holotype	Tertiary	Oligocene	1309-	Contra Costa County	California	United States	North America	yes
11248	11248 I	Gastropoda	Ancilla	fishii	Hypotype	Tertiary	Oligocene	1132-	Contra Costa County	California	United States	North America	yes
11249	11249 I	Gastropoda	Ancilla	fishii	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11250	11250 I	Gastropoda	Natica	gabbii	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11251	11251 I	Gastropoda	Olivella	quadriplicata	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11252	11252 I	Gastropoda	gabbii	gabbii	Holotype	Tertiary	Oligocene	1311-	Contra Costa County	California	United States	North America	yes
11253	11253 I	Gastropoda	Ancilla	fishii	Hypotype	Tertiary	Oligocene	52-	Contra Costa County	California	United States	North America	yes
11254	11254 I	Gastropoda	Actaeon	kirkrensis	Holotype	Tertiary	Oligocene	76-	Contra Costa County	California	United States	North America	yes
11255	11255 I	Gastropoda	Natica	gabbii	Paratype	Tertiary	Oligocene	1309-	Contra Costa County	California	United States	North America	yes
11257	11257 I	Gastropoda	Natica	ramonenis	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11258	11258 I	Cephalopoda	Aturia	sp.	Hypotype	Tertiary	Eocene	1173-	Contra Costa County	California	United States	North America	yes
11260	11260 I	Bivalvia	Nucula	radioloneata	Holotype	Tertiary	Eocene	1173-	Contra Costa County	California	United States	North America	yes
11261	11261 I	Scaphopoda	Dentalium	radioloneata	Holotype	Tertiary	Eocene	1173-	Contra Costa County	California	United States	North America	yes
11262	11262 I	Polychaeta	Serpula	rectiformis	Holotype	Tertiary	Oligocene	52-	Contra Costa County	California	United States	North America	yes
11263	11263 I	Gastropoda	Fusinus	lincolnensis	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11266	11266 I	Gastropoda	Agasoma	gravidum	Holotype	Tertiary	Oligocene	2754-	Contra Costa County	California	United States	North America	yes
11268	11268 I	Bivalvia	Saxidomus	portoricensis	Holotype	Tertiary	Oligocene	3051-	Contra Costa County	California	United States	North America	yes
11269	11269 I	Gastropoda	Turritella	portoricensis	Holotype	Tertiary	Oligocene	3051-	Contra Costa County	California	United States	North America	yes
11277	11277 I	Bivalvia	Thracia	condoni	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11278	11278 I	Bivalvia	Donax	sp. indet.	Hypotype	Tertiary	Oligocene	1314-	Contra Costa County	California	United States	North America	yes
11281	11281 I	Bivalvia	Pitar?	sp.	Hypotype	Tertiary	Miocene,Oligocene	78-	Contra Costa County	California	United States	North America	yes
11282	11282 I	Bivalvia	Mytilus	mathewsoni	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11284	11284 I	Gastropoda	Cancelaria?	sp. B	Hypotype	Tertiary	Oligocene	3051-	Contra Costa County	California	United States	North America	yes
11285	11285 I	Gastropoda	Turris	sp.	Hypotype	Tertiary	Oligocene	3051-	Contra Costa County	California	United States	North America	yes
11289	11289 I	Bivalvia	Pandora	acutirostrata	Paratype	Tertiary	Oligocene	1132-	Contra Costa County	California	United States	North America	yes
11322	11322 I	Anthozoa	Siderastrea	clarki	Holotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11327	11327 I	Echinoidea	Astrodrapsis	tumidus	Hypotype	Tertiary	Miocene	IP12082	Contra Costa County	California	United States	North America	yes
11329	11329 I	Echinoidea	Astrodrapsis	tumidus	Neotype	Tertiary	Miocene	IP12082	Contra Costa County	California	United States	North America	yes
11330	11330 I	Echinoidea	Spatangus	pachecoensis	Cotype	Tertiary	Eocene	428-	Contra Costa County	California	United States	North America	yes
11331	11331 I	Echinoidea	Spatangus	pachecoensis	Cotype	Tertiary	Eocene	428-	Contra Costa County	California	United States	North America	yes
11335	11335 I	Echinoidea	Astrodrapsis	brewerianus	Holotype	Tertiary	Miocene	1191-	Contra Costa County	California	United States	North America	yes
11337	11337 I	Echinoidea	Astrodrapsis	major	Cotype	Tertiary	Pliocene	1742-	Contra Costa County	California	United States	North America	yes
11341	11341 I	Echinoidea	Schizaster	lecontei	Hypotype	Tertiary	Eocene	IP12077	Contra Costa County	California	United States	North America	yes
11342	11342 I	Echinoidea	Schizaster	martinezensis	Hypotype	Tertiary	Pliocene	215-	Contra Costa County	California	United States	North America	yes
11349	11349 I	Echinoidea	Linthia?	californica	Holotype	Tertiary	Miocene	IP12078	Contra Costa County	California	United States	North America	yes
11352	11352 I	Echinoidea	Dendraster	oregonensis	Cotype	Tertiary	Pliocene	71-	Contra Costa County	California	United States	North America	yes
11368	11368 I	Echinoidea	Scutella	gabbii	Hypotype	Tertiary	Miocene	IP12082	Contra Costa County	California	United States	North America	yes
11369	11369 I	Echinoidea	Scutella	gabbii	Hypotype	Tertiary	Miocene	1282-	Contra Costa County	California	United States	North America	yes
11370	11370 I	Echinoidea	Scutella	gabbii	Plesiotype	Tertiary	Miocene	IP1219	Contra Costa County	California	United States	North America	yes
11371	11371 I	Echinoidea	Astrodrapsis	brewerianus	Hypotype	Tertiary	Miocene	IP12079	Contra Costa County	California	United States	North America	yes
11378	11378 I	Bivalvia	Pinna	barrowi	Paratype	Tertiary	Paleocene	1547-	Contra Costa County	California	United States	North America	yes
11387	11387 I	Echinoidea	Schizaster	diaboliensis	Holotype	Tertiary	Eocene	1427-	Contra Costa County	California	United States	North America	yes
11388	11388 I	Echinoidea	Schizaster	cordiformis	Holotype	Tertiary	Paleocene	1743-	Contra Costa County	California	United States	North America	yes
11391	11391 I	Echinoidea	Astrodrapsis	whitneyi	Hypotype	Tertiary	Miocene	505-	Contra Costa County	California	United States	North America	yes
11392	11392 I	Echinoidea	Scutella	gabbii	Hypotype	Tertiary	Miocene	IP12083	Contra Costa County	California	United States	North America	yes
11400	11400 I	Echinoidea	Cidaris	martinezensis	Hypotype	Tertiary	Eocene	IP12506	Contra Costa County	California	United States	North America	yes
11401	11401 I	Echinoidea	Cidaris	merriami	Hypotype	Tertiary	Paleocene	1592-	Contra Costa County	California	United States	North America	yes
11409	11409 I	Bivalvia	Arca	biloba	Hypotype	Tertiary	Paleocene	243-	Contra Costa County	California	United States	North America	yes
11410	11410 I	Bivalvia	Arca	biloba	Hypotype	Tertiary	Paleocene	243-	Contra Costa County	California	United States	North America	yes
11440	11440 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	1938-	Contra Costa County	California	United States	North America	yes
11441	11441 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	IP12042	Contra Costa County	California	United States	North America	yes
11442	11442 I	Bivalvia	Mulinia	pabloensis	Holotype	Tertiary	Miocene	1946-	Contra Costa County	California	United States	North America	yes
11447	11447 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	IP12042	Contra Costa County	California	United States	North America	yes
11448	11448 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Pliocene	504-	Contra Costa County	California	United States	North America	yes
11449	11449 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Pliocene	504-	Contra Costa County	California	United States	North America	yes
11451	11451 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11452	11452 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11453	11453 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11454	11454 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11455	11455 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11456	11456 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11457	11457 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	IP12043	Contra Costa County	California	United States	North America	yes
11458	11458 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11459	11459 I	Bivalvia	Mulinia	densata	Hypotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11465	11465 I	Bivalvia	Spisula	catilliformis	Hypotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11466	11466 I	Bivalvia	Spisula	catilliformis	Hypotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11469	11469 I	Bivalvia	Spisula	occidentalis	Hypotype	Tertiary	Miocene	1131-	Contra Costa County	California	United States	North America	yes
11470	11470 I	Bivalvia	Spisula	occidentalis	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11471	11471 I	Bivalvia	Spisula	occidentalis	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
11472	11472 I	Bivalvia	Spisula	abcessa	Hypotype	Tertiary	Miocene	1608-	Contra Costa County	California	United States	North America	yes
11473	11473 I	Bivalvia	Spisula	albaria	Paratype	Tertiary	Oligocene	1687-	Contra Costa County	California	United States	North America	yes
11474	11474 I	Bivalvia	Spisula	albaria	Paratype	Tertiary	Oligocene	1210-	Contra Costa County	California	United States	North America	yes
11482	11482 I	Bivalvia	Spisula	sebyensis	Syntype	Tertiary	Oligocene		Contra Costa County	California	United States	North America	yes

11483	11483 I	Bivalvia	Spisula	selbyensis		Syntype	Tertiary	Oligocene	-1352	Contra Costa County	California	United States	North America	yes
11498	11498 I	Bivalvia	Mactra	trampasensis		Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11499	11499 I	Bivalvia	Mactra	trampasensis		Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11500	11500 I	Bivalvia	Mactra	trampasensis		Syntype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11502	11502 I	Bivalvia	Dosinia	merriami	var. occidentalis	Holotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11503	11503 I	Bivalvia	Dosinia	merriami		Holotype	Tertiary	Miocene	IP12080	Contra Costa County	California	United States	North America	yes
11505	11505 I	Bivalvia	Dosinia	merriami		Paratype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11506	11506 I	Bivalvia	Dosinia	merriami		Paratype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11508	11508 I	Bivalvia	Amiantis	dalli		Cotype	Tertiary	Miocene	38-	Contra Costa County	California	United States	North America	yes
11509	11509 I	Bivalvia	Amiantis	dalli		Cotype	Tertiary	Miocene	38-	Contra Costa County	California	United States	North America	yes
11510	11510 I	Bivalvia	Amiantis	dalli		Cotype	Tertiary	Miocene	38-	Contra Costa County	California	United States	North America	yes
11511	11511 I	Bivalvia	Pitar	stalderi		Holotype	Tertiary	Miocene	1279-	Contra Costa County	California	United States	North America	yes
11512	11512 I	Bivalvia	Pitar	stalderi		Paratype	Tertiary	Miocene	1279-	Contra Costa County	California	United States	North America	yes
11513	11513 I	Bivalvia	Pitar	behri		Holotype	Tertiary	Miocene	1279-	Contra Costa County	California	United States	North America	yes
11514	11514 I	Bivalvia	Pitar	behri		Paratype	Tertiary	Miocene	1279-	Contra Costa County	California	United States	North America	yes
11515	11515 I	Bivalvia	Twela	gabbi		Holotype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
11516	11516 I	Bivalvia	Twela	gabbi		Paratype	Tertiary	Miocene	1949-	Contra Costa County	California	United States	North America	yes
11517	11517 I	Bivalvia	Arca	trilineata		Hypotype	Tertiary	Miocene	1945-	Contra Costa County	California	United States	North America	yes
11518	11518 I	Bivalvia	Glycymeris	coalingensis		Hypotype	Tertiary	Miocene	1954-	Contra Costa County	California	United States	North America	yes
11519	11519 I	Bivalvia	Glycymeris	coalingensis		Hypotype	Tertiary	Miocene	1232-	Contra Costa County	California	United States	North America	yes
11520	11520 I	Bivalvia	Glycymeris	septentrionalis		Hypotype	Tertiary	Miocene	1948-	Contra Costa County	California	United States	North America	yes
11521	11521 I	Bivalvia	Diplodonta	orbella		Hypotype	Tertiary	Miocene	1628-	Contra Costa County	California	United States	North America	yes
11523	11523 I	Bivalvia	Acila	conradi		Hypotype	Tertiary	Miocene	1613-	Contra Costa County	California	United States	North America	yes
11524	11524 I	Bivalvia	Cardium	quadrigenarium		Hypotype	Tertiary	Miocene	307-	Contra Costa County	California	United States	North America	yes
11525	11525 I	Bivalvia	Sanguinolaria	nuttalli		Hypotype	Tertiary	Miocene	749-	Contra Costa County	California	United States	North America	yes
11526	11526 I	Bivalvia	Sanguinolaria	alata		Hypotype	Tertiary	Miocene	IP12081	Contra Costa County	California	United States	North America	yes
11527	11527 I	Bivalvia	Sanguinolaria	sp.		Hypotype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
11528	11528 I	Bivalvia	Sanguinolaria	alata		Hypotype	Tertiary	Miocene	351-	Contra Costa County	California	United States	North America	yes
11529	11529 I	Bivalvia	Spisula	albaria		Hypotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11530	11530 I	Bivalvia	Siliqua	lucida		Hypotype	Tertiary	Miocene	102-	Contra Costa County	California	United States	North America	yes
11531	11531 I	Bivalvia	Tellina	diabloensis		Holotype	Tertiary	Miocene	1478-	Contra Costa County	California	United States	North America	yes
11532	11532 I	Bivalvia	Tellina	hanniballi		Holotype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
11533	11533 I	Bivalvia	Tellina	englishi		Holotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11534	11534 I	Bivalvia	Tellina	salmonae		Hypotype	Tertiary	Miocene	IP12084	Contra Costa County	California	United States	North America	yes
11535	11535 I	Bivalvia	Tellina	salmonae		Hypotype	Tertiary	Miocene	IP12084	Contra Costa County	California	United States	North America	yes
11537	11537 I	Bivalvia	Twela	diabloensis		Cotype	Tertiary	Miocene	1628-	Contra Costa County	California	United States	North America	yes
11538	11538 I	Bivalvia	Twela	diabloensis	var. angulatum	Holotype	Tertiary	Miocene	1608-	Contra Costa County	California	United States	North America	yes
11540	11540 I	Bivalvia	Spisula	catilliformis		Hypotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11542	11542 I	Bivalvia	Saxidomus	nuttalli		Hypotype	Tertiary	Miocene	102-	Contra Costa County	California	United States	North America	yes
11543	11543 I	Bivalvia	Saxidomus	nuttalli		Hypotype	Tertiary	Miocene	771-	Contra Costa County	California	United States	North America	yes
11544	11544 I	Bivalvia	Mytilus	merriami		Holotype	Tertiary	Miocene	118-	Contra Costa County	California	United States	North America	yes
11545	11545 I	Bivalvia	Mytilus	trampasensis		Cotype	Tertiary	Miocene	402-	Contra Costa County	California	United States	North America	yes
11547	11547 I	Bivalvia	Mytilus	perrini		Paratype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
11548	11548 I	Bivalvia	Mytilus	perrini		Holotype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
11549	11549 I	Bivalvia	Modiolus	directus		Hypotype	Tertiary	Miocene	752-	Contra Costa County	California	United States	North America	yes
11551	11551 I	Bivalvia	Mya	ovalis		Hypotype	Tertiary	Miocene	752-	Contra Costa County	California	United States	North America	yes
11552	11552 I	Bivalvia	Mya	ovalis		Hypotype	Tertiary	Miocene	1890-	Contra Costa County	California	United States	North America	yes
11553	11553 I	Bivalvia	Mya	clacksoni		Paratype	Tertiary	Miocene	197-	Contra Costa County	California	United States	North America	yes
11554	11554 I	Bivalvia	Mya	clacksoni		Holotype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
11556	11556 I	Bivalvia	Mactra	trampasensis		Hypotype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11558	11558 I	Bivalvia	Macoma	diabloensis		Paratype	Tertiary	Miocene	1513-	Contra Costa County	California	United States	North America	yes
11559	11559 I	Bivalvia	Macoma	diabloensis		Syntype	Tertiary	Miocene	763-	Contra Costa County	California	United States	North America	yes
11560	11560 I	Bivalvia	Macoma	nasuta		Syntype	Tertiary	Miocene	763-	Contra Costa County	California	United States	North America	yes
11561	11561 I	Bivalvia	Macoma	nasuta		Hypotype	Tertiary	Miocene	1937-	Contra Costa County	California	United States	North America	yes
11562	11562 I	Bivalvia	Macoma	pabloensis		Paratype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
11563	11563 I	Bivalvia	Macoma	pabloensis		Holotype	Tertiary	Miocene	1631-	Contra Costa County	California	United States	North America	yes
11564	11564 I	Bivalvia	Solen	perrini		Holotype	Tertiary	Miocene	1478-	Contra Costa County	California	United States	North America	yes
11565	11565 I	Bivalvia	Ostrea	titan		Hypotype	Tertiary	Miocene	1477-	Contra Costa County	California	United States	North America	yes
11567	11567 I	Bivalvia	Mytilus	pabloensis		Hypotype	Tertiary	Miocene	1608-	Contra Costa County	California	United States	North America	yes
11568	11568 I	Bivalvia	Metis	alta		Hypotype	Tertiary	Miocene	IP12917	Contra Costa County	California	United States	North America	yes
11570	11570 I	Bivalvia	Venus	martini		Holotype	Tertiary	Miocene	741-	Contra Costa County	California	United States	North America	yes
11572	11572 I	Bivalvia	Phacoides	tenuisculpta		Hypotype	Tertiary	Miocene	1290-	Contra Costa County	California	United States	North America	yes
11573	11573 I	Bivalvia	Pecten	pabloensis		Hypotype	Tertiary	Miocene	1632-	Contra Costa County	California	United States	North America	yes
11574	11574 I	Bivalvia	Pecten	pabloensis		Hypotype	Tertiary	Miocene	1632-	Contra Costa County	California	United States	North America	yes
11575	11575 I	Bivalvia	Pecten	pabloensis		Cotype	Tertiary	Miocene	407-	Contra Costa County	California	United States	North America	yes
11576	11576 I	Bivalvia	Pecten	weaveri		Cotype	Tertiary	Miocene	407-	Contra Costa County	California	United States	North America	yes
11577	11577 I	Bivalvia	Pecten	crassicardo		Hypotype	Tertiary	Miocene	102-	Contra Costa County	California	United States	North America	yes
11578	11578 I	Bivalvia	Pecten	billineatus		Cotype	Tertiary	Miocene	1632-	Contra Costa County	California	United States	North America	yes
11579	11579 I	Bivalvia	Pecten	billineatus		Cotype	Tertiary	Miocene	1632-	Contra Costa County	California	United States	North America	yes
11580	11580 I	Bivalvia	Pecten	holyeri		Holotype	Tertiary	Miocene	1632-	Contra Costa County	California	United States	North America	yes
11581	11581 I	Bivalvia	Pecten	raymondi		Cotype	Tertiary	Miocene	1492-	Contra Costa County	California	United States	North America	yes
11582	11582 I	Bivalvia	Pecten	raymondi		Cotype	Tertiary	Miocene	1445-	Contra Costa County	California	United States	North America	yes
11588	11588 I	Gastropoda	Trochophora	lawsoni		Paratype	Tertiary	Miocene	1479-	Contra Costa County	California	United States	North America	yes
11589	11589 I	Gastropoda	Trochophora	lawsoni		Holotype	Tertiary	Miocene	1479-	Contra Costa County	California	United States	North America	yes
11592	11592 I	Gastropoda	Natica	pabloensis		Holotype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11593	11593 I	Gastropoda	Natica	pabloensis		Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
11594	11594 I	Gastropoda	Natica	arnoldi		Holotype	Tertiary	Miocene	505-	Contra Costa County	California	United States	North America	yes
11595	11595 I	Gastropoda	Natica	diabloensis		Holotype	Tertiary	Miocene	1947-	Contra Costa County	California	United States	North America	yes
11596	11596 I	Gastropoda	Calyptaea	martini		Holotype	Tertiary	Miocene	1945-	Contra Costa County	California	United States	North America	yes
11597	11597 I	Gastropoda	Calyptaea	diabloensis		Holotype	Tertiary	Miocene	IP12918	Contra Costa County	California	United States	North America	yes
11598	11598 I	Gastropoda	Calyptaea	pabloensis		Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
11599	11599 I	Gastropoda	Cancellaria	pabloensis		Holotype	Tertiary	Miocene	481-	Contra Costa County	California	United States	North America	yes
11600	11600 I	Gastropoda	Murex	selbyensis		Holotype	Tertiary	Miocene	525-	Contra Costa County	California	United States	North America	yes
11601	11601 I	Gastropoda	Murex	selbyensis		Paratype	Tertiary	Miocene	410-	Contra Costa County	California	United States	North America	yes
11602	11602 I	Gastropoda	Murex	selbyensis		Paratype	Tertiary	Miocene	406-	Contra Costa County	California	United States	North America	yes
11603	11603 I	Gastropoda	Murex	packardii		Paratype	Tertiary	Miocene	409-	Contra Costa County	California	United States	North America	yes
11604	11604 I	Gastropoda	Murex	packardii		Holotype	Tertiary	Miocene	409-	Contra Costa County	California	United States	North America	yes
11605	11605 I	Gastropoda	Murex	dalli		Holotype	Tertiary	Miocene	1620-	Contra Costa County	California	United States	North America	yes
11606	11606 I	Gastropoda	Murex	dalli		Paratype	Tertiary	Miocene	521-	Contra Costa County	California	United States	North America	yes
11607	11607 I	Gastropoda	Cerithiopsis	bolingerensis		Holotype	Tertiary	Miocene	1182-	Contra Costa County	California	United States	North America	yes
11608	11608 I	Gastropoda	Cerithiopsis	turneri		Holotype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11609	11609 I	Gastropoda	Littorina	remondii		Paratype	Tertiary	Miocene	100-	Contra Costa County	California	United States	North America	yes
11610	11610 I	Gastropoda	Littorina	trampasensis		Holotype	Tertiary	Miocene	1251-	Contra Costa County	California	United States	North America	yes
11611	11611 I	Gastropoda	Bursa	filosa		Holotype	Tertiary	Miocene	1521-	Contra Costa County	California	United States	North America	yes
11612	11612 I	Gastropoda	Calyptaea	nashi		Holotype	Tertiary	Miocene	1948-	Contra Costa County	California	United States	North America	yes
11613	11613 I	Gastropoda	Tegula	dawvillensis		Holotype	Tertiary	Miocene	323-	Contra Costa County	California	United States	North America	yes
11614	11614 I	Gastropoda	Tegula	dawvillensis		Holotype	Tertiary	Miocene	323-	Contra Costa County	California	United States	North America	yes
11615	11615 I	Gastropoda	Columbella	holkerensis		Cotype	Tertiary	Miocene	1890-	Contra Costa County	California	United States	North America	yes
11616	11616 I	Gastropoda	Leptothyra	dawvillensis		Paratype	Tertiary	Miocene	323-	Contra Costa County	California	United States	North America	yes
11617	11617 I	Gastropoda	Leptothyra	dawvillensis		Holotype	Tertiary	Miocene	323-	Contra Costa County	California	United States	North America	yes
11619	11619 I	Gastropoda	Bittium	trampasensis		Syntype	Tertiary	Miocene	118-	Contra Costa County	California	United States	North America	yes
11620	11620 I	Gastropoda	Bittium	trampasensis		Syntype	Tertiary	Miocene	118-	Contra Costa County	California	United States	North America	yes
11621	11621 I	Gastropoda	sp. A	pabloensis		Hypotype	Tertiary	Miocene	1380-	Contra Costa County	California	United States	North America	yes
11622	11622 I	Gastropoda	Bittium?	pabloensis		Holotype	Tertiary	Miocene	1618-	Contra Costa County	California	United States	North America	yes
11624	11624 I	Gastropoda	Astrarium	raymondi		Paratype	Tertiary	Miocene	1192-	Contra Costa County	California	United States	North America	yes
11625	11625 I	Gastropoda	Trochophora	gracilis	var. pabloensis	Syntype	Tertiary	Miocene	409-	Contra Costa County	California	United States	North America	yes
11626	11626 I	Gastropoda	Trochophora	gracilis	var. pabloensis									

11629	11629 I	Gastropoda	Trophon	dickersoni		Holotype	Tertiary	Miocene	410-		Contra Costa County	California	United States	North America	yes
11630	11630 I	Gastropoda	Trophon	dickersoni		Paratype	Tertiary	Miocene	410-		Contra Costa County	California	United States	North America	yes
11631	11631 I	Gastropoda	Chrysodomus	diaboloensis		Holotype	Tertiary	Miocene	263-		Contra Costa County	California	United States	North America	yes
11632	11632 I	Gastropoda	Chrysodomus	buwaldi		Holotype	Tertiary	Miocene	1263-		Contra Costa County	California	United States	North America	yes
11634	11634 I	Gastropoda	Chrysodomus	imperialis		Hypotype	Tertiary	Miocene	IP12972		Contra Costa County	California	United States	North America	yes
11635	11635 I	Gastropoda	Chrysodomus	clerboensis		Holotype	Tertiary	Miocene	409-		Contra Costa County	California	United States	North America	yes
11636	11636 I	Gastropoda	Chrysodomus	pabloensis		Holotype	Tertiary	Miocene	409-		Contra Costa County	California	United States	North America	yes
11637	11637 I	Gastropoda	Nassa	pabloensis		Paratype	Tertiary	Miocene	1947-		Contra Costa County	California	United States	North America	yes
11638	11638 I	Gastropoda	Nassa	pabloensis		Holotype	Tertiary	Miocene	1948-		Contra Costa County	California	United States	North America	yes
11639	11639 I	Gastropoda	Calliostoma	bicarinatum		Paratype	Tertiary	Miocene	1182-		Contra Costa County	California	United States	North America	yes
11640	11640 I	Gastropoda	Calliostoma	bicarinatum		Holotype	Tertiary	Miocene	1182-		Contra Costa County	California	United States	North America	yes
11641	11641 I	Gastropoda	Calliostoma	splendens	var. diaboloensis	Holotype	Tertiary	Miocene	350-		Contra Costa County	California	United States	North America	yes
11642	11642 I	Gastropoda	Thais	lima		Hypotype	Tertiary	Miocene	1642-		Contra Costa County	California	United States	North America	yes
11643	11643 I	Gastropoda	Siphonalia	davilleensis		Holotype	Tertiary	Eocene	723-		Contra Costa County	California	United States	North America	yes
11644	11644 I	Gastropoda	Crepidula	pabloensis		Crepidula	Tertiary	Miocene	1942-		Contra Costa County	California	United States	North America	yes
11645	11645 I	Gastropoda	Crepidula	pabloensis		Paratype	Tertiary	Miocene	313-		Contra Costa County	California	United States	North America	yes
11646	11646 I	Gastropoda	Crepidula	pabloensis		Paratype	Tertiary	Miocene	IP12919		Contra Costa County	California	United States	North America	yes
11647	11647 I	Gastropoda	Crepidula	pabloensis		Holotype	Tertiary	Miocene	313-		Contra Costa County	California	United States	North America	yes
11648	11648 I	Gastropoda	Crepidula	aduna		Hypotype	Tertiary	Miocene	1948-		Contra Costa County	California	United States	North America	yes
11649	11649 I	Gastropoda	Littorina	pittsburgensis		Holotype	Tertiary	Miocene	1482-		Contra Costa County	California	United States	North America	yes
11650	11650 I	Gastropoda	Hemifusus	dall		Holotype	Tertiary	Miocene	1631-		Contra Costa County	California	United States	North America	yes
11651	11651 I	Gastropoda	Cerithium	rodeonsis		Holotype	Tertiary	Miocene	1617-		Contra Costa County	California	United States	North America	yes
11652	11652 I	Gastropoda	Cerithium	rodeonsis		Paratype	Tertiary	Miocene	1617-		Contra Costa County	California	United States	North America	yes
11653	11653 I	Gastropoda	Olivella	pedroana		Hypotype	Tertiary	Miocene	102-		Contra Costa County	California	United States	North America	yes
11654	11654 I	Gastropoda	Turris	kirkensis		Holotype	Tertiary	Miocene	102-		Contra Costa County	California	United States	North America	yes
11655	11655 I	Gastropoda	Turris	kirkensis		Paratype	Tertiary	Miocene	102-		Contra Costa County	California	United States	North America	yes
11656	11656 I	Gastropoda	Turris	kirkensis		Paratype	Tertiary	Miocene	102-		Contra Costa County	California	United States	North America	yes
11657	11657 I	Bivalvia	Petricola	buwaldi		Holotype	Tertiary	Miocene	1942-		Contra Costa County	California	United States	North America	yes
11658	11658 I	Bivalvia	Tellina?	undulifera		Hypotype	Tertiary	Paleocene	1595-		Contra Costa County	California	United States	North America	yes
11659	11659 I	Bivalvia	Tellina?	undulifera		Hypotype	Tertiary	Paleocene	1595-		Contra Costa County	California	United States	North America	yes
11660	11660 I	Bivalvia	Tellina?	undulifera		Hypotype	Tertiary	Paleocene	1595-		Contra Costa County	California	United States	North America	yes
11663	11663 I	Bivalvia	Leda	milleri		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11668	11668 I	Bivalvia	Crassatella	stewartvilleensis		Holotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11669	11669 I	Bivalvia	Crassatellites	claytonensis		Holotype	Tertiary	Paleocene	1559-		Contra Costa County	California	United States	North America	yes
11670	11670 I	Bivalvia	Crassatellites	claytonensis		Paratype	Tertiary	Paleocene	1547-		Contra Costa County	California	United States	North America	yes
11671	11671 I	Bivalvia	Cucullaea	mathewsoni		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11672	11672 I	Bivalvia	Cuspidaria	haseibai		Holotype	Tertiary	Paleocene	1547-		Contra Costa County	California	United States	North America	yes
11676	11676 I	Bivalvia	Lima	haseltinei		Holotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11681	11681 I	Bivalvia	Phacoides	diaboli		Holotype	Tertiary	Eocene	340-		Contra Costa County	California	United States	North America	yes
11682	11682 I	Bivalvia	Phacoides	muirensis		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11686	11686 I	Bivalvia	Modiolus	bakeri		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11694	11694 I	Echinoides	Schizaster	lecontei		Hypotype	Tertiary	Paleocene	1511-		Contra Costa County	California	United States	North America	yes
11695	11695 I	Gastropoda	Natica	sp.		Hypotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11696	11696 I	Gastropoda	Nerita	biangulata		Holotype	Tertiary	Miocene	155-		Contra Costa County	California	United States	North America	yes
11697	11697 I	Gastropoda	Nerita	sp.		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11698	11698 I	Gastropoda	Turris	louderbacki		Syntype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11699	11699 I	Gastropoda	Turris	louderbacki		Syntype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11702	11702 I	Gastropoda	Ammauropis	marlineensis		Paratype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11703	11703 I	Gastropoda	Ammauropis	marlineensis		Paratype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11704	11704 I	Gastropoda	Olivella	claytonensis		Holotype	Tertiary	Paleocene	1543-		Contra Costa County	California	United States	North America	yes
11705	11705 I	Echinoidea	Cidaris?	sp. C		Hypotype	Tertiary	Paleocene	1592-		Contra Costa County	California	United States	North America	yes
11706	11706 I	Gastropoda	Anchura	gabbi		Holotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11707	11707 I	Rhynchonellata	Argopecten	argospectonicus		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11712	11712 I	Rhynchonellata	Terebratulina	tejonensis		Plesiotype	Tertiary	Paleocene	1743-		Contra Costa County	California	United States	North America	yes
11713	11713 I	Bivalvia	Spisula?	weaveri		Paratype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11714	11714 I	Bivalvia	Spisula?	weaveri		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11717	11717 I	Bivalvia	Meretrix	sp.		Hypotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11720	11720 I	Bivalvia	Lima?	claytonensis		Cotype	Tertiary	Paleocene	1592-		Contra Costa County	California	United States	North America	yes
11721	11721 I	Bivalvia	Lima?	claytonensis		Cotype	Tertiary	Paleocene	1592-		Contra Costa County	California	United States	North America	yes
11722	11722 I	Bivalvia	Mytilus	cf. ascia		Hypotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11723	11723 I	Bivalvia	Meretrix	stantoni		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11724	11724 I	Bivalvia	Yoldia?	powersi		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11726	11726 I	Bivalvia	Crassatellites	unioides		Hypotype	Tertiary	Paleocene	1545-		Contra Costa County	California	United States	North America	yes
11727	11727 I	Bivalvia	Teredo	sp.		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11728	11728 I	Bivalvia	Perna	barrowsi		Holotype	Tertiary	Paleocene	1547-		Contra Costa County	California	United States	North America	yes
11729	11729 I	Echinoidea	Cidaris	sp. A		Cotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11730	11730 I	Gastropoda	Surcula	merriami		Holotype	Tertiary	Paleocene	1558-		Contra Costa County	California	United States	North America	yes
11731	11731 I	Gastropoda	Surcula	fairbanksi		Holotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11732	11732 I	Gastropoda	Neptunea	mucronatum		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11735	11735 I	Bivalvia	Cuspidaria	argospectonicus		Hypotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11737	11737 I	Gastropoda	Anchura	engishii		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11740	11740 I	Bivalvia	Meretrix	stantoni		Paratype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11743	11743 I	Gastropoda	Lunatia	hornii		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11744	11744 I	Gastropoda	Fissurella?	behri		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11796	11796 I	Bivalvia	Tapes?	quadrata		Hypotype	Tertiary	Paleocene	1815-		Contra Costa County	California	United States	North America	yes
11815	11815 I	Gastropoda	Gastropoda	howardi		Holotype	Tertiary	Eocene	476-		Contra Costa County	California	United States	North America	yes
11840	11840 I	Cephalopoda	Aturia	dickersoni		Holotype	Tertiary	Eocene	150-		Contra Costa County	California	United States	North America	yes
11841	11841 I	Cephalopoda	Eutrophoceras	stephensoni		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11842	11842 I	Cephalopoda	Herczoglossa	merriami		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11843	11843 I	Anthozoa	Trochocyathus	zitteli		Hypotype	Tertiary	Paleocene	1656-		Contra Costa County	California	United States	North America	yes
11844	11844 I	Anthozoa	Trochocyathus	zitteli		Hypotype	Tertiary	Paleocene	1656-		Contra Costa County	California	United States	North America	yes
11846	11846 I	Anthozoa	Flabellum	remondianum		Hypotype	Tertiary	Paleocene	1743-		Contra Costa County	California	United States	North America	yes
11847	11847 I	Gastropoda	Fusus	mathewsoni		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11848	11848 I	Gastropoda	Fusus	occidentalis		Hypotype	Tertiary	Paleocene	501-		Contra Costa County	California	United States	North America	yes
11849	11849 I	Gastropoda	Fusus	flexuosus		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11853	11853 I	Echinoidea	Cidaris	sp. A		Hypotype	Tertiary	Paleocene	245-		Contra Costa County	California	United States	North America	yes
11856	11856 I	Gastropoda	Surcula	sp.		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11857	11857 I	Gastropoda	Surcula	sp.		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11859	11859 I	Gastropoda	Turbinella	crassitesta		Hypotype	Tertiary	Paleocene	1815-		Contra Costa County	California	United States	North America	yes
11860	11860 I	Gastropoda	Tritonium	marlineensis		Holotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
11862	11862 I	Gastropoda	Surcula	andersoni		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11863	11863 I	Gastropoda	Urosyca	caudata		Hypotype	Tertiary	Paleocene	1580-		Contra Costa County	California	United States	North America	yes
11864	11864 I	Gastropoda	Urosyca	caudata		Hypotype	Tertiary	Paleocene	1580-		Contra Costa County	California	United States	North America	yes
11865	11865 I	Gastropoda	Urosyca	robusta		Hypotype	Tertiary	Paleocene	1888-		Contra Costa County	California	United States	North America	yes
11866	11866 I	Gastropoda	Hemifusus?	waringi		Holotype	Tertiary	Eocene	IP12923		Contra Costa County	California	United States	North America	yes
11868	11868 I	Gastropoda	Siphonalia?	lineata		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11869	11869 I	Gastropoda	Ovula	martini		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11870	11870 I	Gastropoda	Perrisilax	tricarinatus		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11871	11871 I	Gastropoda	Perrisilax	tricarinatus		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11872	11872 I	Gastropoda	Ringiella	pinguis		Hypotype	Tertiary	Paleocene	1743-		Contra Costa County	California	United States	North America	yes
11874	11874 I	Gastropoda	Neptunea	cretacea		Hypotype	Tertiary	Paleocene	1746-		Contra Costa County	California	United States	North America	yes
11875	11875 I	Scaphopoda	Dentalium	cooperi		Hypotype	Tertiary	Paleocene	1543-		Contra Costa County	California	United States	North America	yes

11884	11884	Bivalvia	Arca	biloba		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11885	11885	Bivalvia	Arca	biloba		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11886	11886	Gastropoda	Unio	robusta		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11887	11887	Gastropoda	Ficopsis	angulatus		Holotype	Tertiary	Paleocene	337-		Contra Costa County	California	United States	North America	yes
11888	11888	Gastropoda	Architectonica	tuberculata		Holotype	Tertiary	Paleocene	541-		Contra Costa County	California	United States	North America	yes
11889	11889	Gastropoda	Discohelix	californicus		Holotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
11891	11891	Malacostraca	Plagiophilus	weaveri		Paratype	Tertiary	Paleocene	542-		Contra Costa County	California	United States	North America	yes
11892	11892	Bivalvia	Modiola	merriami		Holotype	Tertiary	Paleocene	333-		Contra Costa County	California	United States	North America	yes
11894	11894	Gastropoda	Turritella	conica		Holotype	Tertiary	Paleocene	532-		Contra Costa County	California	United States	North America	yes
11895	11895	Gastropoda	Ficus	rodeoensis		Holotype	Tertiary	Miocene	1176-		Contra Costa County	California	United States	North America	yes
11898	11898	Gastropoda	Trophosyon	stanfordense		Hypotype	Tertiary	Miocene	1243-		Contra Costa County	California	United States	North America	yes
11899	11899	Gastropoda	Ficus	pyriformis		Hypotype	Tertiary	Oligocene	1686-		Contra Costa County	California	United States	North America	yes
11900	11900	Gastropoda	Agasoma	sinuata		Hypotype	Tertiary	Miocene	1354-		Contra Costa County	California	United States	North America	yes
11902	11902	Gastropoda	Agasoma	barkerianum	var. clarki	Holotype	Tertiary	Oligocene		-1352	Contra Costa County	California	United States	North America	yes
11903	11903	Gastropoda	Agasoma	barkerianum	var. clarki	Hypotype	Tertiary	Oligocene		-1352	Contra Costa County	California	United States	North America	yes
11907	11907	Gastropoda	Agasoma	gravidum		Hypotype	Tertiary	Miocene	1203-		Contra Costa County	California	United States	North America	yes
11908	11908	Gastropoda	Agasoma	gravidum		Hypotype	Tertiary	Miocene	1203-		Contra Costa County	California	United States	North America	yes
11909	11909	Gastropoda	Trophosyon	stanfordense		Hypotype	Tertiary	Miocene	1243-		Contra Costa County	California	United States	North America	yes
11911	11911	Gastropoda	Chrysodomus?	martini		Hypotype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
11912	11912	Gastropoda	Chrysodomus?	martini		Hypotype	Tertiary	Paleocene	3157-		Contra Costa County	California	United States	North America	yes
11925	11925	Bivalvia	Arca	montereyana		Holotype	Tertiary	Miocene	IP12924		Contra Costa County	California	United States	North America	yes
11936	11936	Gastropoda	Turritella	clarki		Holotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes
11941	11941	Bivalvia	Solen	stantoni		Holotype	Tertiary	Paleocene	532-		Contra Costa County	California	United States	North America	yes
11942	11942	Gastropoda	Tritonium	pulchrum		Holotype	Tertiary	Paleocene	532-		Contra Costa County	California	United States	North America	yes
11943	11943	Gastropoda	Fusus	aequalateralis		Holotype	Tertiary	Paleocene	227-		Contra Costa County	California	United States	North America	yes
11953	11953	Bivalvia	Inoceramus	piochii		Holotype	Tertiary	Cretaceous	IP11371		Contra Costa County	California	United States	North America	yes
11954	11954	Bivalvia	Inoceramus	piochii		Hypotype	Tertiary	Cretaceous	IP11371		Contra Costa County	California	United States	North America	yes
11958	11958	Bivalvia	Pholadomya	nasuta		Paratype	Tertiary	Paleocene	IP12779		Contra Costa County	California	United States	North America	yes
11962	11962	Bivalvia	Mytilus	pauerculus		Holotype	Tertiary	Late Cretaceous	IP12780		Contra Costa County	California	United States	North America	yes
11968	11968	Gastropoda	Paosia	californica		Lectotype	Tertiary	Cretaceous	IP11347		Contra Costa County	California	United States	North America	yes
11972	11972	Gastropoda	Cyrtodonta	remondii		Paratype	Tertiary	Late Cretaceous	IP11347		Contra Costa County	California	United States	North America	yes
11974	11974	Gastropoda	Globiconcha	remondii		Holotype	Tertiary	Cretaceous	IP11344		Contra Costa County	California	United States	North America	yes
11976	11976	Gastropoda	Cinulia	pinguis		Paratype	Tertiary	Paleocene	IP11332		Contra Costa County	California	United States	North America	yes
11977	11977	Gastropoda	Cinulia	pinguis		Synotype	Tertiary	Paleocene	IP11332		Contra Costa County	California	United States	North America	yes
11978	11978	Gastropoda	Fusus	martinez		Holotype	Tertiary	Eocene	IP12927		Contra Costa County	California	United States	North America	yes
11979	11979	Gastropoda	Fusus	aratus		Holotype	Tertiary	Late Cretaceous	IP12783		Contra Costa County	California	United States	North America	yes
11981	11981	Bivalvia	Trigonia	gibboniana		Hypotype	Tertiary	Late Cretaceous	IP12928		Contra Costa County	California	United States	North America	yes
11983	11983	Bivalvia	Avicula	pellucida		Cotype	Tertiary	Cretaceous	IP11377		Contra Costa County	California	United States	North America	yes
11985	11985	Bivalvia	Crenella	concentrica		Holotype	Tertiary	Eocene	IP11391		Contra Costa County	California	United States	North America	yes
11990	11990	Bivalvia	Myia	polita		Holotype	Tertiary	Eocene	IP11388		Contra Costa County	California	United States	North America	yes
11991	11991	Bivalvia	Nesera	dolabraeformis		Holotype	Tertiary	Eocene	IP12785		Contra Costa County	California	United States	North America	yes
11992	11992	Bivalvia	Arctio	sinuata		Holotype	Tertiary	Eocene	IP11390		Contra Costa County	California	United States	North America	yes
11994	11994	Gastropoda	Clavella	sinuata		Holotype	Tertiary	Miocene	IP12932		Contra Costa County	California	United States	North America	yes
11995	11995	Gastropoda	Clavella	sinuata		Cotype	Tertiary	Miocene	IP12932		Contra Costa County	California	United States	North America	yes
11999	11999	Bivalvia	Chione	whitneyi		Holotype	Tertiary	Miocene	IP11400		Contra Costa County	California	United States	North America	yes
12018	12018	Anthozoa	Turbinolia	pustulanima		Holotype	Tertiary	Eocene	476-		Contra Costa County	California	United States	North America	0000 0000 0412 1083 yes
12019	12019	Anthozoa	Turbinolia	pustulanima		Paratype	Tertiary	Eocene	476-		Contra Costa County	California	United States	North America	yes
12021	12021	Anthozoa	Siderastrea	californica		Hypotype	Tertiary	Eocene	716-		Contra Costa County	California	United States	North America	yes
12022	12022	Anthozoa	Siderastrea	clarki		Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
12024	12024	Anthozoa	Thamnasteria	sinuata		Cotype	Tertiary	Eocene	476-		Contra Costa County	California	United States	North America	yes
12025	12025	Anthozoa	Thamnasteria	sinuata		Cotype	Tertiary	Eocene	476-		Contra Costa County	California	United States	North America	yes
12029	12029	Anthozoa	Flabellum	remondianum		Hypotype	Tertiary	Paleocene	1556-		Contra Costa County	California	United States	North America	yes
12030	12030	Gastropoda	Mytilus	californicus		Hypotype	Tertiary	Oligocene	IP12938		Contra Costa County	California	United States	North America	yes
12034	12034	Anthozoa	Flabellum	californicus		Hypotype	Tertiary	Eocene	IP12938		Contra Costa County	California	United States	North America	yes
12035	12035	Anthozoa	Flabellum	californicus		Hypotype	Tertiary	Eocene	IP12938		Contra Costa County	California	United States	North America	yes
12072	12072	Bivalvia	Tellina	oides		Holotype	Tertiary	Cretaceous	IP11351		Contra Costa County	California	United States	North America	0000 0000 0412 1080 yes
12085	12085	Bivalvia	Pecten	crassirado		Hypotype	Tertiary	Miocene	IP12161		Contra Costa County	California	United States	North America	yes
12087	12087	Echinoidea	Astrodapsis	whitneyi		Plesiotype	Tertiary	Miocene	IP224		Contra Costa County	California	United States	North America	yes
12107	12107	Cephalopoda	Napitopsis	whitneyi		Hypotype	Tertiary	Eocene	IP12788		Contra Costa County	California	United States	North America	yes
12111	12111	Cephalopoda	Parapachydiscus	sp.		Holotype	Tertiary	Late Cretaceous	IP12957		Contra Costa County	California	United States	North America	0000 0000 0412 0485 yes
12116	12116	Cephalopoda	Baculites	chicoensis		Hypotype	Tertiary	Late Cretaceous	IP12789		Contra Costa County	California	United States	North America	0000 0000 0412 1090 yes
12145	12145		Xenohelix?	clarki		Paratype	Tertiary	Miocene	IP12994		Contra Costa County	California	United States	North America	yes
12171	12171	Bivalvia	Trigonia	leana		Holotype	Tertiary	Late Cretaceous	IP12961		Contra Costa County	California	United States	North America	yes
12172	12172	Bivalvia	Mytilus	pauerculus	var. lignitica	Paratype	Tertiary	Late Cretaceous	IP12780		Contra Costa County	California	United States	North America	yes
12174	12174	Bivalvia	Arctio	sinuata		Holotype	Tertiary	Paleocene	IP12780		Contra Costa County	California	United States	North America	yes
12176	12176	Bivalvia	Mytilus	pauerculus		Paratype	Tertiary	Late Cretaceous	IP12780		Contra Costa County	California	United States	North America	yes
12177	12177	Bivalvia	Anatina	tryoniana		Paratype	Tertiary	Cretaceous	IP11237		Contra Costa County	California	United States	North America	yes
12191	12191	Bivalvia	Meretrix	nitida		Paratype	Tertiary	Cretaceous	IP12792		Contra Costa County	California	United States	North America	yes
12192	12192	Bivalvia	Meretrix	nitida		Paratype	Tertiary	Cretaceous	IP12792		Contra Costa County	California	United States	North America	yes
12203	12203	Bivalvia	Tellina	hoffmanniana		Paratype	Tertiary	Cretaceous	IP11357		Contra Costa County	California	United States	North America	yes
12204	12204	Bivalvia	Tellina	hoffmanniana		Paratype	Tertiary	Cretaceous	IP11357		Contra Costa County	California	United States	North America	yes
12206	12206	Bivalvia	Tellina	hoffmanniana		Paratype	Tertiary	Cretaceous	IP11357		Contra Costa County	California	United States	North America	yes
12210	12210	Gastropoda	Turritella	uvasana	aedificata	Paratype	Tertiary	Oligocene	125-		Contra Costa County	California	United States	North America	yes
12212	12212	Gastropoda	Odostomia	cllessini		Topotype	Tertiary	Miocene	516-		Contra Costa County	California	United States	North America	yes
12213	12213	Gastropoda	Odostomia	cllessini		Topotype	Tertiary	Miocene	516-		Contra Costa County	California	United States	North America	yes
12214	12214	Gastropoda	Odostomia	cllessini		Topotype	Tertiary	Miocene	516-		Contra Costa County	California	United States	North America	yes
12217	12217	Bivalvia	?Mytilus	polita		Paratype	Tertiary	Eocene	IP11388		Contra Costa County	California	United States	North America	yes
12226	12226	Gastropoda	Cylindrites	brevis		Paratype	Tertiary	Late Cretaceous	IP12963		Contra Costa County	California	United States	North America	yes
12234	12234	Gastropoda	Pugnellus	hamulus		Paratype	Tertiary	Cretaceous	IP11345		Contra Costa County	California	United States	North America	yes
12248	12248	Gastropoda	Aetoneina	californica		Paratype	Tertiary	Cretaceous	IP11347		Contra Costa County	California	United States	North America	yes
12256	12256	Anthozoa	Trochophyllia	sinuata		Hypotype	Tertiary	Paleocene	IP12965		Contra Costa County	California	United States	North America	yes
12257	12257	Anthozoa	Flabellum	remondianum		Holotype	Tertiary	Paleocene	IP12966		Contra Costa County	California	United States	North America	yes
12325	12325	Bivalvia	Chione	diaboloensis		Holotype	Tertiary	Miocene	1492-		Contra Costa County	California	United States	North America	yes
12362	12362	Bivalvia	Leda	furlongi		Holotype	Tertiary	Miocene	15-		Contra Costa County	California	United States	North America	yes
12363	12363	Bivalvia	Leda	furlongi		Paratype	Tertiary	Miocene	15-		Contra Costa County	California	United States	North America	yes
12366	12366	Bivalvia	Pecten	tolmani		Hypotype	Tertiary	Miocene	3581-		Contra Costa County	California	United States	North America	yes
12367	12367	Bivalvia	Pecten	tolmani		Hypotype	Tertiary	Miocene	3581-		Contra Costa County	California	United States	North America	yes
12370	12370	Bivalvia	Pecten	andersoni	gonicostus	Holotype	Tertiary	Miocene	1176-		Contra Costa County	California	United States	North America	yes
12371	12371	Bivalvia	Pecten	raymondi		Cotype	Tertiary	Miocene	1942-		Contra Costa County	California	United States	North America	yes
12372	12372	Bivalvia	Modiolus	gabbi	subconvexus	Holotype	Tertiary	Miocene	793-		Contra Costa County	California	United States	North America	yes
12374	12374	Bivalvia	Cyrena	diaboloensis		Holotype	Tertiary	Miocene	1949-		Contra Costa County	California	United States	North America	yes
12376	12376	Bivalvia	Venus	brioniana		Hypotype	Tertiary	Miocene	207-		Contra Costa County	California	United States	North America	yes
12377	12377	Bivalvia	Venus	brioniana		Holotype	Tertiary	Miocene	177-		Contra Costa County	California	United States	North America	yes
12378	12378	Bivalvia	Twella	merriami		Holotype	Tertiary	Miocene	3582-		Contra Costa County	California	United States	North America	yes
12379	12379	Bivalvia	Antigona	willisi		Holotype	Tertiary	Miocene	146-		Contra Costa County	California	United States	North America	yes
12380	12380	Bivalvia	Spisula	falcata	var. brioniana	Holotype	Tertiary	Miocene	3522-		Contra Costa County	California	United States	North America	yes
12385	12385	Gastropoda	Calliostoma	obliquistriata		Holotype	Tertiary	Miocene	3575-		Contra Costa County	California	United States	North America	yes
12386	12386	Gastropoda	Calliostoma	trigenerium		Holotype	Tertiary	Miocene	3575-		Contra Costa County	California	United States	North America	yes
12387	12387	Gastropoda	Nassa	whitneyi		Holotype	Tertiary	Miocene	3524-		Contra Costa County	California	United States	North America	yes
12388	12388	Gastropoda	Nassa	whitneyi		Paratype	Tertiary	Miocene	1176-		Contra Costa County	California	United States	North America	yes
12389	12389	Gastropoda	Siphonalia	rodeoensis		Holotype	Tertiary	Miocene	1177-		Contra Costa County	California	United States	North America	yes
12390	12390	Gastropoda	Trochoph	gracilis	var. clarki										

12483	12483 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Paleocene	3159-	Contra Costa County	California	United States	North America	yes
12493	12493 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Eocene	475-	Contra Costa County	California	United States	North America	yes
12504	12504 i	Bivalvia	Atrina	varia	Paratype	Tertiary	Eocene	IP11390	Contra Costa County	California	United States	North America	yes
12507	12507 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
12510	12510 i	Bivalvia	Crassatella	grandis	Paratype	Tertiary	Eocene	IP12795	Contra Costa County	California	United States	North America	yes
12516	12516 i	Bivalvia	Meekia	navis	Paratype	Tertiary	Cretaceous	IP11380	Contra Costa County	California	United States	North America	yes
12531	12531 i	Anthozoa	Halmesiastraea	petrosa	Hypotype	Tertiary	Eocene	IP12974	Contra Costa County	California	United States	North America	yes
12532	12532 i	Anthozoa	Halmesiastraea	petrosa	Hypotype	Tertiary	Eocene	IP12974	Contra Costa County	California	United States	North America	yes
12533	12533 i	Anthozoa	Halmesiastraea	petrosa	Hypotype	Tertiary	Eocene	IP12974	Contra Costa County	California	United States	North America	yes
12536	12536 i	Anthozoa	Halmesiastraea	petrosa	Hypotype	Tertiary	Eocene	IP12974	Contra Costa County	California	United States	North America	yes
12537	12537 i	Anthozoa	Halmesiastraea	petrosa	Hypotype	Tertiary	Eocene	IP12974	Contra Costa County	California	United States	North America	yes
12547	12547 i	Asterioidea	Asterias	remondii	Hypotype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
12574	12574 i	Echinoidea	Astrodapsis	whitneyi	Holotype	Tertiary	Miocene	IP11399	Contra Costa County	California	United States	North America	yes
12575	12575 i	Echinoidea	Echinarchnius	brewerianus	Paratype	Tertiary	Miocene	IP12801	Contra Costa County	California	United States	North America	yes
12576	12576 i	Echinoidea	Echinarchnius	brewerianus	Paratype	Tertiary	Miocene	IP12801	Contra Costa County	California	United States	North America	yes
12577	12577 i	Echinoidea	Echinarchnius	brewerianus	Paratype	Tertiary	Miocene	IP12801	Contra Costa County	California	United States	North America	yes
14117	14117 i	Bivalvia	Cymbophora	ashburneri	Hypotype	Tertiary	Late Cretaceous	2609-	Contra Costa County	California	United States	North America	yes
14187	14187 i	Bivalvia	Cymbophora	ashburneri	See Below	Cretaceous	Late Cretaceous	IP12134	Contra Costa County	California	United States	North America	yes
14411	14411 i	Gastropoda	Polinices	gesteri	Hypotype	Tertiary	Paleocene	3577-	Contra Costa County	California	United States	North America	yes
14678	14678 i	Gastropoda	Aequineia	californica	Synotype	Tertiary	Miocene	753-	Contra Costa County	California	United States	North America	yes
14752	14752 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14753	14753 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14755	14755 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14756	14756 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14757	14757 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14758	14758 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14759	14759 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14772	14772 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14773	14773 i	Bivalvia	Plicatula	varia	Paratype	Tertiary	Cretaceous	IP11377	Contra Costa County	California	United States	North America	yes
14835	14835 i	Bivalvia	Clinocardium	praelabundum	Paratype	Tertiary	Miocene	1262-	Contra Costa County	California	United States	North America	yes
14837	14837 i	Bivalvia	Clinocardium	pristinum	Paratype	Tertiary	Miocene	1936-	Contra Costa County	California	United States	North America	yes
14838	14838 i	Bivalvia	Clinocardium	pristinum	Paratype	Tertiary	Miocene	1943-	Contra Costa County	California	United States	North America	yes
14855	14855 i	Cephalopoda	Ammonites	newberryanus	Hypotype	Tertiary	Cretaceous	IP12541	Contra Costa County	California	United States	North America	yes
14858	14858 i	Cephalopoda	Aturia	mathewsonii	Paratype	Tertiary	Paleocene	IP12909	Contra Costa County	California	United States	North America	yes
14877	14877 i	Gastropoda	Exilia	sp. A	Hypotype	Tertiary	Paleocene	A1435	Contra Costa County	California	United States	North America	yes
14878	14878 i	Gastropoda	Exilia	sp. A	Hypotype	Tertiary	Paleocene	A1435	Contra Costa County	California	United States	North America	yes
14899	14899 i	Erythraea	umbonata	variegata	Paratype	Tertiary	Miocene	IP11361	Contra Costa County	California	United States	North America	yes
14901	14901 i	Bivalvia	Venus	tetrahedra	Paratype	Tertiary	Paleocene	IP11384	Contra Costa County	California	United States	North America	yes
14911	14911 i	Gastropoda	Pugnellus	hamulus	Paratype	Tertiary	Cretaceous	IP11345	Contra Costa County	California	United States	North America	yes
14926	14926 i	Bivalvia	Mactra	ashburneri	Paratype	Tertiary	Cretaceous	IP11315	Contra Costa County	California	United States	North America	yes
14934	14934 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
14935	14935 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
14936	14936 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
14937	14937 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
14947	14947 i	Cephalopoda	Aturia	mathewsonii	Paratype	Tertiary	Paleocene	IP12808	Contra Costa County	California	United States	North America	yes
14948	14948 i	Cephalopoda	Nautilus	sp.	Hypotype	Tertiary	Eocene	IP12788	Contra Costa County	California	United States	North America	yes
14952	14952 i	Cephalopoda	Sluteria	diaboliensis	Paratype	Tertiary	Cretaceous	IP12133	Contra Costa County	California	United States	North America	yes
15001	15001 i	Bivalvia	Mya	dickersoni	Hypotype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
15002	15002 i	Bivalvia	Mya	arrosi	Paratype	Tertiary	Oligocene	1687-	Contra Costa County	California	United States	North America	yes
15003	15003 i	Bivalvia	Mya	arrosi	Paratype	Tertiary	Miocene	1617-	Contra Costa County	California	United States	North America	yes
15004	15004 i	Bivalvia	Mya	arrosi	Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
15005	15005 i	Bivalvia	Mya	arrosi	Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
15006	15006 i	Bivalvia	Mya	arrosi	Paratype	Tertiary	Miocene	1227-	Contra Costa County	California	United States	North America	yes
15075	15075 i	Gastropoda	Nassarius	whitneyi	Hypotype	Tertiary	Miocene	A4020	Contra Costa County	California	United States	North America	yes
15076	15076 i	Gastropoda	Nassarius	whitneyi	Hypotype	Tertiary	Miocene	A4925	Contra Costa County	California	United States	North America	yes
15077	15077 i	Gastropoda	Nassarius	whitneyi	Hypotype	Tertiary	Miocene	84749	Contra Costa County	California	United States	North America	yes
15078	15078 i	Gastropoda	Nassarius	whitneyi	Hypotype	Tertiary	Miocene	84749	Contra Costa County	California	United States	North America	yes
15218	15218 i	Gastropoda	Turritella	cf. broderipiana	Hypotype	Tertiary	Miocene	1462-	Contra Costa County	California	United States	North America	yes
15219	15219 i	Gastropoda	Turritella	variegata	Hypotype	Tertiary	Miocene	1463-	Contra Costa County	California	United States	North America	yes
15223	15223 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Paleocene	3159-	Contra Costa County	California	United States	North America	yes
15225	15225 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Paleocene	3151-	Contra Costa County	California	United States	North America	yes
15227	15227 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Paleocene	3156-	Contra Costa County	California	United States	North America	yes
15229	15229 i	Gastropoda	Turritella	merriami	Hypotype	Tertiary	Paleocene	3159-	Contra Costa County	California	United States	North America	yes
15329	15329 i	Gastropoda	Turritella	tolenasiensis	Paratype	Tertiary	Cretaceous	IP12132	Contra Costa County	California	United States	North America	yes
15346	15346 i	Gastropoda	Turritella	bachecensis	Paratype	Tertiary	Cretaceous	IP12131	Contra Costa County	California	United States	North America	yes
15348	15348 i	Gastropoda	Turritella	infragranulata	Hypotype	Tertiary	Paleocene	501-	Contra Costa County	California	United States	North America	yes
15349	15349 i	Gastropoda	Turritella	infragranulata	Hypotype	Tertiary	Paleocene	213-	Contra Costa County	California	United States	North America	yes
15352	15352 i	Gastropoda	Turritella	meganosensis	Hypotype	Tertiary	Paleocene	3152-	Contra Costa County	California	United States	North America	yes
15431	15431 i	Maxillipoda	Candona	lactea	Holotype	Tertiary	Paleocene	IP12594	Contra Costa County	California	United States	North America	yes
15468	15468 i	Bivalvia	Platydodon	pecki	Holotype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15471	15471 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15472	15472 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15473	15473 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15474	15474 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15536	15536 i	Gastropoda	Acteonina	californica	Paratype	Tertiary	Cretaceous	IP11347	Contra Costa County	California	United States	North America	yes
15538	15538 i	Gastropoda	Acteonina	californica	Paratype	Tertiary	Cretaceous	IP11347	Contra Costa County	California	United States	North America	yes
15539	15539 i	Gastropoda	Acteonina	californica	Paratype	Tertiary	Cretaceous	IP11347	Contra Costa County	California	United States	North America	yes
15540	15540 i	Gastropoda	Cinulia	obliqua	Paratype	Tertiary	Cretaceous	IP11347	Contra Costa County	California	United States	North America	yes
15576	15576 i	Bivalvia	Avicula	pellucida	Cotype	Tertiary	Eocene	IP12810	Contra Costa County	California	United States	North America	yes
15909	15909 i	Bivalvia	Mya	incognita	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
15922	15922 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15923	15923 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15925	15925 i	Bivalvia	Platydodon	pecki	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
15989	15989 i	Echinoidea	Eoscutella	sp.	Hypotype	Tertiary	Eocene	A1612	Contra Costa County	California	United States	North America	yes
15990	15990 i	Echinoidea	Eoscutella	sp.	Hypotype	Tertiary	Eocene	A1612	Contra Costa County	California	United States	North America	yes
30007	30007 i	Bivalvia	Mytilus	arlingtoni	Holotype	Tertiary	Cretaceous	3826-	Contra Costa County	California	United States	North America	yes
30008	30008 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3826-	Contra Costa County	California	United States	North America	yes
30010	30010 i	Bivalvia	Modiolus	henryi	Holotype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
30011	30011 i	Bivalvia	Modiolus	henryi	Paratype	Tertiary	Cretaceous	3822-	Contra Costa County	California	United States	North America	yes
30012	30012 i	Bivalvia	Dosinia	sp.	Hypotype	Tertiary	Oligocene	A4660	Contra Costa County	California	United States	North America	yes
30013	30013 i	Bivalvia	Dosinia	sp.	Hypotype	Tertiary	Oligocene	A4660	Contra Costa County	California	United States	North America	yes
30060	30060 i	Anthozoa	Platytrichus	diaboliensis	Holotype	Tertiary	Eocene	A3872	Contra Costa County	California	United States	North America	yes
30064	30064 i	Anthozoa	Platytrichus	diaboliensis	Paratype	Tertiary	Eocene	A3872	Contra Costa County	California	United States	North America	yes
30068	30068 i	Anthozoa	Halmesiastraea	petrosa	Hypotype?	Tertiary	Paleocene	IP12613	Contra Costa County	California	United States	North America	yes
30069	30069 i	Anthozoa	Halmesiastraea	petrosa	Hypotype?	Tertiary	Paleocene	IP12613	Contra Costa County	California	United States	North America	yes
30074	30074 i	Anthozoa	Platytrichus	diaboliensis	Paratype	Tertiary	Eocene	A3872	Contra Costa County	California	United States	North America	yes
30078	30078 i	Anthozoa	Platytrichus	diaboliensis	Paratype	Tertiary	Eocene	A3872	Contra Costa County	California	United States	North America	yes
30082	30082 i	Anthozoa	Cyclolites?	sp.	Hypotype	Tertiary	Eocene	A3821	Contra Costa County	California	United States	North America	yes
30087	30087 i	Anthozoa	Cyclolites?	sp.	Hypotype	Tertiary	Eocene	A3821	Contra Costa County	California	United States	North America	yes
30089	30089 i	Anthozoa	Cyclolites?	sp.	Hypotype	Tertiary	Eocene	A3821	Contra Costa County	California	United States	North America	yes
30092	30092 i	Anthozoa	Flabellum	remondianum	Hypotype	Tertiary	Paleocene	A1621	Contra Costa County	California	United States	North America	yes
30101	30101 i	Bivalvia	Penitella	durhami	Holotype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30102	30102 i	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30103	30103 i	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30104	30104 i	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30105	30105 i	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30108	30108 i	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
30151	30151 i	Bivalvia	Clinocardium	pristinum	Paratype	Tertiary	Miocene	1943-	Contra Costa County	California	United States	North America	yes
30152	30152 i	Bivalvia	Clinocardium	pristinum	Paratype								

130153	30153.1	Bivalvia	Clinocardium	pristinum		Paratype	Tertiary	Miocene	1943-		Contra Costa County	California	United States	North America	yes
130279	30279.1	Gastropoda	Turritella	uvasana	aedificata	Hypotype	Tertiary	Eocene	A4311		Contra Costa County	California	United States	North America	yes
130283	30283.1	Gastropoda	Euphorceras	cf. E. stephensoni		Hypotype	Tertiary	Paleocene	IP12165		Contra Costa County	California	United States	North America	yes
130323	30323.1	Bivalvia	Pholadidea	lorenzana		Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
130330	30330.1	Bivalvia	Panope	ramonensis		Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
130331	30331.1	Bivalvia	Panope	ramonensis		Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
130344	30344.1	Bivalvia	Spisula	subquadrata		Holotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
130412	30412	Bivalvia	Venercardia	hornii	calafia	Hypotype	Tertiary	Eocene	1426-		Contra Costa County	California	United States	North America	yes
130589	30589.1	Bivalvia	Callocardia	similex		Cotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
130671	30671.1	Bivalvia	Vollella	cf. gabbi		Hypotype	Tertiary	Pliocene	A2569		Contra Costa County	California	United States	North America	yes
130672	30672.1	Gastropoda	Calyptaea	cf. martini		Hypotype	Tertiary	Pliocene	A2569		Contra Costa County	California	United States	North America	yes
130673	30673.1	Bivalvia	Tivela	gabbi		Hypotype	Tertiary	Pliocene	A2569		Contra Costa County	California	United States	North America	yes
130674	30674.1	Bivalvia	Chione	semiplicata		Hypotype	Tertiary	Pliocene	A2569		Contra Costa County	California	United States	North America	yes
130675	30675.1	Bivalvia	Mytilus	trampasensis		Hypotype	Tertiary	Pliocene	A2568		Contra Costa County	California	United States	North America	yes
130779	30779.1	Bivalvia	Yoldia	Mytilus		Hypotype	Tertiary	Pliocene	1131-		Contra Costa County	California	United States	North America	yes
131169	31169.1	Bivalvia	Tellina	tenuilinata		Paratype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
131172	31172.1	Bivalvia	Acila	shumardi		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes
131173	31173.1	Gastropoda	Ancilla	fishii		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes
131174	31174.1	Gastropoda	Astrarium	raymondi		Holotype	Tertiary	Miocene	1192-		Contra Costa County	California	United States	North America	yes
131178	31178.1	Gastropoda	Peristolax	gabbi		Holotype	Tertiary	Paleocene	532-		Contra Costa County	California	United States	North America	yes
131179	31179.1	Gastropoda	Fusus	aratus		Hypotype	Tertiary	Paleocene	243-		Contra Costa County	California	United States	North America	yes
131184	31184.1	Bivalvia	Pecten	estrellanus		Hypotype	Tertiary	Miocene	IP12659		Contra Costa County	California	United States	North America	yes
131205	31205.1	Bivalvia	Tellina	aequalis		Plastoholotype	Cretaceous	Late Cretaceous	IP12660		Contra Costa County	California	United States	North America	yes
131231	31231.1	Gastropoda	Bulbifusus	californicus		Holotype	Tertiary	Paleocene	3156-		Contra Costa County	California	United States	North America	yes
131232	31232.1	Gastropoda	Bulbifusus	californicus		Paratype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131233	31233.1	Gastropoda	Bulbifusus	californicus		Paratype	Tertiary	Paleocene	3156-		Contra Costa County	California	United States	North America	yes
131234	31234.1	Gastropoda	Brachysphingus	mamillatus		Holotype	Tertiary	Paleocene	3157-		Contra Costa County	California	United States	North America	yes
131235	31235.1	Gastropoda	Brachysphingus	mamillatus		Paratype	Tertiary	Eocene	3557-		Contra Costa County	California	United States	North America	yes
131236	31236.1	Gastropoda	Brachysphingus	mamillatus		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131237	31237.1	Gastropoda	Brachysphingus	mamillatus		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131238	31238.1	Gastropoda	Brachysphingus	meganoensis		Paratype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131241	31241.1	Gastropoda	Ficopsis	meganoensis		Paratype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131242	31242.1	Gastropoda	Ficopsis	meganoensis		Paratype	Tertiary	Paleocene	3151-		Contra Costa County	California	United States	North America	yes
131243	31243.1	Gastropoda	Fusinus	meganoensis		Holotype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131244	31244.1	Gastropoda	Galeodea	sutterensis		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131245	31245.1	Gastropoda	Gemma	diablenis		Holotype	Tertiary	Paleocene	3579-		Contra Costa County	California	United States	North America	yes
131246	31246.1	Gastropoda	Hemiphaedusa	postquadrata		Holotype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131247	31247.1	Gastropoda	Molopophorus	californicus		Holotype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131248	31248.1	Gastropoda	Molopophorus	californicus		Paratype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131249	31249.1	Gastropoda	Ostodoma	diaboli		Holotype	Tertiary	Paleocene	3579-		Contra Costa County	California	United States	North America	yes
131250	31250.1	Gastropoda	Oliva	meganoensis		Holotype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131251	31251.1	Gastropoda	Oliva	meganoensis		Paratype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131252	31252.1	Gastropoda	Parvisphingo?	meganoensis		Holotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131253	31253.1	Gastropoda	Polinices	gesteri		Hypotype	Tertiary	Paleocene	3578-		Contra Costa County	California	United States	North America	yes
131254	31254.1	Gastropoda	Polinices	gesteri		Hypotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131255	31255.1	Gastropoda	Polinices	hornii		Hypotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131256	31256.1	Gastropoda	Polinices	hornii		Hypotype	Tertiary	Paleocene	3580-		Contra Costa County	California	United States	North America	yes
131259	31259.1	Gastropoda	Scaphander	cf. dilleyi		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131261	31261.1	Gastropoda	Scaphander	cf. costatus		Hypotype	Tertiary	Paleocene	3156-		Contra Costa County	California	United States	North America	yes
131263	31263.1	Gastropoda	Neverita	globosa		Hypotype	Tertiary	Paleocene	3586-		Contra Costa County	California	United States	North America	yes
131264	31264.1	Gastropoda	Turricula	cooperi		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131265	31265.1	Gastropoda	Turricula	cooperi		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131267	31267.1	Gastropoda	Hartleyensis	hartleyensis		Holotype	Tertiary	Paleocene	3069-		Contra Costa County	California	United States	North America	yes
131268	31268.1	Gastropoda	Drillia	meganoensis		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131269	31269.1	Gastropoda	Parvisphingo?	meganoensis		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131270	31270.1	Gastropoda	Polinices	nuciformis		Hypotype	Tertiary	Paleocene	3580-		Contra Costa County	California	United States	North America	yes
131272	31272.1	Gastropoda	Turbonilla	marshensis		Holotype	Tertiary	Paleocene	3580-		Contra Costa County	California	United States	North America	yes
131273	31273.1	Gastropoda	Turbonilla	cooperi		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131277	31277.1	Bivalvia	Cardium	hartleyensis		Holotype	Tertiary	Paleocene	3600-		Contra Costa County	California	United States	North America	yes
131278	31278.1	Bivalvia	Cardium	maryvillensis		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131279	31279.1	Bivalvia	Corbula	diaboli		Holotype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131280	31280.1	Bivalvia	Corbula	diaboli		Paratype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131281	31281.1	Bivalvia	Corbula	diaboli		Paratype	Tertiary	Paleocene	3150-		Contra Costa County	California	United States	North America	yes
131283	31283.1	Bivalvia	Crassatella	meganoensis		Holotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131284	31284.1	Bivalvia	Crassatella	meganoensis		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131285	31285.1	Bivalvia	Crassatella	meganoensis		Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131286	31286.1	Bivalvia	Diplodonta	cretacea		Hypotype	Tertiary	Paleocene	3578-		Contra Costa County	California	United States	North America	yes
131287	31287.1	Bivalvia	Dosinopsis	stewartvillensis		Holotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131288	31288.1	Bivalvia	Dosinopsis	stewartvillensis		Paratype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131289	31289.1	Bivalvia	Glycymeris	major	var. meganoensis	Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131290	31290.1	Bivalvia	Glycymeris	major	var. meganoensis	Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131291	31291.1	Bivalvia	Leda	gabbi		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131294	31294.1	Bivalvia	Lyonsia	venturaensis		Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131295	31295.1	Bivalvia	Macrocallista	meganoensis		Holotype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131296	31296.1	Bivalvia	Macrocallista	meganoensis		Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131297	31297.1	Bivalvia	Martesia	meganoensis		Holotype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131298	31298.1	Bivalvia	Martesia	meganoensis		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131299	31299.1	Bivalvia	Modiolus	ornatus		Hypotype	Tertiary	Paleocene	3579-		Contra Costa County	California	United States	North America	yes
131301	31301.1	Bivalvia	Pedalion	sp.		Hypotype	Tertiary	Paleocene	3609-		Contra Costa County	California	United States	North America	yes
131303	31303.1	Bivalvia	Phacodes	meganoensis		Holotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131304	31304.1	Bivalvia	Phacodes	meganoensis		Paratype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131305	31305.1	Bivalvia	Phacodes	meganoensis		Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131306	31306.1	Bivalvia	Pitar	californiana	stewartvillensis	Holotype	Tertiary	Paleocene	3580-		Contra Costa County	California	United States	North America	yes
131307	31307.1	Bivalvia	Pitar	californiana	stewartvillensis	Paratype	Tertiary	Paleocene	3237-		Contra Costa County	California	United States	North America	yes
131308	31308.1	Bivalvia	Pitar	californiana	stewartvillensis	Paratype	Tertiary	Paleocene	3237-		Contra Costa County	California	United States	North America	yes
131309	31309.1	Bivalvia	Pitar	californiana	stewartvillensis	Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131313	31313.1	Bivalvia	Pitar	palmeri		Holotype	Tertiary	Paleocene	3158-		Contra Costa County	California	United States	North America	yes
131314	31314.1	Bivalvia	Pitar	palmeri		Paratype	Tertiary	Paleocene	3158-		Contra Costa County	California	United States	North America	yes
131315	31315.1	Bivalvia	Pitar	uvasanus	marshensis	Holotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131316	31316.1	Bivalvia	Pitar	uvasanus	marshensis	Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131317	31317.1	Bivalvia	Pitar	uvasanus	marshensis	Paratype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131318	31318.1	Bivalvia	Pitar	uvasanus	marshensis	Paratype	Tertiary	Paleocene	3577-		Contra Costa County	California	United States	North America	yes
131319	31319.1	Bivalvia	Psammobia?	sp.		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131320	31320.1	Bivalvia	Psammobia?	sp.		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131321	31321.1	Bivalvia	Pteria	sp.		Hypotype	Tertiary	Paleocene	3152-		Contra Costa County	California	United States	North America	yes
131322	31322.1	Bivalvia	Solemya	sp.		Hypotype	Tertiary	Eocene	3162-		Contra Costa County	California	United States	North America	yes
131324	31324.1	Bivalvia	Solen	stantoni		Hypotype	Tertiary	Paleocene	3159-		Contra Costa County	California	United States	North America	yes
131326	31326.1	Bivalvia	Sphenia?	meganoensis		Holotype	Tertiary	Paleocene	3586-		Contra Costa County	California	United States	North America	yes
131327	31327.1	Bivalvia	Sphenia?	meganoensis		Paratype	Tertiary	Paleocene	3586-		Contra Costa County	California	United States	North America	yes
131328	31328.1	Bivalvia	Tivela	kellogenesis		Paratype	Tertiary	Paleocene	3578-		Contra Costa County	California	United States	North America</	

131339	31339 I	Bivalvia	Spisula	meganosensis	Paratype	Tertiary	Paleocene	3586-	Contra Costa County	California	United States	North America	yes
131340	31340 I	Bivalvia	Jouannetia	sp.	Hypotype	Tertiary	Paleocene	3158-	Contra Costa County	California	United States	North America	yes
131364	31364 I	Gastropoda	Gemmula	diaboloensis	Paratype	Tertiary	Paleocene	3152-	Contra Costa County	California	United States	North America	yes
131365	31365 I	Gastropoda	Strepisidura?	diaboloensis	Holotype	Tertiary	Paleocene	3577-	Contra Costa County	California	United States	North America	yes
131366	31366 I	Gastropoda	Strepisidura?	diaboloensis	Paratype	Tertiary	Paleocene	3577-	Contra Costa County	California	United States	North America	yes
131367	31367 I	Gastropoda	Solariella	hartleyensis	Holotype	Tertiary	Paleocene	3159-	Contra Costa County	California	United States	North America	yes
131378	31378 I	Gastropoda	Gemmula	wattsi	Hypotype	Tertiary	Paleocene	3159-	Contra Costa County	California	United States	North America	yes
131384	31384 I	Gastropoda	Neptunea	gracilis	Holotype	Tertiary	Eocene	IP12883	Contra Costa County	California	United States	North America	yes
131395	31395 I	Gastropoda	Pugetulus	hamulus	Holotype	Cretaceous		IP13345	Contra Costa County	California	United States	North America	yes
131402	31402 I	Gastropoda	Trochoph	penderosum	Holotype	Tertiary	Miocene	IP11316	Contra Costa County	California	United States	North America	yes
131403	31403 I	Gastropoda	Cypraea	bayerquell	Holotype	Tertiary	Paleocene?	IP12672	Contra Costa County	California	United States	North America	yes
131414	31414 I	Anthozoa	Archohelia	clarki	Cotype	Tertiary	Paleocene	3609-	Contra Costa County	California	United States	North America	yes
131415	31415 I	Anthozoa	Archohelia	clarki	Cotype	Tertiary	Paleocene	3609-	Contra Costa County	California	United States	North America	yes
131428	31428 I	Bivalvia	Arca	hornii	Holotype	Tertiary	Paleocene	3579-	Contra Costa County	California	United States	North America	yes
131429	31429 I	Bivalvia	Glycymeris	vestrichi	Hypotype	Tertiary	Paleocene	3579-	Contra Costa County	California	United States	North America	yes
131449	31449 I	Bivalvia	Crassatellites	grandis	Lectotype	Tertiary	Eocene	IP12795	Contra Costa County	California	United States	North America	yes
131451	31451 I	Bivalvia	Tellina	remondii	Holotype	Tertiary	Eocene	IP12830	Contra Costa County	California	United States	North America	yes
131452	31452 I	Bivalvia	Tellina	decurtata	Holotype	Tertiary	Cretaceous	IP11371	Contra Costa County	California	United States	North America	yes
131457	31457 I	Bivalvia	Meekia	sella	Holotype	Tertiary	Cretaceous	IP12681	Contra Costa County	California	United States	North America	yes
131458	31458 I	Bivalvia	Meekia	navis	Holotype	Tertiary	Cretaceous	IP12682	Contra Costa County	California	United States	North America	yes
131893	31893 I	Cephalopoda	Aturia	matthewsonii	Lectotype	Tertiary	Paleocene	IP244	Contra Costa County	California	United States	North America	0000 0000 0412 1089
131954	31954 I	Bivalvia	Marcia	angustifrons	Hypotype	Tertiary	Miocene	360-	Contra Costa County	California	United States	North America	yes
131992	31992 I	Bivalvia	Brucarkia	oregonensis	Hypotype	Tertiary	Miocene	54-	Contra Costa County	California	United States	North America	yes
132269	32269 I	Anthozoa	Turbinolia	pusillanima	Topotype	Tertiary	Eocene	476-	Contra Costa County	California	United States	North America	yes
132269	32269 I	Echinoides	Astrodrapsis	tumulus	Hypotype	Tertiary	Miocene	A4786	Contra Costa County	California	United States	North America	yes
132300	32300 I	Echinoides	Astrodrapsis	tumulus	Hypotype	Tertiary	Miocene	A4786	Contra Costa County	California	United States	North America	yes
132412	32412 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132413	32413 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132414	32414 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132415	32415 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132416	32416 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132417	32417 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132418	32418 I	Bivalvia	Leda	proteata	Paratype?	Tertiary	Paleocene	IP200	Contra Costa County	California	United States	North America	yes
132426	32426 I	Gastropoda	Brucarkia	gravidia	Hypotype	Tertiary	Oligocene	A4661	Contra Costa County	California	United States	North America	yes
132432	32432 I	Anthozoa	Balanophyllia	variabilis	Hypotype	Tertiary	Eocene	A4300	Contra Costa County	California	United States	North America	yes
132437	32437 I	Gastropoda	Cylindrites	brevis	Paratype	Tertiary	Late Cretaceous	IP12426	Contra Costa County	California	United States	North America	yes
132439	32439 I	Anthozoa	Mediampressa	mediampressa	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
132444	32444 I	Gastropoda	Agasoma	acuminatum	Hypotype	Tertiary	Oligocene	IP12088	Contra Costa County	California	United States	North America	yes
132457	32457 I	Gastropoda	Molopophorus	fishii	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
132486	32486 I	Gastropoda	Gyraulus	pabloanus	Hypotype	Tertiary	Pliocene	87268	Contra Costa County	California	United States	North America	yes
132501	32501 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132503	32503 I	Bivalvia	Platydont	durhami	Paratype	Tertiary	Miocene	A7762	Contra Costa County	California	United States	North America	yes
132504	32504 I	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
132505	32505 I	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
132506	32506 I	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
132507	32507 I	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
132508	32508 I	Bivalvia	Penitella	durhami	Paratype	Tertiary	Eocene	A7762	Contra Costa County	California	United States	North America	yes
132511	32511 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132513	32513 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132514	32514 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132516	32516 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132517	32517 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132518	32518 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132520	32520 I	Bivalvia	Platydont	clarki	Paratype	Tertiary	Miocene	1942-	Contra Costa County	California	United States	North America	yes
132622	32622 I	Bivalvia	Apolymetis	biangulata	Hypotype	Tertiary	Eocene	1668-	Contra Costa County	California	United States	North America	yes
132626	32626 I	Bivalvia	Apolymetis	biangulata	Hypotype	Tertiary	Eocene	1668-	Contra Costa County	California	United States	North America	yes
132663	32663 I	Bivalvia	Mytilus	pauperculus	Paratype	Tertiary	Cretaceous	IP12780	Contra Costa County	California	United States	North America	yes
132665	32665 I	Bivalvia	Pecten	discus	Hypotype	Tertiary	Miocene	IP12098	Contra Costa County	California	United States	North America	yes
132698	32698 I	Bivalvia	Pecten	crassicaudo	Hypotype	Tertiary	Miocene	IP12100	Contra Costa County	California	United States	North America	yes
132716	32716 I	Bivalvia	Modiolus	merriami	Topotype	Tertiary	Paleocene	333-	Contra Costa County	California	United States	North America	yes
132720	32720 I	Bivalvia	Modiola	ornata	Paratype	Tertiary	Paleocene	IP12861	Contra Costa County	California	United States	North America	yes
132751	32751 I	Bivalvia	Coralliophaga	sp.	Hypotype	Tertiary	Paleocene	3609-	Contra Costa County	California	United States	North America	yes
132756	32756 I	Bivalvia	Crassatella	studleyi	Holotype	Tertiary	Paleocene	1540-	Contra Costa County	California	United States	North America	yes
132766	32766 I	Bivalvia	Modiola	ornata	Paratype	Tertiary	Paleocene	IP12861	Contra Costa County	California	United States	North America	yes
132783	32783 I	Bivalvia	Cyrenia	californica	Tertiary	Tertiary	Paleocene	IP12862	Contra Costa County	California	United States	North America	yes
132799	32799 I	Bivalvia	Venericardia	diaboloensis	Paratype	Tertiary	Eocene	IP12105	Contra Costa County	California	United States	North America	yes
132803	32803 I	Bivalvia	Venericardia	hornii	Plastohypotype	Tertiary	Eocene	IP12863	Contra Costa County	California	United States	North America	yes
132813	32813 I	Bivalvia	Tellina	hoffmanniana	Paratype	Tertiary	Cretaceous	IP11353	Contra Costa County	California	United States	North America	yes
132818	32818 I	Bivalvia	Modiola	ornata	Paratype	Tertiary	Paleocene	IP12861	Contra Costa County	California	United States	North America	yes
132872	32872 I	Bivalvia	Mytilus	polius	Paratype	Tertiary	Eocene	IP13388	Contra Costa County	California	United States	North America	yes
132878	32878 I	Bivalvia	Venus	tetrahedra	Paratype	Tertiary	Paleocene	IP11384	Contra Costa County	California	United States	North America	yes
132879	32879 I	Bivalvia	Venus	tetrahedra	Paratype	Tertiary	Paleocene	IP11384	Contra Costa County	California	United States	North America	yes
132880	32880 I	Bivalvia	Venus	tetrahedra	Paratype	Tertiary	Paleocene	IP11384	Contra Costa County	California	United States	North America	yes
132916	32916 I	Bivalvia	Clinocardium	praeblandum	Paratype	Tertiary	Miocene	1262-	Contra Costa County	California	United States	North America	yes
132917	32917 I	Bivalvia	Clinocardium	pristinum	Paratype	Tertiary	Miocene	1943-	Contra Costa County	California	United States	North America	yes
132918	32918 I	Bivalvia	Clinocardium	praeblandum	Paratype	Tertiary	Miocene	1947-	Contra Costa County	California	United States	North America	yes
132992	32992 I	Gastropoda	Helminthoglypta	sp.	Hypotype	Tertiary	Pliocene	87270	Contra Costa County	California	United States	North America	yes
132993	32993 I	Gastropoda	Goniobasis	sp.	Hypotype	Tertiary	Pliocene	87268	Contra Costa County	California	United States	North America	yes
133060	33060 I	Bivalvia	Meekia	sella	Plastohypotype	Tertiary	Cretaceous	IP12115	Contra Costa County	California	United States	North America	yes
133302	33302 I	Bivalvia	Tellina	parilis	Paratype	Tertiary	Cretaceous	IP12119	Contra Costa County	California	United States	North America	yes
133369	33369 I	Gastropoda	Echinoides	reticulata	Hypotype	Tertiary	Miocene	142-	Contra Costa County	California	United States	North America	yes
13402	3402 I	Echinoides	Remondella	gabbii	Hypotype	Tertiary	Miocene	IP12123	Contra Costa County	California	United States	North America	yes
13491	3491 I	Bivalvia	Pholadidea	lorenzana	Paratype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
13497	3497 I	Gastropoda	Opalia	wroblewskyi	Hypotype	Tertiary	Miocene	525-	Contra Costa County	California	United States	North America	yes
13734	3734 I	Bivalvia	Dosinia	whitneyi	Hypotype	Tertiary	Oligocene	1131-	Contra Costa County	California	United States	North America	yes
13836	3836 I	Bivalvia	Tellina	hoffmanniana	Plastoparatype	Tertiary	Cretaceous	IP1353	Contra Costa County	California	United States	North America	yes
13988	3988 I	Gastropoda	Turritella	uvasana	Turritella	Tertiary	Eocene	A1421	Contra Costa County	California	United States	North America	yes
13989	3989 I	Gastropoda	Turritella	uvasana	Paratype	Tertiary	Eocene	A1402	Contra Costa County	California	United States	North America	yes
13990	3990 I	Gastropoda	Turritella	uvasana	Paratype	Tertiary	Eocene	A1402	Contra Costa County	California	United States	North America	yes
13991	3991 I	Gastropoda	Turritella	uvasana	Paratype	Tertiary	Eocene	A1402	Contra Costa County	California	United States	North America	yes
14120	4120 I	Bivalvia	Nuculana	chehalensis	Hypotype	Tertiary	Miocene	A4928	Contra Costa County	California	United States	North America	yes
14121	4121 I	Bivalvia	Nuculana	chehalensis	Hypotype	Tertiary	Miocene	A4933	Contra Costa County	California	United States	North America	yes
14123	4123 I	Bivalvia	Yoldia	cooperi	Hypotype	Tertiary	Miocene	A4929	Contra Costa County	California	United States	North America	yes
14126	4126 I	Bivalvia	Anadara	devincta	Plastotype	Tertiary	Miocene	A4929	Contra Costa County	California	United States	North America	yes
14127	4127 I	Bivalvia	Anadara	devincta	Hypotype	Tertiary	Miocene	A4935	Contra Costa County	California	United States	North America	yes
14128	4128 I	Bivalvia	Anadara	devincta	Hypotype	Tertiary	Miocene	A4926	Contra Costa County	California	United States	North America	yes
14129	4129 I	Bivalvia	Ostrea	sp.	Hypotype	Tertiary	Miocene	A4930	Contra Costa County	California	United States	North America	yes
14130	4130 I	Bivalvia	Pecten	sp.	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14131	4131 I	Bivalvia	Pecten	sp.	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14132	4132 I	Bivalvia	Pecten	sp.	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14135	4135 I	Bivalvia	Mytilus	edulis	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14138	4138 I	Bivalvia	Macoma	sesseensis	Hypotype	Tertiary	Miocene	516-	Contra Costa County	California	United States	North America	yes
14139	4139 I	Bivalvia	Macoma	sesseensis	Hypotype	Tertiary	Miocene	A4924	Contra Costa County	California	United States	North America	yes
14140	4140 I	Bivalvia	Solen	sp.	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14141	4141 I	Bivalvia	Solen	sp.	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14145	4145 I	Bivalvia	Spisula	catilliformis	Hypotype	Tertiary	Miocene	305-	Contra Costa County	California	United States	North America	yes
14146	4146 I	Bivalvia	Spisula	catilliformis	Hypotype	Tertiary	Miocene	A4928	Contra Costa County	California	United States	North America	yes
14153	4153 I	Bivalvia	Dosinia	whitneyi	Hypotype	Tertiary	Miocene	A4923	Contra Costa County	California	United States	North America	yes
14154	4154 I	Bivalvia	Marcia	angustifrons	Hypotype	Tertiary	Miocene</						

134155	34155 I	Bivalvia	Panope	generosa		Hypotype	Tertiary	Miocene	A4923		Contra Costa County	California	United States	North America	yes	
134158	34158 I	Gastropoda	Polinices	reclusiana	var. andersoni	Hypotype	Tertiary	Miocene	A4928		Contra Costa County	California	United States	North America	yes	
134164	34164 I	Gastropoda	Bucurkia	sp.		Hypotype	Tertiary	Miocene	A4929		Contra Costa County	California	United States	North America	yes	
134165	34165 I	Gastropoda	Thais	sp.		Hypotype	Tertiary	Miocene	A4931		Contra Costa County	California	United States	North America	yes	
134166	34166 I	Gastropoda	Thais	sp.		Hypotype	Tertiary	Miocene	A4929		Contra Costa County	California	United States	North America	yes	
134167	34167 I	Gastropoda	Nassarius	whitneyi		Hypotype	Tertiary	Miocene	A4924		Contra Costa County	California	United States	North America	yes	
134169	34169 I	Gastropoda	Cancellaria	weaveri		Hypotype	Tertiary	Miocene	A4929		Contra Costa County	California	United States	North America	yes	
134263	34263 I	Rhynchonellata	Pentamerus	oblongus		Hypotype	Tertiary	Miocene	1942-		Contra Costa County	California	United States	North America	yes	
134628	34628 I	Echinoidea	Astrodapsis	antiselli		Hypotype	Tertiary	Miocene	A3176		Contra Costa County	California	United States	North America	yes	
134718	34718 I	Gastropoda	Scutus	anatinus		Hypotype	Tertiary	Miocene?	68-		Contra Costa County	California	United States	North America	yes	
134719	34719 I	Gastropoda	Scutus	anatinus		Hypotype	Tertiary	Miocene?	68-		Contra Costa County	California	United States	North America	yes	
134728	34728 I	Gastropoda	Patella	compressa		Hypotype	Tertiary	Eocene	1654-		Contra Costa County	California	United States	North America	yes	
134731	34731 I	Gastropoda	Notomella	candida		Hypotype	Tertiary	Miocene	307-		Contra Costa County	California	United States	North America	yes	
134841	34841 I	Gastropoda	Noetia	gabbi		Plastoholotype	Cretaceous	Late Cretaceous	IP12758		Contra Costa County	California	United States	North America	yes	
134842	34842 I	Gastropoda	Anchuthera	carrierae		Plastoholotype	Cretaceous	Late Cretaceous	IP12758		Contra Costa County	California	United States	North America	yes	
134843	34843 I	Gastropoda	Scalaria	mathewsoni		Plastoholotype	Cretaceous	Late Cretaceous	IP12758		Contra Costa County	California	United States	North America	yes	
135714	35714 I	Bivalvia	Pharella	alta		Plastoparatype	Cretaceous		IP11236		Contra Costa County	California	United States	North America	yes	
136074	36074 I	Bivalvia	Chione	californiensis	var. gealyi	Holotype	Tertiary	Paleocene	1657-		Contra Costa County	California	United States	North America	yes	
136075	36075 I	Bivalvia	Chione	californiensis	var. gealyi	Paratype	Tertiary	Paleocene	1657-		Contra Costa County	California	United States	North America	yes	
136079	36079 I	Bivalvia	Chione	undatella	simillima	Hypotype	Tertiary	Eocene	1668-		Contra Costa County	California	United States	North America	yes	
136090	36090 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136091	36091 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136092	36092 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136093	36093 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136094	36094 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136095	36095 I	Bivalvia	Securella	cryptolineata		Hypotype	Tertiary	Oligocene	1131-		Contra Costa County	California	United States	North America	yes	
136102	36102 I	Bivalvia	Prototrocha	fluctifraga		Hypotype	Tertiary	Paleocene	1657-		Contra Costa County	California	United States	North America	yes	
136233	36233 I	Bivalvia	Cardium	costatum		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136234	36234 I	Bivalvia	Prototrocha	staminea		Hypotype	Tertiary	Eocene	1668-		Contra Costa County	California	United States	North America	yes	
136309	36309 I	Bivalvia	Pododesmus	macroscisma		Hypotype	Tertiary	Paleocene	1694-		Contra Costa County	California	United States	North America	yes	
136328	36328 I	Bivalvia	Trigonia	pectinata		Hypotype	Tertiary	Eocene	1652-		Contra Costa County	California	United States	North America	yes	
136342	36342 I	Bivalvia	Trigonia	pectinata		Hypotype	Tertiary	Eocene	150-		Contra Costa County	California	United States	North America	yes	
136370	36370 I	Bivalvia	Aequipecten	raymondi		Hypotype	Tertiary	Miocene	A4671		Contra Costa County	California	United States	North America	yes	
136371	36371 I	Bivalvia	Aequipecten	raymondi		Hypotype	Tertiary	Miocene	A4671		Contra Costa County	California	United States	North America	yes	
136372	36372 I	Bivalvia	Amussium	japonicum		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136373	36373 I	Bivalvia	Amussium	japonicum		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136385	36385 I	Bivalvia	Amussium	montereyana		Hypotype	Tertiary	Miocene	305-		Contra Costa County	California	United States	North America	yes	
136396	36396 I	Bivalvia	Piacenta	papyracea		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136404	36404 I	Bivalvia	Ruditapes	decussata		Hypotype	Tertiary	Miocene	130-		Contra Costa County	California	United States	North America	yes	
136406	36406 I	Bivalvia	Tapes	malabarica		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136412	36412 I	Bivalvia	Prototrocha	fluctifraga		Hypotype	Tertiary	Eocene	1683-		Contra Costa County	California	United States	North America	yes	
136421	36421 I	Bivalvia	Gemma	gigantea		Hypotype	Tertiary	Eocene	1668-		Contra Costa County	California	United States	North America	yes	
136426	36426 I	Bivalvia	Paphia	papilionacea		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136429	36429 I	Bivalvia	Pitar	californianus	stewartvillensis	Hypotype	Tertiary	Paleocene	A1435		Contra Costa County	California	United States	North America	yes	
136482	36482 I	Gastropoda	Patella	compressa		Hypotype	Tertiary	Eocene	1654-		Contra Costa County	California	United States	North America	yes	
136537	36537 I	Bivalvia	Venus	verrucosa		Hypotype	Tertiary	Cretaceous	249-		Contra Costa County	California	United States	North America	yes	
136538	36538 I	Bivalvia	Circe	gobba		Hypotype	Tertiary	Miocene	138-		Contra Costa County	California	United States	North America	yes	
136539	36539 I	Bivalvia	Gemma	divaricata		Hypotype	Tertiary	Miocene	50-		Contra Costa County	California	United States	North America	yes	
136540	36540 I	Bivalvia	Sunetta	scripta		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
136542	36542 I	Bivalvia	Meretrix	meretrix		Hypotype	Tertiary	Miocene	10-		Contra Costa County	California	United States	North America	yes	
136549	36549 I	Bivalvia	Heterodonax	bimaculata		Hypotype	Tertiary	Eocene	1668-		Contra Costa County	California	United States	North America	yes	
136585	36585 I	Bivalvia	Aphrodina	varians		Plastoholotype	Cretaceous		IP12022		Contra Costa County	California	United States	North America	yes	
136586	36586 I	Bivalvia	Aphrodina	varians		See below	Cretaceous		IP12022		Contra Costa County	California	United States	North America	yes	
137499	37499 I	Gastropoda	Turritella	infragranulata		Hypotype	Tertiary	Miocene, Oligocene	78-		Contra Costa County	California	United States	North America	yes	
137994	37994 I	Gastropoda	Peristylis	stantoni		Hypotype	Tertiary	Cretaceous	249-		Contra Costa County	California	United States	North America	yes	
138656	38656 I	Bivalvia	Calva	varians		Hypotype	Tertiary	Cretaceous	2609-		Contra Costa County	California	United States	North America	yes	
151071	51071 I	Malacostraca	Mursia	cf. M. gaudichaudii		Hypotype	Tertiary	Miocene	201-		Contra Costa County	California	United States	North America	yes	
151234	51234 I	Echinoidea	Microporipitella	granti		Hypotype	Tertiary	Eocene	A3762		Contra Costa County	California	United States	North America	yes	
151235	51235 I	Echinoidea	Microporipitella	granti		Hypotype	Tertiary	Eocene	A3762		Contra Costa County	California	United States	North America	yes	
151236	51236 I	Echinoidea	Microporipitella	granti		Hypotype	Tertiary	Eocene	A3762		Contra Costa County	California	United States	North America	yes	
151237	51237 I	Echinoidea	Microporipitella	granti		Hypotype	Tertiary	Eocene	A3762		Contra Costa County	California	United States	North America	yes	
151238	51238 I	Echinoidea	Microporipitella	granti		Hypotype	Tertiary	Eocene	A3762		Contra Costa County	California	United States	North America	yes	
154917	54917 I	Gastropoda	Brachysphingus	liratus		Hypotype	Tertiary	Paleocene	1545-		Contra Costa County	California	United States	North America	yes	
154919	54919 I	Gastropoda	Brachysphingus	liratus		Hypotype	Tertiary	Paleocene	1545-		Contra Costa County	California	United States	North America	yes	
154920	54920 I	Gastropoda	Loxostoma?	sp.		Hypotype	Tertiary	Paleocene	1558-		Contra Costa County	California	United States	North America	yes	
154930	54930 I	Gastropoda	Brachysphingus	gabbi		Hypotype	Tertiary	Paleocene	1558-		Contra Costa County	California	United States	North America	yes	
1110610	110610 I	Ophiuroidea	Ophioglyphus?	sp.		Hypotype	Tertiary	Miocene	1318-		Contra Costa County	California	United States	North America	yes	
1117331	117331 I	Gastropoda	Heterotermia	gabbi		Hypotype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes	
1117332	117332 I	Gastropoda	Protobucon	juditae		Paratype	Tertiary	Paleocene	1540-		Contra Costa County	California	United States	North America	yes	
161441 I	161441 I	Hydrzoa	Hydrzoa	sp.		Hypotype	Tertiary	Miocene	510-		Contra Costa County	California	United States	North America	yes	
161566	161566 I	Hydrzoa	Anthozoa	lecontei		Hypotype	Tertiary	Miocene	15-		Contra Costa County	California	United States	North America	yes	
1172038	172038 I	Gastropoda	Atrina	inornata		Hypotype	Tertiary	Cretaceous	2609-		Contra Costa County	California	United States	North America	yes	
1199000	199000 I	Echinoidea	Schizaster	lecontei		Hypotype	Tertiary	Eocene	1415-		Contra Costa County	California	United States	North America	0000 0000 0412 1682	yes
1199001	199001 I	Echinoidea	Astrodapsis	sp.		Hypotype	Tertiary	Miocene	1465-		Contra Costa County	California	United States	North America	0000 0000 0412 1683	yes
1199002	199002 I	Bivalvia	Astrodapsis	sp.		Hypotype	Tertiary	Miocene	1477-		Contra Costa County	California	United States	North America	0000 0000 0412 1684	yes
1199003	199003 I	Bivalvia	Astrodapsis	sp.		Hypotype	Tertiary	Cretaceous	82-		Contra Costa County	California	United States	North America	0000 0000 0412 1685	yes
1199004	199004 I	Bivalvia	Astrodapsis	sp.		Hypotype	Tertiary	Cretaceous	82-		Contra Costa County	California	United States	North America	0000 0000 0412 1685	yes
1230929	230929 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1230930	230930 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1230931	230931 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1230932	230932 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1230933	230933 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1230934	230934 I	Bivalvia	Astrodapsis	sp.		Hypotype	Quaternary	Pleistocene	A4272		Contra Costa County	California	United States	North America	yes	
1239220	239220 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239221	239221 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239222	239222 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239223	239223 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239224	239224 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239225	239225 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239226	239226 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239227	239227 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1239228	239228 I	Bivalvia	Ostrea	lurida		Hypotype	Tertiary	Pliocene	8988		Contra Costa County	California	United States	North America	yes	
1312620	312620 I	Gastropoda	Scaphander	cf. costatus		Hypotype	Tertiary	Paleocene	3156-		Contra Costa County	California	United States	North America	yes	
1318960	318960 I	Bivalvia	Periploma	tryoniana		Plastoholotype	Cretaceous		IP430		Contra Costa County	California	United States	North America	yes	
1324930	324930 I	Bivalvia	Penitella	durhami		Paratype	Tertiary	Eocene	A7762		Contra Costa County	California	United States	North America	yes	
1324940	324940 I	Bivalvia	Penitella	durhami		Paratype	Tertiary	Eocene	A7762		Contra Costa County	California	United States	North America	yes	
1324950	324950 I	Bivalvia	Penitella	durhami		Paratype	Tertiary	Eocene	A7762		Contra Costa County	California	United States	North America	yes	
1324960	324960 I	Bivalvia	Penitella	durhami		Paratype	Tertiary	Eocene	A7762		Contra Costa County	California	United States	North America	yes	
1324970	324970 I	Bivalvia	Penitella	durhami		Paratype	Tertiary	Eocene	A7762		Contra Costa County	California	United States	North America	yes	
1555885	555885 I	Bivalvia	Glycymeris	sp.												

M7082		7082 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B415	Contra Costa County	California	United States	North America	yes		
M7083		7083 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B416	Contra Costa County	California	United States	North America	yes		
M7084		7084 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B417	Contra Costa County	California	United States	North America	yes		
M7085		7085 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B418	Contra Costa County	California	United States	North America	yes		
M7086		7086 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B419	Contra Costa County	California	United States	North America	yes		
M7087		7087 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B420	Contra Costa County	California	United States	North America	yes		
M7088		7088 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B421	Contra Costa County	California	United States	North America	yes		
M7089		7089 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B423	Contra Costa County	California	United States	North America	yes		
M7090		7090 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B424	Contra Costa County	California	United States	North America	yes		
M7091		7091 M	No fauna recovered.			Tertiary	Eocene	B425	Contra Costa County	California	United States	North America	yes		
M7263		7263 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B403	Contra Costa County	California	United States	North America	yes		
M7264		7264 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B404	Contra Costa County	California	United States	North America	yes		
M7265		7265 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B405	Contra Costa County	California	United States	North America	yes		
M7670		7670 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1721	Contra Costa County	California	United States	North America	yes		
M7671		7671 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1721	Contra Costa County	California	United States	North America	yes		
M7672		7672 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1770	Contra Costa County	California	United States	North America	yes		
M7673		7673 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1770	Contra Costa County	California	United States	North America	yes		
M7674		7674 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1771	Contra Costa County	California	United States	North America	yes		
M7675		7675 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1771	Contra Costa County	California	United States	North America	yes		
M7716		7716 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A3875	Contra Costa County	California	United States	North America	yes		
M7770		7770 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B412	Contra Costa County	California	United States	North America	yes		
M7771		7771 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B427	Contra Costa County	California	United States	North America	yes		
M7888		7888 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B467	Contra Costa County	California	United States	North America	yes		
M8172		8172 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1720	Contra Costa County	California	United States	North America	yes		
M8177		8177 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1753	Contra Costa County	California	United States	North America	yes		
M8178		8178 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1753	Contra Costa County	California	United States	North America	yes		
M8183		8183 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1758	Contra Costa County	California	United States	North America	yes		
M8184		8184 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1758	Contra Costa County	California	United States	North America	yes		
M8185		8185 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1765	Contra Costa County	California	United States	North America	yes		
M8186		8186 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1765	Contra Costa County	California	United States	North America	yes		
M8189		8189 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1767	Contra Costa County	California	United States	North America	yes		
M8193		8193 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1767	Contra Costa County	California	United States	North America	yes		
M8194		8194 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1835	Contra Costa County	California	United States	North America	yes		
M8195		8195 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1835	Contra Costa County	California	United States	North America	yes		
M8196		8196 M	Polythalamia		FORAMINIFERA	Tertiary	Paleocene	A1835	Contra Costa County	California	United States	North America	yes		
M8197		8197 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1841	Contra Costa County	California	United States	North America	yes		
M8198		8198 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	A1841	Contra Costa County	California	United States	North America	yes		
M8389		8389 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B446	Contra Costa County	California	United States	North America	yes		
M8390		8390 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B448	Contra Costa County	California	United States	North America	yes		
M8391		8391 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B451	Contra Costa County	California	United States	North America	yes		
M8392		8392 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B454	Contra Costa County	California	United States	North America	yes		
M8393		8393 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B455	Contra Costa County	California	United States	North America	yes		
M8394		8394 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B456	Contra Costa County	California	United States	North America	yes		
M8395		8395 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B495	Contra Costa County	California	United States	North America	yes		
M8396		8396 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B428	Contra Costa County	California	United States	North America	yes		
M8397		8397 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B429	Contra Costa County	California	United States	North America	yes		
M8398		8398 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B430	Contra Costa County	California	United States	North America	yes		
M8399		8399 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B431	Contra Costa County	California	United States	North America	yes		
M8400		8400 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B433	Contra Costa County	California	United States	North America	yes		
M8401		8401 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B434	Contra Costa County	California	United States	North America	yes		
M8402		8402 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B436	Contra Costa County	California	United States	North America	yes		
M8403		8403 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B437	Contra Costa County	California	United States	North America	yes		
M8404		8404 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B438	Contra Costa County	California	United States	North America	yes		
M8405		8405 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B440	Contra Costa County	California	United States	North America	yes		
M8406		8406 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B441	Contra Costa County	California	United States	North America	yes		
M8407		8407 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B442	Contra Costa County	California	United States	North America	yes		
M8408		8408 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B445	Contra Costa County	California	United States	North America	yes		
M9035		9035 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene?	A1722	Contra Costa County	California	United States	North America	yes		
M9036		9036 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene?	A1722	Contra Costa County	California	United States	North America	yes		
M9037		9037 M	Polythalamia		FORAMINIFERA	Tertiary	Eocene	B496	Contra Costa County	California	United States	North America	yes		
M12870		12870 M	Polythalamia		MISSOINIA	Tertiary	Miocene	A1714	Contra Costa County	California	United States	North America	yes		
M22759		22759 M				Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22760		22760 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22761		22761 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22762		22762 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22763		22763 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22764		22764 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22765		22765 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22766		22766 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22767		22767 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22768		22768 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22769		22769 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22770		22770 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Eocene	Mf7499	Contra Costa County	California	United States	North America	yes		
M22827		22827 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7524	Contra Costa County	California	United States	North America	yes		
M22828		22828 M				Tertiary	Eocene	Mf7525	Contra Costa County	California	United States	North America	yes		
M22834		22834 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7529	Contra Costa County	California	United States	North America	yes		
M22837		22837 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7529	Contra Costa County	California	United States	North America	yes		
M22840		22840 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7529	Contra Costa County	California	United States	North America	yes		
M22843		22843 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7529	Contra Costa County	California	United States	North America	yes		
M22844		22844 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7529	Contra Costa County	California	United States	North America	yes		
M22906		22906 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7557	Contra Costa County	California	United States	North America	yes		
M22918		22918 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7564	Contra Costa County	California	United States	North America	yes		
M22955		22955 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Paleocene	Mf7588	Contra Costa County	California	United States	North America	yes		
M23009		23009 M	Polythalamia		FORAMINIFERA, Sorted Assemblage	Tertiary	Paleocene	Mf7620	Contra Costa County	California	United States	North America	yes		
M23011		23011 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf7622	Contra Costa County	California	United States	North America	yes		
M24309		24309 M	Polythalamia		FORAMINIFERA, sorted assemblage	Tertiary	Eocene	Mf8251	Contra Costa County	California	United States	North America	yes		
M40015		40015 M	Polythalamia	Textularia	mississippiensis	hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40017		40017 M	Polythalamia	Textularia	mississippiensis	hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40032		40032 M	Polythalamia	Dorthis	praefloga	hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40039		40039 M	Polythalamia			hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40046		40046 M	Polythalamia	Robulus	chehalensis	hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40050		40050 M	Polythalamia	Robulus	inornatus	hypotype	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40068		40068 M	Polythalamia	Lenticulina		hypotype	Eocene	A6662	Contra Costa County	California	United States	North America	yes		
M40110		40110 M	Polythalamia	Lagena	amphora	paucicostata	Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40123		40123 M	Polythalamia	Elphidium	smithi		Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40127		40127 M	Polythalamia	Uvigerina		hypotype	Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40134		40134 M	Polythalamia	Nodogenerina		hypotype	Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40136		40136 M	Polythalamia	Bulinella	robertsi		Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40138		40138 M	Polythalamia	Bulimina	pachecoensis	holotype	Paleocene	A6662	Contra Costa County	California	United States	North America	0000 0000 0405 0928	yes	
M40149		40149 M	Polythalamia	Loxostomum	delicatulum	hypotype	Paleocene	A6662	Contra Costa County	California	United States	North America	yes		
M40161		40161 M	Polythalamia	Angulogerina	wilcoxensis	hypotype	Paleocene	A6679	Contra Costa County	California	United States	North America	yes		
M40164		40164 M	Polythalamia	Ellipsonodosaria	nuttalli	gracillima	Eocene	A6679	Contra Costa County	California	United States	North America	yes		
M40165		40165 M	Polythalamia	Ellipsonodosaria	nuttalli	gracillima	FORAMINIFERA	hypotype	Tertiary	Eocene	A6679	United States	North America	yes	
M40167		40167 M	Polythalamia	Valvulineria	martinezensis		FORAMINIFERA	holotype	Tertiary	Paleocene	A6662	United States	North America	0000 0000 0405 1942	yes
M40168		40168 M	Polythalamia	Valvulineria	martinezensis		FORAMINIFERA	paratype	Tertiary	Paleocene	A6662	United States	North America	yes	
M40169		40169 M	Polythalamia	Valvulineria	martinezensis		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	United States	North America	yes	
M40172		40172 M	Polythalamia	Gyroldina			FORAMINIFERA	hypotype	Tertiary	Eocene	A6679	United States	North America	yes	
M40191		40191 M	Polythalamia	Alabamina	wilcoxensis		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	United States	North America	yes	
M40195		40195 M	Polythalamia	Pullenia	sallisburyi		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	United States	North America	yes	

M40212	40212 M	Polythalamia	Anomalina	regina		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	Contra Costa County	California	United States	North America		yes
M40216	40216 M	Polythalamia	Anomalina			FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	Contra Costa County	California	United States	North America		yes
M40219	40219 M	Polythalamia	Cibicides	eponidiformis		FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	Contra Costa County	California	United States	North America		yes
M40236	40236 M	Polythalamia	Cibicidoides	coalingensis	minor	FORAMINIFERA	holotype	Tertiary	Paleocene	A6662	Contra Costa County	California	United States	North America	0000 0000 0405 0963	yes
M40244	40244 M	Polythalamia	Uvigerina			FORAMINIFERA	hypotype	Tertiary	Paleocene	A6662	Contra Costa County	California	United States	North America		yes
V136590	136590 V	Chondrichthyes	Squatina					Tertiary	Miocene	B5549	Contra Costa County	California	United States	North America		yes