Hemphill Diversion Structure Project

Draft Environmental Impact Report

APPENDICES ONLY

CEQA Lead Agency:

Nevada Irrigation District

April 2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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(ECORP Consulting, Inc.)

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- C. Fish Passage Alternatives Developed for Auburn Ravine's NID Gaging Site and Hemphill Dam Site (Michael Love & Associates 2009);
- D. Hemphill Diversion Structure Final Report on Field Study Investigations
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Initial Study/NOP and Scoping Comments Appendices
(ECORP Consulting, Inc.)

APPENDIX 1.0 A1

Notice of Preparation and Scoping Comments
(ECORP Consulting, Inc.)

Notice of Preparation of a Draft Environmental Impact Report for the NID Hemphill Diversion Structure

The Nevada Irrigation District (NID) will be the Lead Agency and will prepare an environmental impact report for the Hemphill Diversion Structure Project. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (☐ is ☒ is not) attached but is available at: https://nidwater.com/hemphill-diversion-facility/documents/.

PROJECT DESCRIPTION:
The Proposed Project includes analysis of four potential alternatives including: 1) Riverbank Infiltration Gallery Alternative, 2) Fish Passage Alternative, 3) Pipeline Alternative, and 4) Abandonment of Hemphill Canal Alternative. The alternatives vary as far as construction attributes and areas of potential disturbance. All of these alternatives are designed to allow for fish passage beyond the Hemphill Diversion Structure on Auburn Ravine.

This project will require further CEQA environmental review in the form of an Environmental Impact Report (EIR).

PUBLIC REVIEW PERIOD:
The 30-day public review period for the Initial Study will begin on **September 3, 2020 and end on October 2, 2020** for any interested and concerned individuals and public agencies to submit written comments on the document. The Initial Study is available for review and download at the Nevada Irrigation District website at the following link: https://nidwater.com/hemphill-diversion-facility/documents/.

PUBLIC MEETING:
The Nevada Irrigation District will consider the certification of the EIR at a future Board of Directors meeting to be determined. An online public scoping meeting has been scheduled for **Monday, September 21, 2020 from 4:00 pm through 6:00 pm**. Because of current COVID-19 pandemic, the scoping meeting will be held online via Zoom. A brief presentation will begin at 4:00 pm, afterwards comments will be accepted until the meeting concludes at 6:00 pm. See https://nidwater.com/hemphill-diversion-facility/documents/ for information on how to connect to the Zoom meeting.

Please send your response to Kris Stepanian at the address shown on the reverse page or via email at stepaniank@nidwater.com.

Date: September 3, 2020
Signature: Tonia M Tabucchi Herrera
Title: Tonia M. Tabucchi Herrera, NID Project Manager
Telephone: 530-271-6815

Nevada Irrigation District
1036 West Main Street
Grass Valley, CA 95945

APPENDIX 1.0 A2

Initial Study Public Review Draft
(ECORP Consulting, Inc.)

Initial Study

Hemphill Diversion Structure Project

September 2020

Lead Agency:

Nevada Irrigation District
1036 West Main Street
Grass Valley, California 95945

Prepared by:

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2525 Warren Drive
Rocklin, California 95677

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INITIAL STUDY
HEMPHILL DIVERSION STRUCTURE PROJECT

Lead Agency:	Nevada Irrigation District (NID)
Project Proponent:	NID
Project Location:	The Hemphill Diversion Structure is located on Auburn Ravine northeast of the City of Lincoln, California. The structure diverts water from Auburn Ravine into the Hemphill Canal located south of the ravine for delivery to NID raw water customers. The Hemphill Diversion Structure is located in Section 13, Township 12 North, and Range 6 West (Mount Diablo Base and Meridian) of the "Lincoln" 7.5-minute quadrangle (Figure 1. *Regional Location* and Figure 2. *Site Location*). The structure is located at latitude 38.896731˚ and longitude -121.251885˚.

NID proposes to remove or replace the existing diversion structure by implementing one of four alternatives being considered by the NID. Based on the four alternatives, there are essentially three "project sites" as two of the alternatives are located in the same area. Elements of all four projects are located within the project site that encompasses the diversion structure and surrounding area.

Alternative 1 would include removal of the Hemphill Diversion Structure and construction of an infiltration gallery within the north or south bank of Auburn Ravine to facilitate continued water deliveries to Hemphill Canal. The gallery is anticipated to be located approximately 75 feet downstream of the existing diversion structure.

Alternative 2 would include the potential replacement or alteration of the Hemphill Diversion Structure to accommodate a fish ladder within the Auburn Ravine. The fish ladder is anticipated to be located adjacent to or on the existing diversion structure.

Alternative 3 would remove the existing diversion structure and construct an underground pipeline extending from existing NID facilities on Gold Hill Road to Hemphill Canal. Construction of Alternative 3 would include installation of a 24-inch raw water pipeline in the Fruitvale Road, Fowler Road and Virginiatown Road rights-of-way (ROWs). This alternative would also include an above-ground stream crossing downstream and west of the existing diversion. The majority of the pipeline is within Placer County jurisdiction for encroachment permits.

Alternative 4 would remove the Hemphill Diversion Structure and decommission Hemphill Canal and would include the Hemphill Canal as it travels through Turkey Creek Golf Course as well as adjacent land to the west. Additionally, this alternative would affect existing Hemphill Canal raw water users within the City of Lincoln.

Because of the four possible Alternatives, areas potentially affected by all of the Alternatives being considered range in elevation from 177 to 477 feet above mean sea level (AMSL).

Project Description:	The Proposed Project includes analysis of four potential alternatives including: 1) Riverbank Infiltration Gallery Alternative, 2) Fish Passage Alternative, 3) Pipeline Alternative, and 4) Abandonment of Hemphill Canal Alternative. The alternatives vary as far as construction attributes and areas of potential disturbance. All of these alternatives are designed to allow for fish passage beyond the Hemphill Diversion Structure.
Public Review Period:	September 3, 2020 to October 2, 2020
Public Scoping Meeting:	September 21, 2020 from 4:00pm to 6:00pm.

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ACRONYMS AND ABBREVIATIONS

AF	Acre-feet
AMSL	Above mean sea level
AR/CC	Auburn Ravine/Coon Creek
Assessment	Watershed Assessment
BMPs	Best Management Practices
CAL FIRE	California Department of Forestry and Fire Protection
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CARP	County Aquatic Resources Program
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
cfs	Cubic feet per second
CGS	California Geological Society
CH_4	Methane
CNEL	Community Noise Equivalent Level
CO	Carbon monoxide
CO_2	Carbon Dioxide
CO_2e	carbon dioxide equivalents
dBA	A-weighted decibels
Diesel PM	Diesel particulate matter

ACRONYMS AND ABBREVIATIONS

DOC	California Department of Conservation
DOE	California Department of Education
DOF	California Department of Finance
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
ECHO	Enforcement and Compliance History Online
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERP	Ecosystem Restoration Plan
ESA	Endangered Species Act
F-B-X 10 AC. MIN	Farm-Building site - 10 acre minimum
FEMA	Federal Emergency Management Agency
General Permit	General Construction Activity Stormwater Permit
GHG	Greenhouse Gas
HCP	Habitat Conservation Plan
IS	Initial Study
kWh	kilowatt-hours
L_{eq}	Equivalent noise level
LFD	Lincoln Fire Department
LOS	Level of service
LPD	Lincoln Police Department
MND	Mitigated Negative Declaration
MRZ	Mineral Resource Zones
MTP/SCS	Metropolitan Transportation Plan/Sustainable Communities Strategy
N_2O	Nitrous Oxide
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NID	Nevada Irrigation District
NMFS	National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
PCAPCD	Placer County Air Pollution Control District
PCCP	Placer County Conservation Program
PCFD	Placer County fire Department
PCSO	Placer County Sheriff's Office
PCT	Placer County Transit
PG&E	Pacific Gas and Electric
PM_{10}	coarse particulate matter

ACRONYMS AND ABBREVIATIONS

$PM_{2.5}$	fine particulate matter
PRC	Public Resources Code
Project or Proposed Project	Hemphill Diversion Structure Project
ROW	Right-of-way
RWQCB	Regional Water Quality Control Board
SACOG	Sacramento Area Council of Governments
SGMA	Sustainable Groundwater Management Act
SIP	State Implementation Plan
SO_2	Sulfur dioxide
SR	State Route
SVAB	Sacramento Valley Air Basin
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	Toxic air contaminants
UCMP	California Museum of Paleontology
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Service
VLDR	Village Low Density Residential
VMT	Vehicle miles traveled
VPR	Village Park and Recreation
WPUSD	Western Placer Unified School District
WPWMA	Western Placer Waste Management Authority

SECTION 1.0 BACKGROUND

1.1 Summary

Project Title:	Hemphill Diversion Structure Project
Lead Agency Name and Address:	Nevada Irrigation District 1036 West Main Street Grass Valley, California 95945
Contact Person and Phone Number:	Tonia M. Tabucchi Herrera NID Project Manager 530-271-6815
Project Location:	The Hemphill Diversion Structure is located on Auburn Ravine in the City of Lincoln, California. The structure diverts water from Auburn Ravine into the Hemphill Canal located south of the ravine for delivery to NID raw water customers. The Hemphill Diversion Structure is located in Section 13, Township 12 North, and Range 6 West (Mount Diablo Base and Meridian) of the "Lincoln" 7.5-minute quadrangle (Figure 1. *Regional Location* and Figure 2. Project Location). The structure is located at latitude 38.896731˚ and longitude -121.251885˚. (*Figure 1. Regional Location* and Figure 2. *Site Location*). NID proposes to remove or replace the existing diversion structure by implementing one of four alternatives being considered by the District. Based on the four alternatives, there are essentially three "project sites" as two of the alternatives are located in the same area. Elements of all four projects are located within the project site that encompasses the diversion structure and surrounding area. Alternative 1 would include removal of the Hemphill Diversion Structure and construction of an infiltration gallery within the north or south bank of Auburn Ravine to facilitate continued water deliveries to Hemphill Canal. The gallery is anticipated to be located approximately 75 feet downstream of the existing diversion structure. Alternative 2 would include the potential replacement or alteration of the Hemphill Diversion Structure to accommodate a fish ladder within Auburn Ravine. The fish

ladder is anticipated to be located adjacent to the existing diversion structure.

Alternative 3 would remove the existing diversion structure and construct an underground pipeline extending from existing NID facilities on Gold Hill Road to Hemphill Canal. Construction of Alternative 3 would include installation of 24-inch raw water pipeline in the Fruitvale Road, Fowler Road and Virginiatown Road ROWs. This alternative would also include an above-ground stream crossing downstream and west of the existing diversion. The majority of the pipeline is within Placer County jurisdiction for encroachment permits.

Alternative 4 would remove the Hemphill Diversion Structure and decommission Hemphill Canal and would include the Hemphill Canal as it travels through Turkey Creek Golf Course as well as adjacent land to the west. Additionally, this alternative would affect existing Hemphill Canal raw water users within the City of Lincoln.

Because of the four possible Alternatives, areas potentially affected by all of the Alternatives being considered range in elevation from 177 to 477 feet AMSL .38.896731˚ and longitude -121.251885˚. The Hemphill Diversion Structure project site elevation varies from 198 to 214 feet AMSL.

General Plan Designation:

City of Lincoln: Village 1 (V-1) (portions of all four alternatives are within Lincoln City limits)

Placer County: Agriculture/Timberland – 10 ac min. (includes portions of Alternative 3 within the Placer County unincorporated area)

Zoning:

City of Lincoln: Village 1 Specific Plan – VPR (Village Park and Recreation), VLDR (Village Low Density Residential) (portions of all four alternatives are within Lincoln city limits)

Placer County: Farm-Building site - 10 acre minimum (-F-B-X 10 AC. MIN.) (includes portions of Alternative 3 in Placer County) within the Placer County unincorporated area)

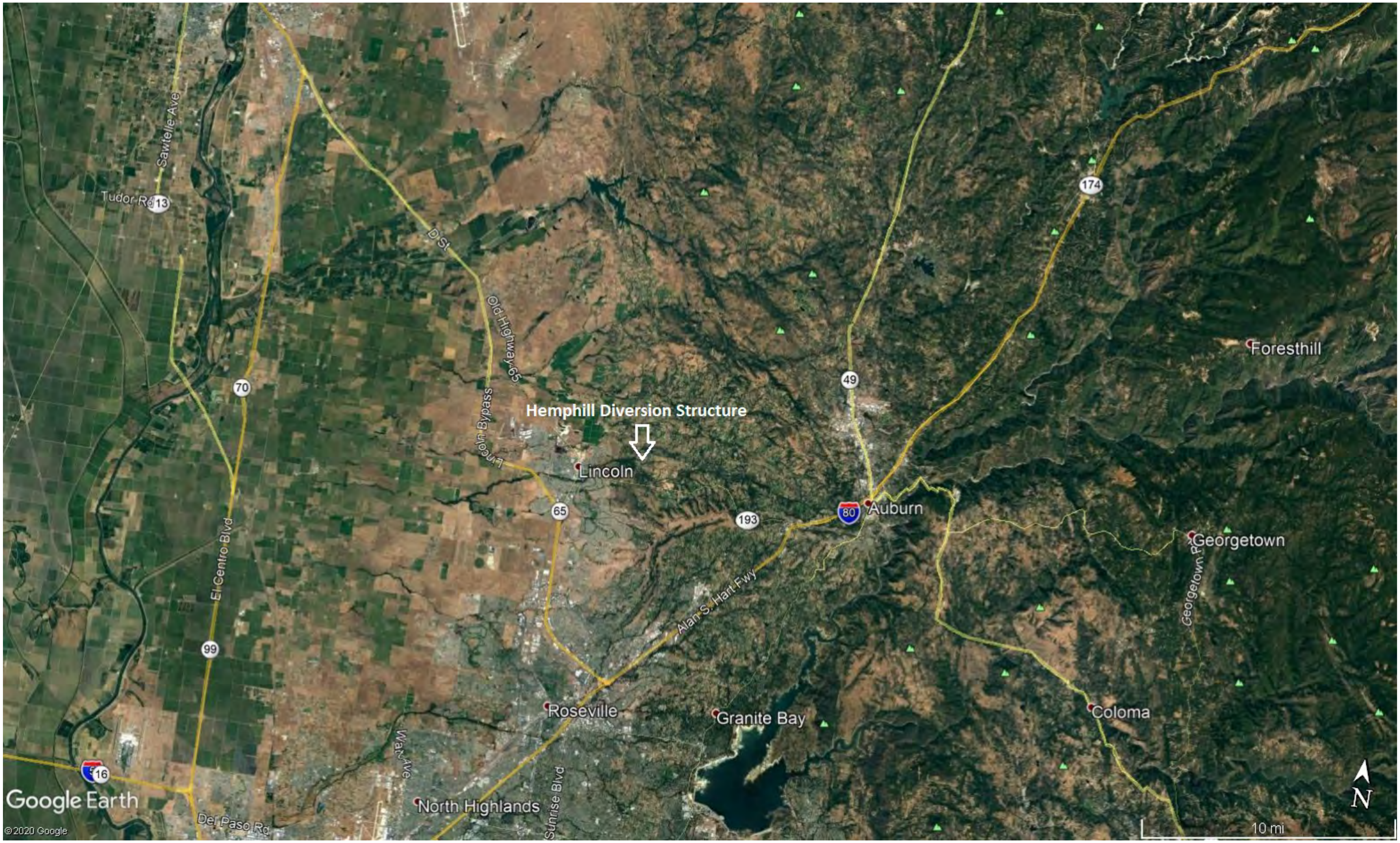

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Figure 1. Regional Location
2020-104 Hemphill Diversion Structure Project

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Figure 2. Site Location
2020-104 Hemphill Diversion Structure Project

1.2 Introduction

The Initial Study has been prepared to identify and assess the anticipated environmental impacts of the Hemphill Diversion Structure Project (Project or Proposed Project). The NID is the Lead Agency for this Initial Study.

The analysis for this Project includes four different alternatives including Alternative 1 - Riverbank Infiltration Gallery Alternative, Alternative 2 - Fish Ladder Alternative, Alternative 3 - Pipeline Alternative, and Alternative 4 - Abandonment of Hemphill Canal Alternative. All of these alternatives are described in Section 2.0 Project Description.

This document has been prepared to satisfy the California Environmental Quality Act (CEQA) (Public Resources Code [PRC], § 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, Mitigated Negative Declaration [MND], or Environmental Impact Report [EIR]). NID has already determined that an EIR will be prepared for the Project. The purpose of the Hemphill Diversion Structure Project Initial Study is to eliminate from further analysis those areas listed in CEQA Guidelines Appendix G shown as having no impact a or a less than significant impact, from further consideration in the EIR. The EIR will include a full analysis of all four alternatives to provide the NID Board of Directors with information necessary to approve their preferred alternative.

1.3 Environmental Setting and Surrounding Land Uses

The headwaters of Auburn Ravine are located just north of the City of Auburn at an elevation of approximately 1,600 feet. Auburn Ravine emerges from the Sierra foothills as it flows west through the City of Lincoln to its confluence with the East Side Canal. The East Side Canal flows into the Cross Canal, which joins the Sacramento River immediately downstream from the confluence of the Feather and Sacramento rivers near Verona. Auburn Ravine, which drains approximately 79 square miles, has a change in elevation from 1,600 to 30 feet AMSL. See Figure 3. *Auburn Ravine Watershed*.

The Hemphill Diversion Structure is located within the Auburn Ravine and is bounded by the Turkey Creek Golf Course to the southwest, undeveloped land to the northwest, and rural residential land developments to the east and northeast. The Lincoln Newcastle Highway (State Route [SR] 193) is located approximately 0.7 mile south of the project site, while Virginiatown Road is located 250 feet north of the site.

The project site for Alternatives 1 and 2, which are in the same general area, is relatively flat, with elevations ranging from 196-225 feet AMSL. In the Project area, Auburn Ravine is a perennial stream with a cobbly/rocky/sandy bottom in an incised channel that averages approximately 100 feet in width. When the Hemphill Diversion Structure is in place during the spring and summer, the stream is impounded to form a slack pond behind the diversion structure. The stream supports a band of riparian vegetation dominated by narrow-leaved willow and red alder below the ordinary high-water mark. Incising of the channel has resulted in the stream being mostly isolated from its historic floodplain in the Project area.

The Alternative 3 project site includes the area surrounding the Hemphill Diversion Structure, as well as, four to five feet of roadway ROW for pipeline trenching, potentially one lane width of roadway for repaving and 11 potential staging areas. The environmental setting along these roadways is low density rural residential development surrounded by grassland (often grazed) and agricultural fields. Grassland areas also include patches of valley oak woodland as well as other tree species. Elevations range from 185 feet AMSL at the most western portion of the Alternative 3 site to 425 feet AMSL at the NID Gold Hill Road facility.

The Alternative 4 project site includes the area surrounding the Hemphill Diversion Structure, as well as the Hemphill Canal as is extends for the Auburn Ravine south through the Turkey Creek Golf Course and vacant land and terminates where the canal crosses SR 193, The more regional setting is primarily characterized by built-out subdivisions to the south and west and agricultural and rural residential development to the north and east of the Alternative 4 project site. See Figure 4. *Surrounding Use*s.

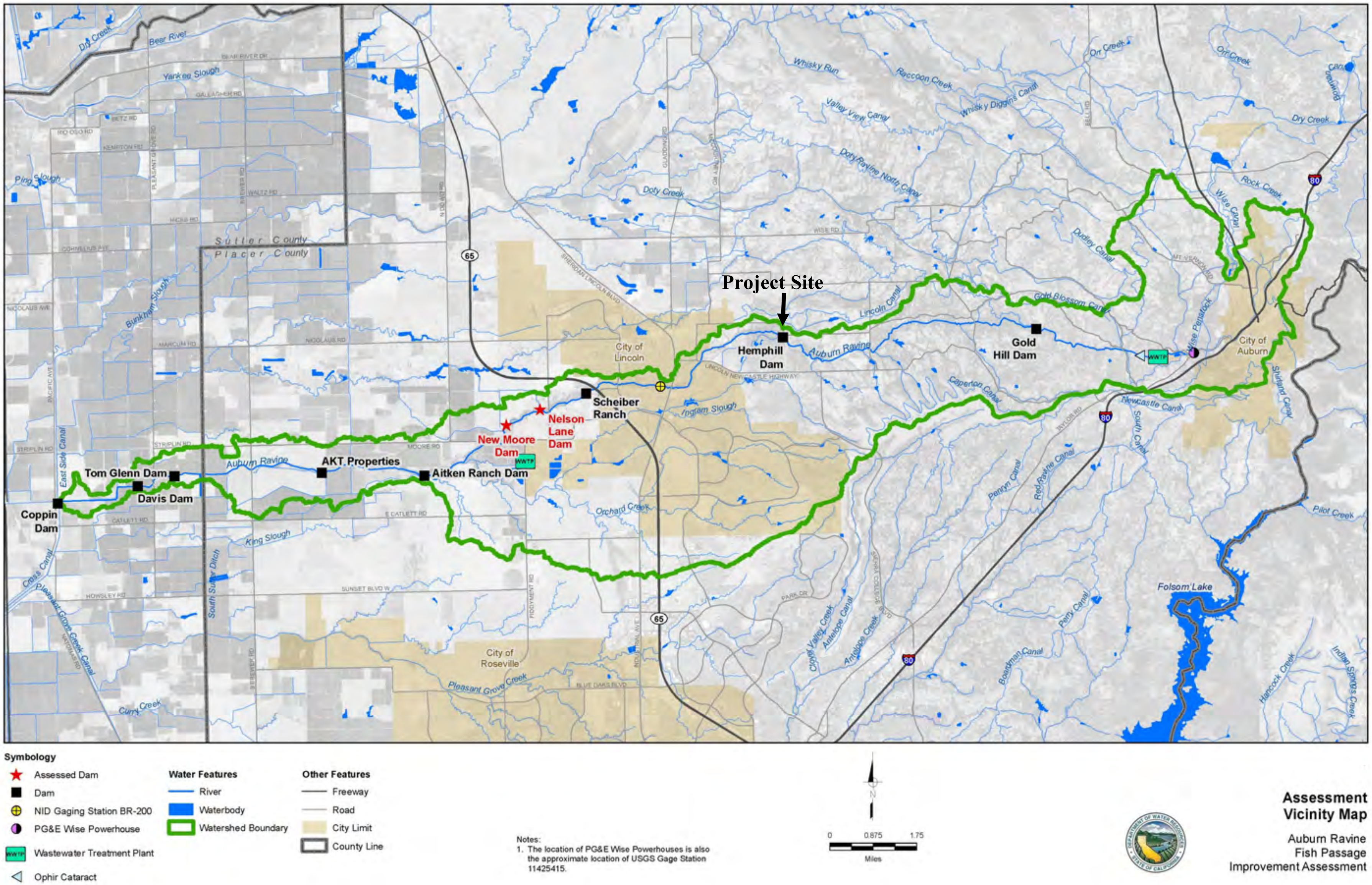

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Figure 3. Auburn Ravine Watershed

2020-104 Hemphill Diversion Structure Project

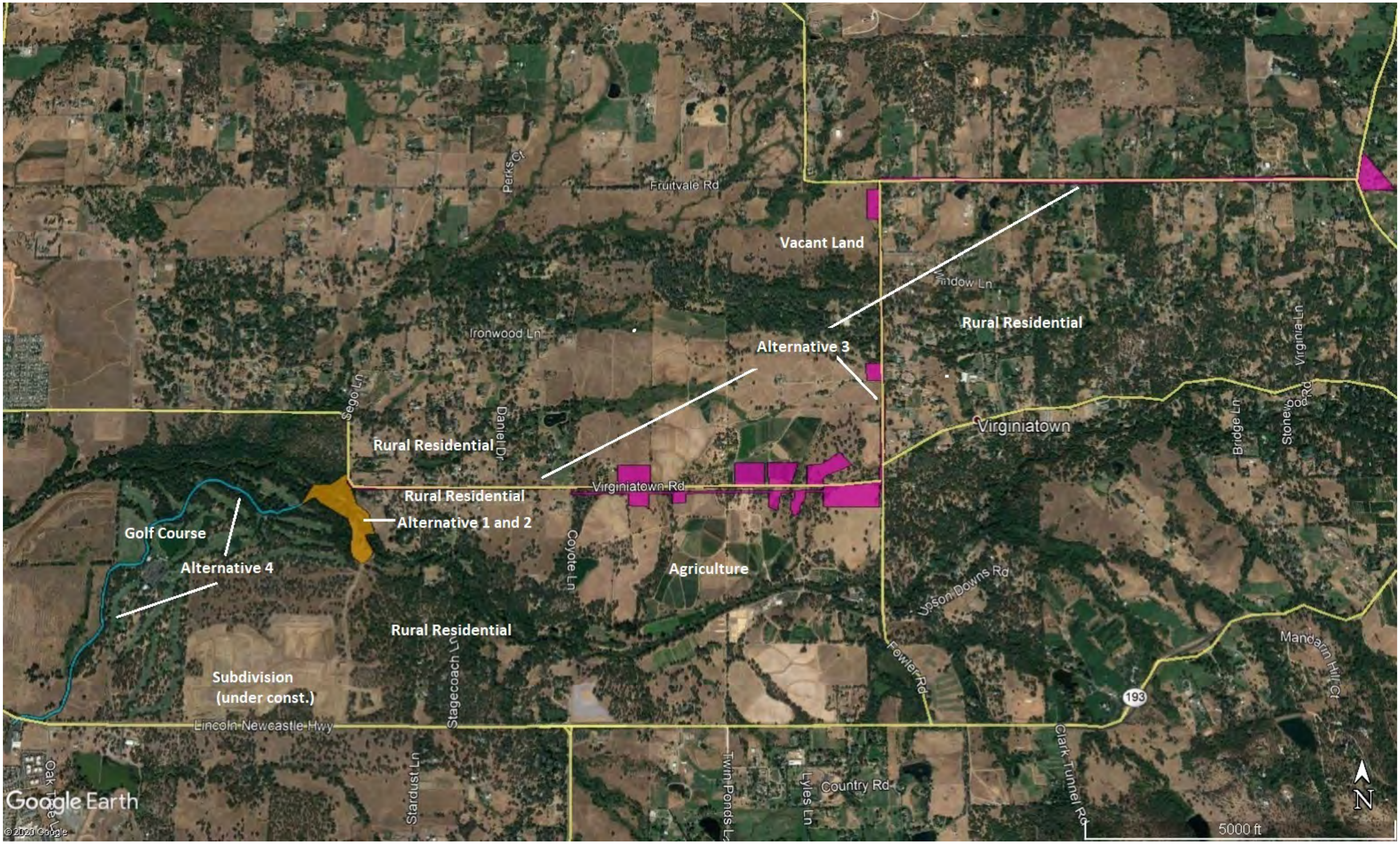

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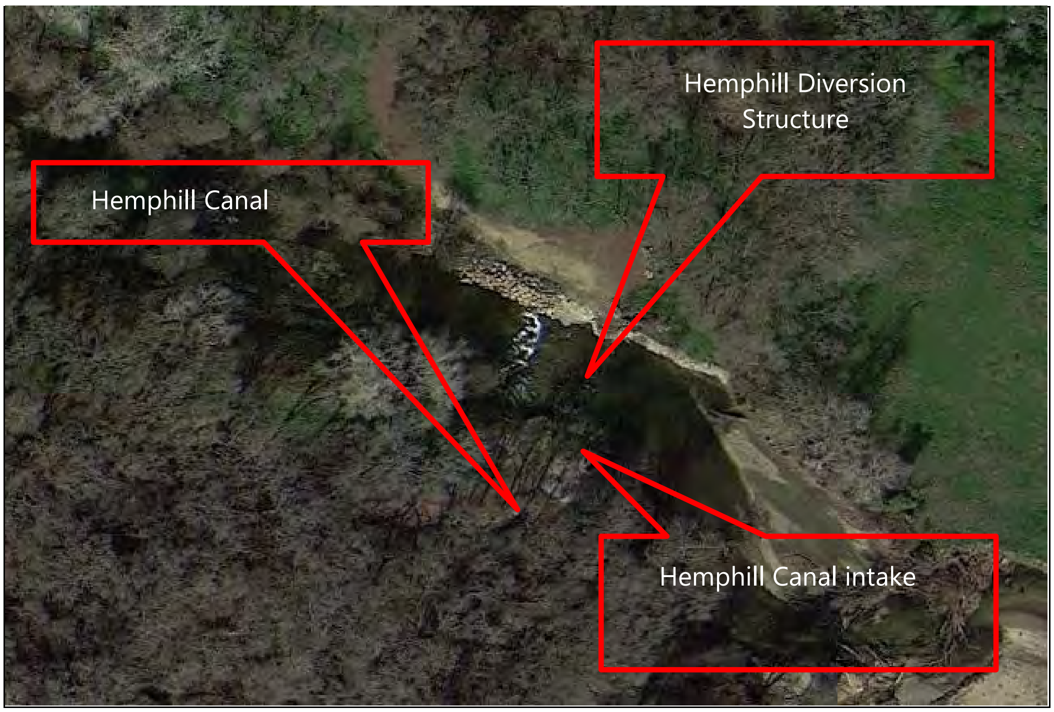
Figure 4. Surrounding Uses
2020-104 Hemphill Diversion Structure Project

SECTION 2.0 PROJECT DESCRIPTION

2.1 Project Characteristics

The Hemphill Diversion Structure has been operated by NID since it's purchase in 1933. The diversion structure is an approximately eight-foot-high concrete structure, with an approximately 40-foot-long concrete apron extending downstream. During irrigation season (mid-April through mid-October), three-foot flashboards are installed on top of the diversion structure in order to facilitate flow into the Hemphill Canal, which is located just upstream of the diversion structure along the left bank (looking downstream) of Auburn Ravine. Figure 5. *Hemphill Diversion Features* below illustrates the location of these features.

Figure 5. Hemphill Diversion Features



Source: NV5 2020

2.1.1 Project Site Definition

Based on the four alternatives discussed below, there are essentially three "project sites". The project sites for Alternatives 1 and 2, as defined in Figure 6. *Alternatives 1 and 2 Project Sites*, are essentially the same as these two alternatives would occur in the same general area. The 14.9-acre project site includes areas subject to construction/improvement, access routes and laydown/staging.

The Alternative 3 project site, the pipeline alternative, includes two potential Auburn Ravine crossing locations, as shown in Figure 9a. *Alternative 3: Pipeline Crossings*. This project site also includes the area around the Hemphill Diversion structure as shown in Figure 9b. *Alternative 3: Pipeline Project Site*. Most of this project site is within the Placer County jurisdictional boundaries. However, the middle of Auburn Ravine appears to be the dividing line in the diversion structure area between the City of Lincoln and Placer County; so those parts of the pipeline west of Virginiatown Road are actually in the City.

The Alternative 4 project site includes the area around the Hemphill Diversion Structure as well as the Hemphill Canal, as discussed below. and shown in Figure 10a.

2.1.2 Proposed Project Alternatives

As noted, NID is considering implementing one of four Project alternatives. Three of the alternatives would require the permanent removal of the Hemphill Diversion Structure, while one does not. All are designed to allow for anadromous fish migration beyond the Hemphill Diversion Structure site. NID has not yet identified a preferred alternative. The four alternatives assessed in this Initial Study are listed below.

Alternative 1: Riverbank Infiltration Gallery Alternative

Alternative 1 would construct an infiltration gallery downstream of the existing diversion structure along the south bank and extending approximately within 25 feet of the existing creek bed and channel. Work would include excavation to weathered granitic rock at approximately 15 feet, installation of infiltration gallery, placement of compacted engineered rock fill, placement of riprap along the bank, and installation of a wet well pump station. Installation of the gallery on the south side of the bank would require an extension of electrical service across Auburn Ravine from a newly set electrical pole to the pump station. The new pole would be located outside the creek banks. Shown in Figures 7a and 7b. *Infiltration Gallery Structure,* are preliminary designs of the riverbank infiltration gallery.

The infiltration gallery pump system would discharge water into the Hemphill Canal via either an armored canal or concrete distribution box located within the creek bank so as to not erode the existing canal. The existing gauge station would have to be relocated downstream and a portion of the canal would be filled.

Construction would occur with the existing Hemphill Diversion Structure in place, allowing for irrigation service to continue until the infiltration gallery is completed and functioning. After testing and proving of the infiltration gallery function, the existing diversion structure will be removed. The existing headwalls most likely will also be removed.

Figure 6. Alternatives 1 and 2 Project Site
2020-104 Hemphill Diversion Structure Project

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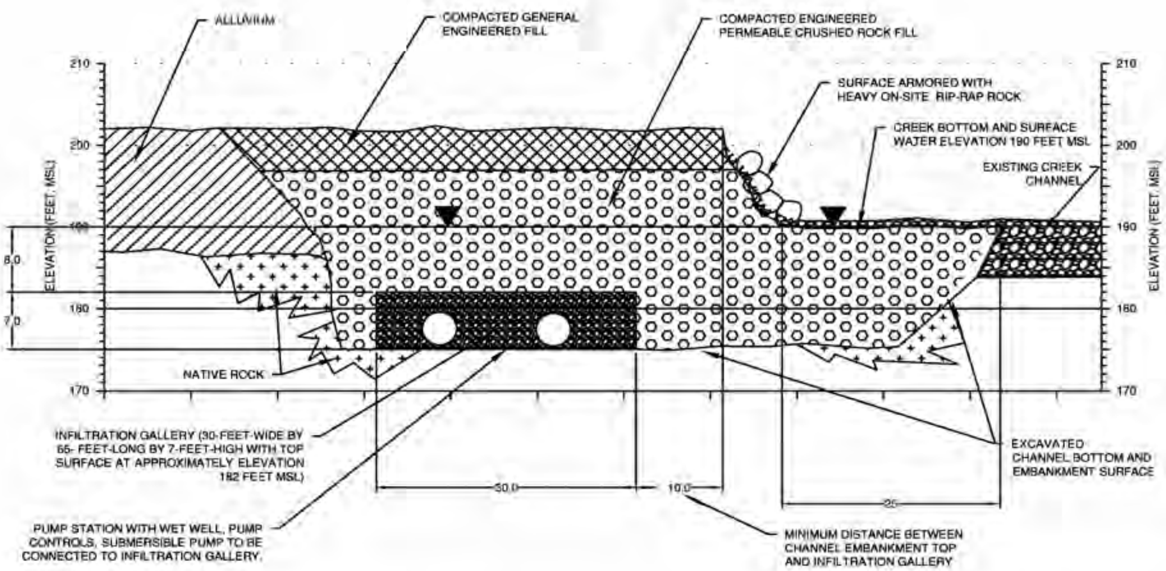

Notes: 1. ALL FEATURES AND DIMENSIONS SHOWN ON THIS FIGURE ARE APPROXIMATE AND ARE PROVIDED FOR GENERAL CONCEPT ILLUSTRATION PURPOSES.

2. WIDTH OF RAVINE IS VARIABLE OVER TIME, DESIGN ASSUMES EXISTING ROCK ELEVATION AS CONTROL DUE TO VARIABLE DEPTH OF WATER.

SCALES: HORIZONTAL = VERTICAL

20 Feet 0 20 40

1 Inch 0

NV5
792 Searls Avenue
Nevada City, California
PH: 530-478-1305 FX: 530-478-1019

CROSS-SECTION A-A'
DIVERSION STRUCTURE CONCEPT

Nevada Irrigation District
Hemphill Diversion Structure
Lincoln, Placer County, California

DRAWN BY:	DMO
CHECKED BY:	CRK
PROJ. NO.:	4794.00
DATE:	03-05-2020

SHEET NO.: 1

ECORP Consulting, Inc.
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Figure 7a. Infiltration Gallery Structure
2020-104 Hemphill Diversion Structure Project

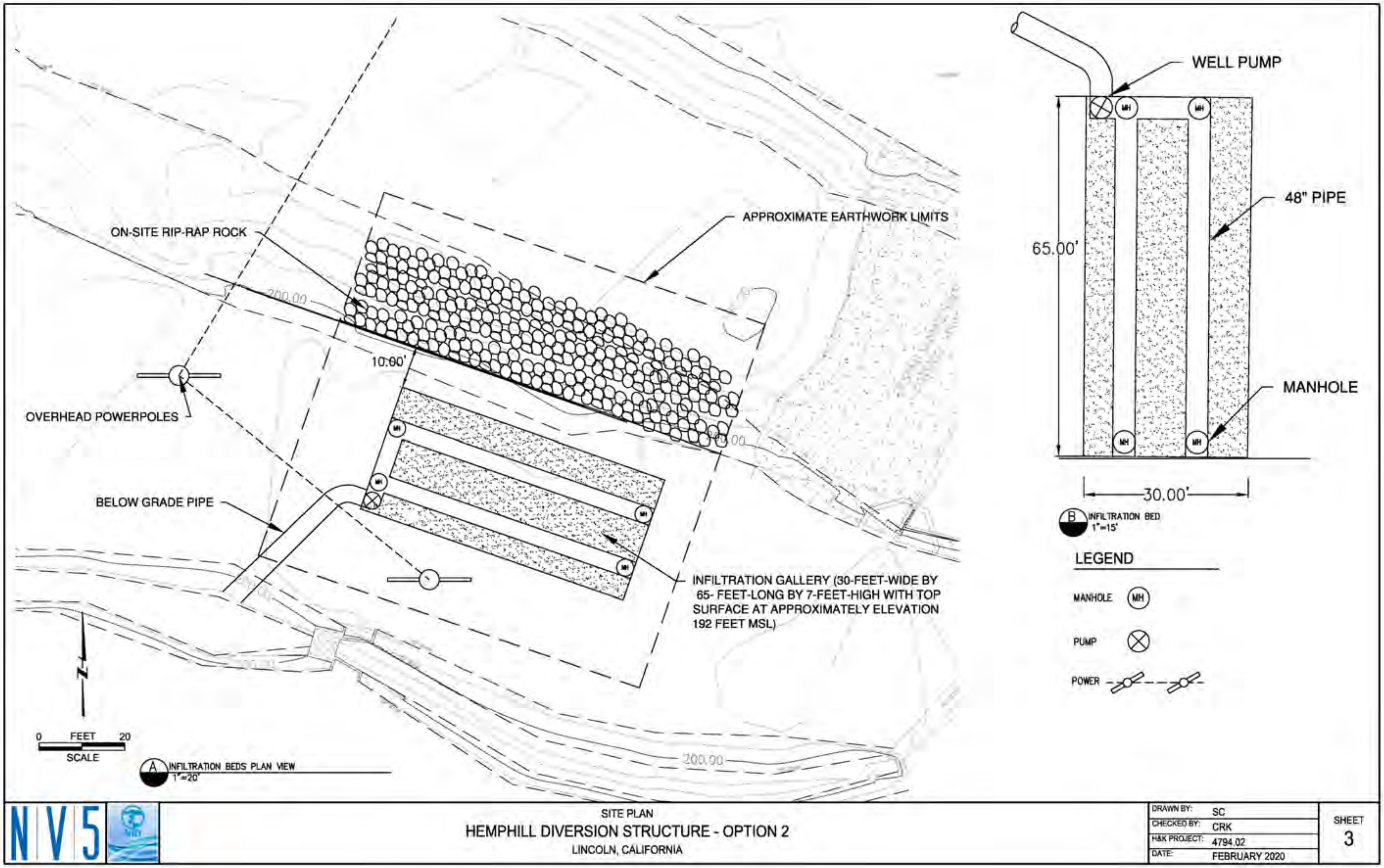

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Figure 7b. Infiltration Gallery Structure
2020-104 Hemphill Diversion Structure Project

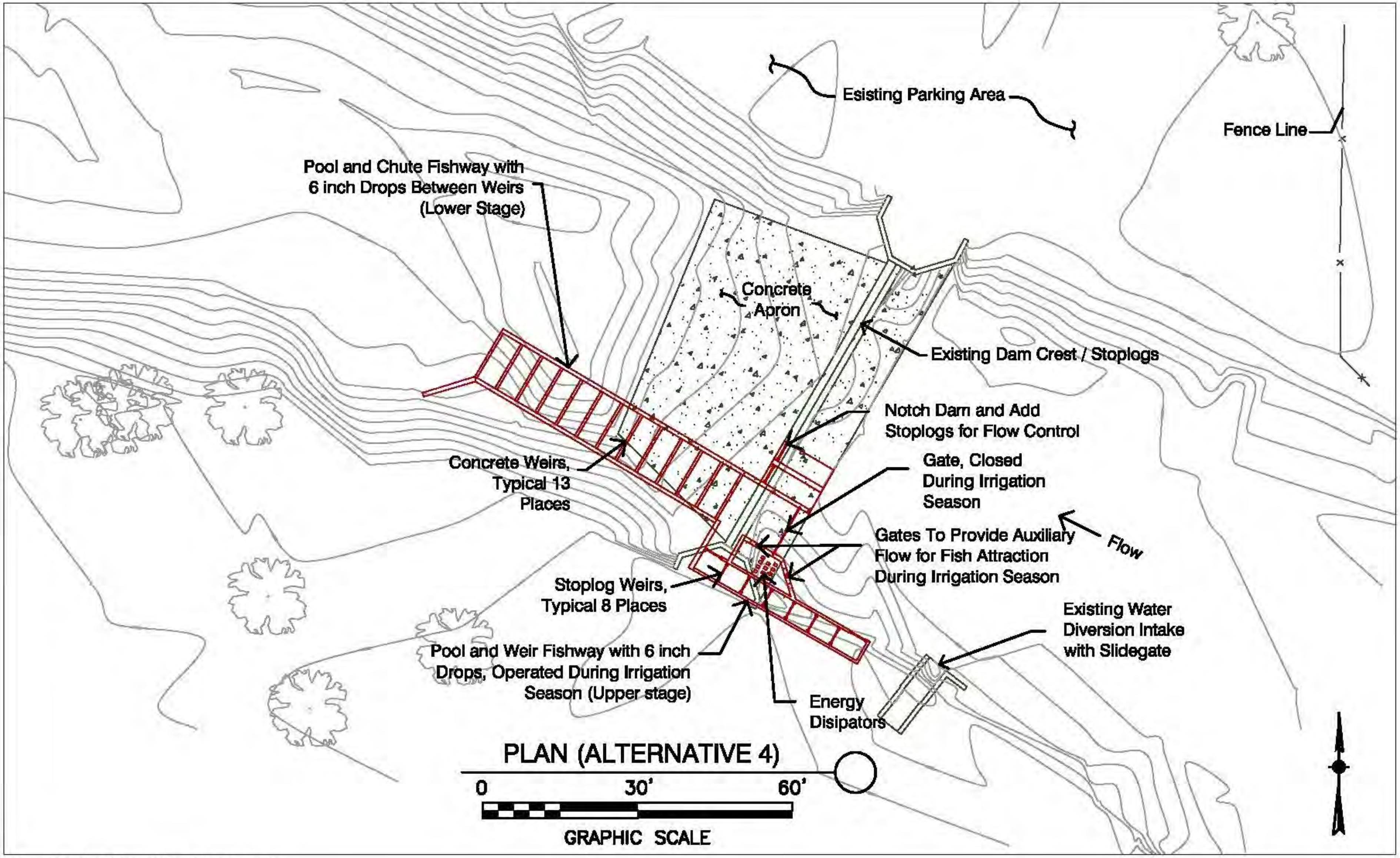
Alternative 2: Fish Passage Alternative

Alternative 2 is to install a fish ladder within Auburn Ravine. An evaluation of installation of a fish ladder was completed by Placer County in 2009, with consideration of four alternatives. Of the four alternatives, two provided year round passage for fish – either a bypass or two-stage fish ladder. As Auburn Ravine is identified for both fall run salmon and steelhead, selection of one of the two year-around passages would improve anadromous fish migration conditions. The two stage fish ladder is more desirable as it does not significantly increase the footprint of NID's operation. Due to the existing condition of the diversion structure, there is a potential that the existing Hemphill Diversion Structure may need replacement to construct a viable fish ladder facility.

Figure 8 Alternative 2: Fish Ladder Conceptual Design provides a conceptual design for the fish ladder. Further analysis and design of a fish ladder at this location is being completed at this time and actual design of the ladder may change. However, the location of the fish ladder will remain within the Alternatives 1 and 2 project site as illustrated in Figure 6.

Alternative 3: Pipeline Alternative

Alternative 3 would construct a 24-inch pipeline from NID's Placer Yard on Gold Hill Road and then along Fruitvale Road, Fowler Road, Virginiatown Road, and the access road to the Hemphill Canal. The Alternative 3 project site includes two potential Auburn Ravine crossing locations, as shown in Figure 9a. This project site also includes the area around the Hemphill Diversion Structure, the pipeline routes, and the staging areas, as shown in Figure 9b. Figure 9a illustrates the potential alignment for a pipeline(s) to provide raw water to the Hemphill Canal. Work is anticipated to occur within the Placer County ROW along Fruitvale, Fowler and Virginiatown roads. Trenching will be approximately 3.5 to 4 feet wide. This alternative may require construction within private property adjacent to Virginiatown Road, which would necessitate easement acquisitions within these properties. An additional approximately 25-foot easement may also be required in the vicinity of the access road and pipeline crossing. The pipeline would cross Auburn Ravine via either an aerial pipe or jack-and-bore construction to serve the Hemphill Canal. Two possible locations for the crossing of Auburn Ravine have been identified: Pipe Crossing A and Pipe Crossing B, as shown in Figure 9a. Pipe Crossing A is located in the same area as the existing Hemphill Diversion Structure. Pipe Crossing B is located approximately 550 feet downstream of the diversion structure. This location was selected as it represents the narrowest span over/under the creek for the pipe. Additionally, this alternative includes 11 potential staging areas for environmental review along Fruitvale, Fowler and Virginiatown roads. However, not all of these staging areas will be used as some will be eliminated as result of the biological and cultural surveys or lack of property access. The restoration of the roadway would occur upon completion of construction as shown in Figure 9a. An initial constraint analysis is being completed to evaluate the staging areas. This information will assist in determining the preferred staging area locations. Easements will be required, and additional surveys may be needed depending on site conditions.



Source: Michael Love and Associates 2009

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Figure 8. Alternative 2: Fish Ladder Conceptual Design
2020-104 Hemphill Diversion Structure Project

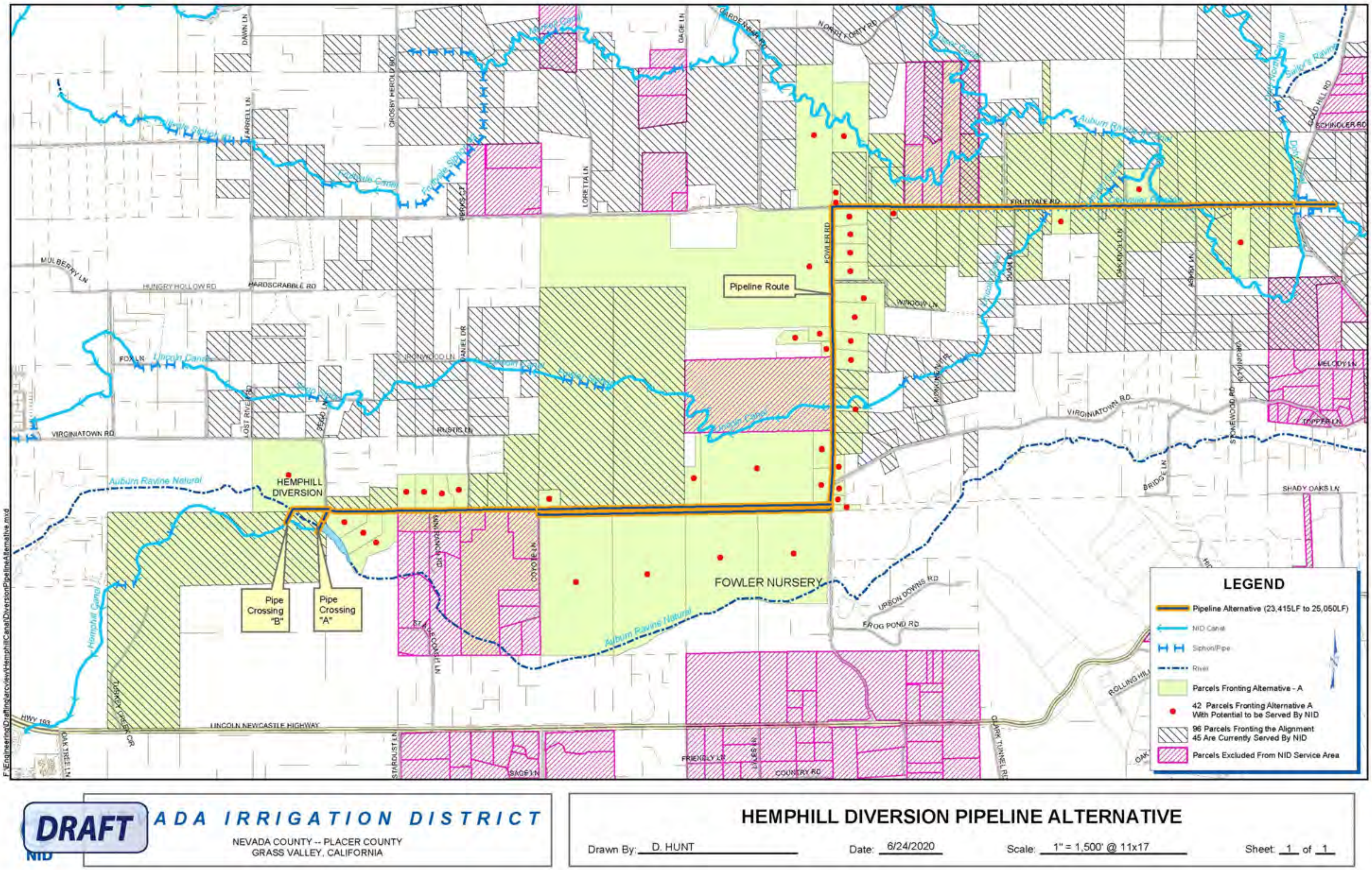

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Figure 9a. Alternative 3: Pipeline Route and Crossings

2020-104 Hemphill Diversion Structure Project

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Figure 9b. Alternative 3: Pipeline Project Site

2020-104 Hemphill Diversion Structure Project

Alternative 4: Abandonment of Hemphill Canal Alternative

The Alternative 4 project site includes the Hemphill Canal as well as the area around the Hemphill Diversion Structure as shown in *Figure 10a. Alternative 4: Project Site.* Hemphill Canal provides irrigation water for multiple parcels including, but not limited to Turkey Creek Golf Course, Lincoln Hills Golf Course, Lincoln Crossing Community Association, and Lincoln Land Holdings, as shown in Figure 10b. *Affected Parcels*. Alternative 4 would abandon the Hemphill Canal and, as an option to the various property owners for the abandonment of the canal, NID historically offers to fill in the canal with soil through the leveling of existing berms or the importing of soil to level out the canal area. As such, this Initial Study analysis is based on the leveling of the canal. This would extend from where the canal connects to Auburn Ravine down to SR 193. South of SR 193, the canal is undergrounded, so no leveling of the canal is required beyond that point.

With this Alternative, no NID irrigation water would be provided down the Hemphill Canal, which would affect those properties listed above. The canal is currently master-planned for 18 cubic feet per second (cfs). There are six existing service boxes on the canal with a peak summer delivery of 12 cfs. Historically, NID's goal is to keep the customer "whole" with modification projects such as these. A replacement municipal well was considered for delivery into the Hemphill Canal, but was rejected due to sustainability. Private well owners would have the same concern. There is the potential of evaluating pump accounts for individuals. For a pump account, NID would import water to Auburn Ravine and the individual property owner would own and maintain smaller pump systems. This alternative would remove the Hemphill Diversion and Hemphill Canal inlet structures from the Auburn Ravine.

Removal of Hemphill Diversion Structure

As discussed above, Alternatives 1, 3, and 4 would include the removal of the existing Hemphill Structure. As noted above, there is a potential that the existing diversion structure would be reconstructed under Alternative 2 as well. Removal of the existing diversion structure can occur either all at once or in increments, after implementation of the selected alternative. A key consideration will be determining whether manual sediment removal will be required or if natural processes will be relied on to disperse sediment trapped behind the diversion downstream. A sedimentation transport study considering these options from a geomorphic perspective has been completed and will be considered in the environmental review process. Additionally, stabilization of upstream banks may be required and will be considered in the environmental review process.

Project Construction Timing and Workers

Construction timing, anticipated work force, and equipment requirements to implement the Proposed Project will vary based on which one of the four alternatives is chosen by NID. Because the alternatives scope and complexity vary schedule, staffing and equipment required to implement the alternatives can't be determined at this time. However, construction details and timing will be more precisely defined in the EIR.

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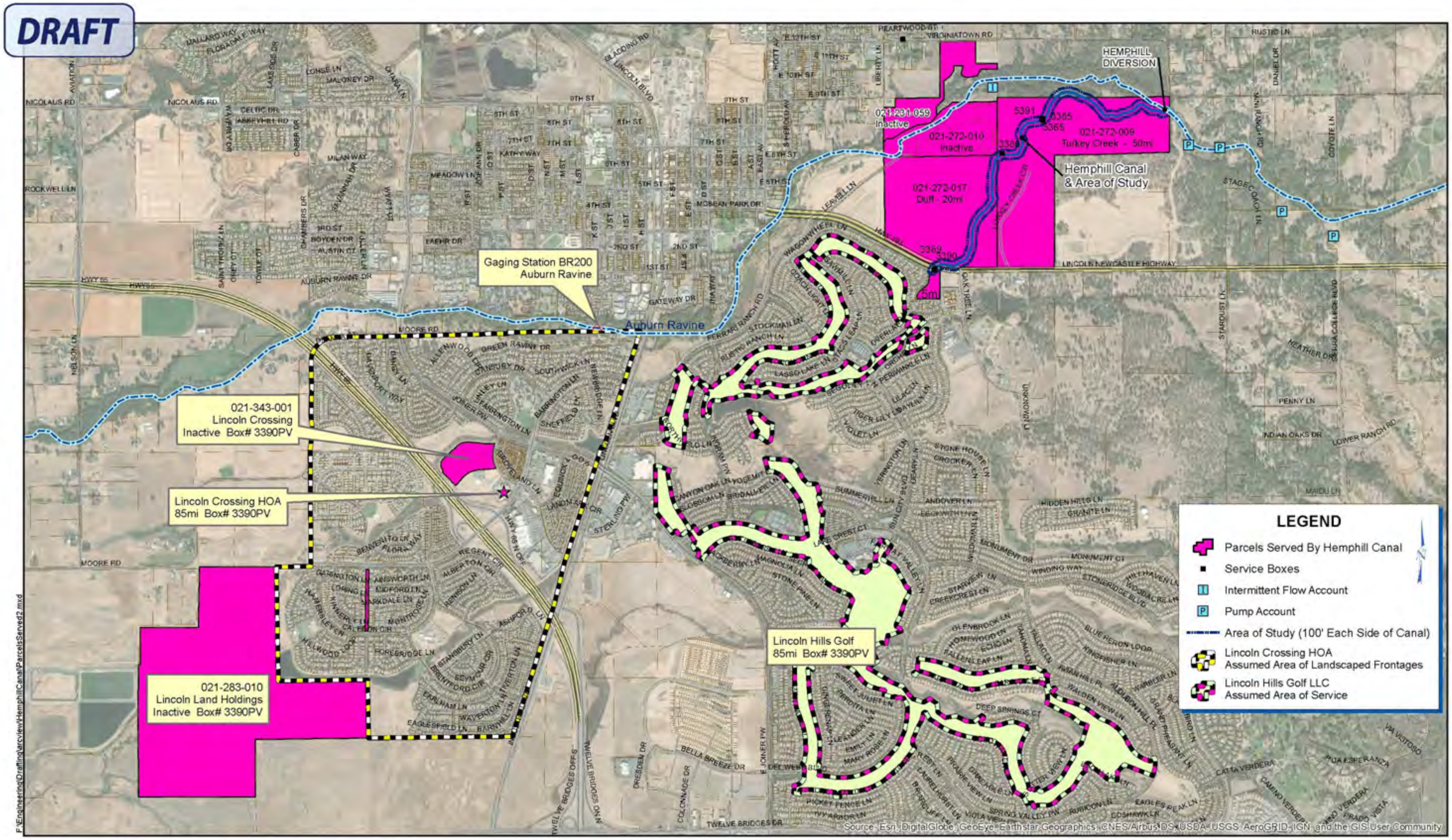
Figure 10a. Alternative 4 Project Site
2020-104 Hemphill Diversion Structure Project



NID

NEVADA IRRIGATION DISTRICT

NEVADA COUNTY -- PLACER COUNTY
GRASS VALLEY, CALIFORNIA

Date: 6/25/2020
Drawn By: D. HUNT

HEMPHILL DIVERSION PROJECT
DISCONTINUATION OF SERVICES
AND/OR CONVERT TO PUMP ACCOUNTS

Scale: 1" = 2,000' @ 11x17

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 10b. Affected Parcels
2020-104 Hemphill Diversion Structure Project

2.2 Regulatory Requirements, Permits, and Approvals

The following approvals and regulatory permits would be required for implementation of the Proposed Project.

2.2.1 Lead Agency Approval

As the lead agency, NID has the ultimate authority for Project approval or denial. The Proposed Project may require the following discretionary approvals and permits by the NID for actions proposed as part of the Project:

- Certification of the EIR
- Selection of a preferred Alternative

In addition to the above NID actions, the Project may require approvals, permits, and entitlements from other public agencies for which this Initial Study may be used, including, without limitation, the following:

- California Department of Fish and Wildlife (CDFW), Region 2
- California Regional Water Quality Control Board (RWQCB), Region 5
- Placer County Air Pollution Control District (PCAPCD)
- United States Army Corp of Engineers
- National Marine Fisheries Service (NMFS)
- Placer County Community Development Department

2.3 Relationship of Project to Other Plans and Projects

2.3.1 City of Lincoln General Plan 2050

Portions of the Proposed Project are located within the jurisdiction of the City of Lincoln and therefore may be subject to the Lincoln General Plan goals and policies. The City of Lincoln General Plan 2050 is the primary document governing land use development in the City. The General Plan 2050 was adopted in March 2008. The City's General Plan includes numerous goals and policies pertaining to sustainability; land use; circulation; community design; downtown; economic development; housing; parks, public facilities, and services; open space and environment; cultural resources and historic preservation; safety; and noise.

2.3.2 Placer County General Plan

Portions of the Proposed Project are located within the jurisdiction of Placer County and therefore may be subject to the Placer County General Plan goals and policies. The Placer County General Plan consists of two types of documents: the Countywide General Plan (which consists of a policy document and land use diagram) and a set of more detailed community plans (including one "area" plan) covering specific areas of the unincorporated County. The Countywide General Plan provides an overall framework for development of the County and protection of its natural and cultural resources. The goals and policies contained in the Countywide General Plan are applicable throughout the County, except to the extent that County authority is preempted by cities within their corporate limits. Community and area plans (hereafter referred to as community plans), adopted in the same manner as the Countywide General Plan, provide a more detailed focus on specific geographic areas within the unincorporated County. The goals and policies contained in the community plans supplement and elaborate upon, but do not supersede, the goals and policies of the Countywide General Plan.

2.3.3 Auburn Ravine/Coon Creek Ecosystem Restoration Plan

The Proposed Project is located in the area covered by the Auburn Ravine/Coon Creek Ecosystem Restoration Plan (ERP). The ERP is composed of a Watershed Assessment Report and a Restoration Program. The Introduction section provides guiding principles for the preparation of the ERP, ERP goals and objectives, and general descriptions of the watersheds located within the planning area. The Watershed Assessment (Assessment) section identifies growth projections and land uses within the ERP planning area, summarizes the water resources present, and provides a description of current watershed conditions as they pertain to stream sediment and water quality. Plant communities established within the ERP planning area and special-status fish and wildlife species potentially occurring are also included in the Assessment. The final section of the ERP, the Restoration Program, identifies specific restoration projects within the ERP planning area and presents the goals, opportunities, and requirements established for individual project implementation. In addition, monitoring guidelines are provided for the restoration project.

2.3.4 Placer County Conservation Program

The project site is located in the area identified as being within the Placer County Conservation Program (PCCP). The PCCP is a County-proposed solution to coordinate and streamline the permitting process by allowing local entities to issue state and federal permits. The proposed PCCP is a Habitat Conservation Plan (HCP) under the federal Endangered Species Act (ESA) and a Natural Community Conservation Plan (NCCP) under the California Natural Community Conservation Planning Act. As proposed, the PCCP would include the County Aquatic Resources Program (CARP) to issue permits related to the Federal Clean Water Act and the California Fish and Game Code. At this time, the PCCP has not been adopted and is currently undergoing environmental review under CEQA and National Environmental Policy Act (NEPA). The Final PCCP Environmental Impact Report/Environmental Impact Statement (EIR/EIS) is currently out of public review until June 22, 2020 (Placer Conservation 2020). The PCCP has not yet been adopted.

SECTION 3.0 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.

☐ Aesthetics	☒ Greenhouse Gas Emissions	☐ Public Services
☐ Agriculture and Forestry Resources	☐ Hazards/Hazardous Materials	☐ Recreation
☒ Air Quality	☒ Hydrology/Water Quality	☐ Transportation
☒ Biological Resources	☐ Land Use and Planning	☒ Tribal Cultural Resources
☒ Cultural Resources	☐ Mineral Resources	☒ Utilities and Service Systems
☐ Energy	☒ Noise	☐ Wildfire
☒ Geology and Soils	☐ Population and Housing	☒ 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.	☐

8/27/2020

Greg Jones
NID Interim General Manager

Date

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SECTION 4.0 ENVIRONMENTAL CHECKLIST AND DISCUSSION

4.1 Aesthetics

4.1.1 Environmental Setting

Views from the Alternatives 1 and 2 sites are limited to the area immediately surrounding the Hemphill Diversion Structure. Views beyond the structure are largely obstructed by trees and dense vegetation. Views of the creek and immediate adjacent area are generally unobstructed.

Views available from the Alternative 3 pipeline route include the rolling grasslands intermixed with stands of trees and private ponds. The area is largely developed with large lot rural residential uses. While distant views of the Sierra Nevada may be available, views are fairly limited by trees and buildings.

Views from Alternative 4 include the Turkey Creek Golf Course as well as distant views of the Sierra Nevada. The views of the Sierra Nevada, however, are fairly limited by vegetation and buildings.

4.1.2 Regional Setting

City of Lincoln

While the City of Lincoln General Plan Background Report identifies views of Telegraph Hill and background views of the Sierra Nevada from SR-65 to be of scenic quality, the General Plan does not include any policies for the protection of views or identify any viewsheds, or scenic vistas that should be protected.

Placer County

The Placer County General Plan does not identify any specific scenic viewsheds that should be protected to allow for public enjoyment. However, Policy 1.K.1 does require that new development in scenic areas (e.g., river canyons, lake watersheds, scenic highway corridors, ridgelines and steep slopes) be planned and designed in a manner that employs design, construction, and maintenance techniques that:

a. avoids locating structures along ridgelines and steep slopes;
b. incorporates design and screening measures to minimize the visibility of structures and graded areas; and
c. maintains the character and visual quality of the area.

Additionally, Policy 1.K.2 requires that new development in scenic areas be designed to utilize natural landforms and vegetation for screening structures, access roads, building foundations, and cut-and-fill slopes.

State Scenic Highways

The intent of the California Scenic Highway Program is to protect and enhance the scenic beauty of California’s highways and adjacent corridors. A highway can be designated as scenic based on how much natural beauty can be seen by users of the highway, the quality of the scenic landscape, and if development impacts the enjoyment of the view. No officially designated scenic highways are located within the vicinity of any of the Project's alternative sites (Caltrans 2020).

Visual Character of the Project Alternatives Sites

The Alternative 1 and 2 site surrounds the existing Hemphill Diversion Structure. The Hemphill Diversion Structure is located in the Auburn Ravine. At this location, the Auburn Ravine is a fairly shallow tree-lined creek with elevations ranging from 198-214 feet AMSL. The Diversion Structure consists of two, approximately eight-foot-tall concrete structure located on either side of Auburn Ravine and concrete dam within the ravine. During irrigation season (April to October) three-foot-tall flashboards are installed in the diversion to increase the water surface elevation upstream and direct flow into the Hemphill canal. The canal intake is located 40 feet upstream of the structure on river-left (looking downstream). See Figures 11a through 11d for the visual character of the site with and without the flashboards installed.

For the most part, the Alternative 3 pipeline route occurs within the ROW of existing roadways and potential staging areas are located on private property adjacent to the roadway with the exception of the area west of Virginiatown Road, which includes the proposed pipeline crossing location on Auburn Ravine. The Project area roadways are typical rural two-lane paved roads. Portions of the roads have defined shoulders, while other areas have narrow or no shoulders. The Alternative 3 project site also includes the Hemphill Diversion Structure removal.

The Alternative 4 project site includes the Hemphill Diversion Structure area and the Hemphill Canal as it meanders through the Turkey Creek Golf Course and the vacant land immediately west of the golf course and north of SR 193.

Figure 11a. Hemphill Diversion Structure During Irrigation Season

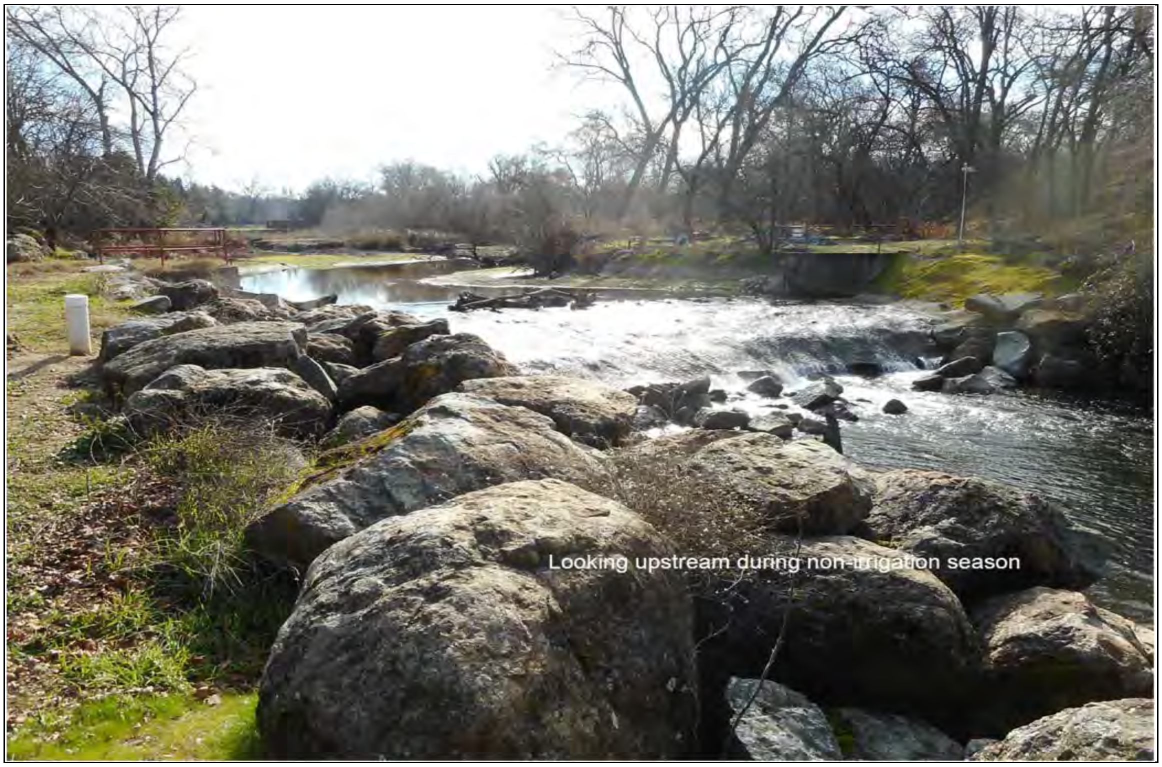


Figure 11b. Hemphill Diversion Structure During Non-Irrigation Season

Figure 11c. Hemphill Diversion Structure Flashboards Not Installed

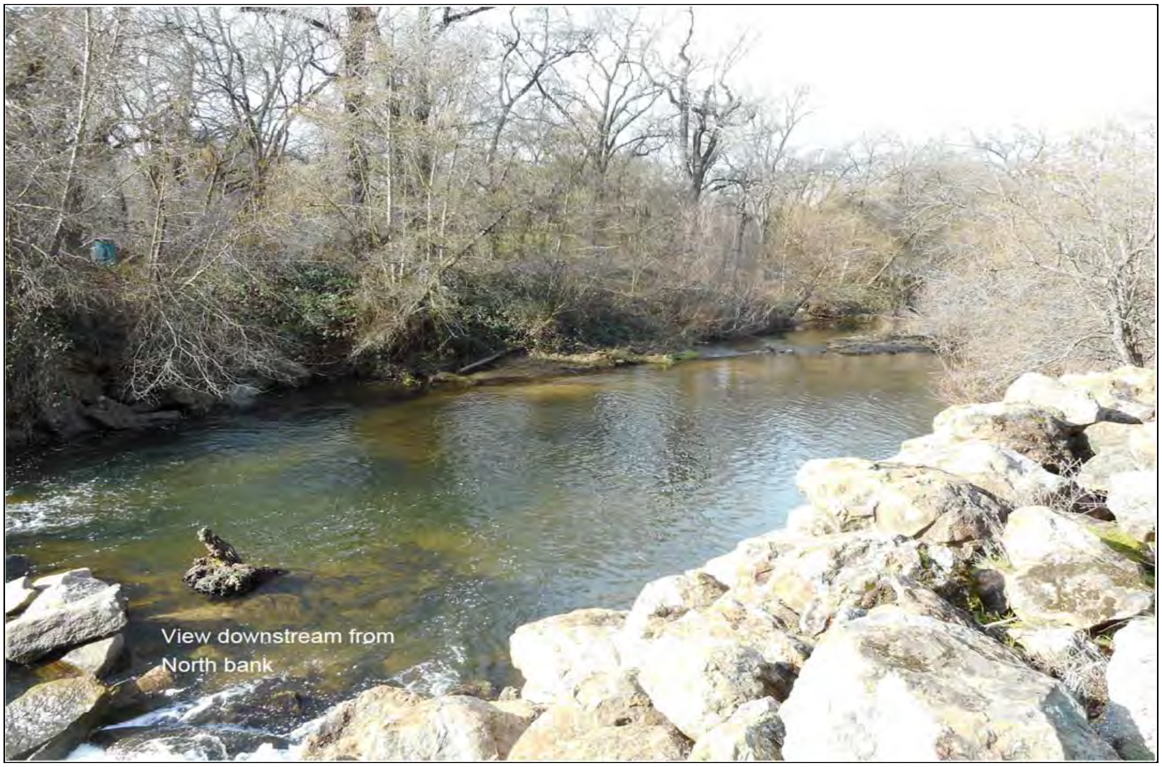


Figure 11d. Hemphill Diversion Structure View Downstream

4.1.3 Aesthetics (I) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒

During construction there will be vehicles and equipment at various sites depending on which of the four alternatives is chosen for construction. However, these will be temporary and will cease once construction is completed. All features constructed as a part of the four Alternatives would be at ground level or underground, with the exception of the potential for the aboveground pipeline crossing of Auburn Ravine in Alternative 3. None of the Alternatives would result in obstruction of scenic views. The Project would not affect the viewshed or scenic vista of the site. Implementation of Alternatives 1, 3 and 4 would return Auburn Ravine to a more natural state in the vicinity of the existing Hemphill Diversion Structure. Therefore, the Proposed Project would have no impact on scenic vistas.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒

The Project Alternatives are not located within view of an officially designated scenic highway. No impact would occur.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) In a non-urbanized area substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point.) If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	☐	☐	☒	☐

There will be construction activities at various sites during construction, depending on which of the four alternatives is chosen for construction. However, these will be temporary and will cease once construction is completed. All features constructed as a part of the four Alternatives would be at ground level or underground, with the exception the aboveground pipeline crossing of Auburn Ravine if Alternative 3 is chosen. While the Alternative 3 pipeline crossing would present a new manmade structure to the creek, this structure is not inconsistent with the manmade structures currently existing in the Project area. Therefore, none of the Alternatives would result in a substantial degradation of the visual character of the site or impact public views of the site and its surroundings. The Project would have a less than significant impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) Would the project create a new source of substantial light or glare, which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒

The proposed Alternatives include the removal of an existing diversion structure and canal inlet structure, depending on the alternative. The Project may include the construction of a fish ladder or infiltration structure or pipeline. All of these are either underground or at the ground surface and do not include any construction or operation attributes that would produce light or glare. No new light or glare sources would be introduced during construction or operation. All normal construction work will be performed during normal daylight construction hours, thereby eliminating any need for temporary light sources necessary for nighttime work. As such, the Proposed Project would have no impact for the potential to create light or glare that would adversely affect day or nighttime views.

4.2 Agriculture and Forestry Resources

4.2.1 Environmental Setting

The California Department of Conservation (DOC) manages the Farmland Mapping and Monitoring Program), which identifies and maps significant farmland. Farmland is classified using a system of five categories including Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, and Grazing Land. The classifications of farmland as Prime Farmland, Unique Farmland, and Farmland of Statewide Importance are based on the suitability of soils for agricultural production, as determined by a soil survey conducted by the Natural Resources Conservation Service (NRCS). The DOC manages the California Important Farmland Finder, an interactive website, which can be used to identify the farmland classification of a specific area. This website identifies the lands in the Project vicinity as being Grazing Land and Other Land (DOC 2020a).

As discussed previously, based on the various alternatives, there are essentially three project sites analyzed in this Initial Study. One parcel under Williamson Act Contract is located on Fruitvale Road, adjacent to the pipeline alignment for Alternative 3 (Placer County 2020). No construction areas under any of the Project's Alternatives nor any adjacent lands are subject to a Williamson Act contract (Placer County 2020).

PRC Section 12220(g) defines forest land as "land that can support 10-percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits."

PRC Section 4526 defines timberland as "land, … which is available for, and capable of, growing a crop of trees of a commercial species used to produce lumber and other forest products, including Christmas trees. Commercial species shall be determined by the board on a district basis."

Portions of the project sites adjacent to the Hemphill Diversion Structure, which is in the City of Lincoln boundaries, are within an area which could be considered to contain a small amount of forest land as this area is predominantly in a natural riparian condition. However, this area is not zoned by the City of Lincoln for forestland protection or timber production.

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

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒

According to the DOC (2020b), all areas potentially affected by construction of the Proposed Project Alternatives are identified as Grazing Land and Other Land. As such, the Proposed Project would not have the potential to convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance into non-agricultural use. There would be no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒

There is one 30-acre parcel north of Fruitvale Road that is under a Williamson Act contract. This parcel is directly adjacent to the Alternative 3 pipeline alignment. However, the installation of an underground raw water pipeline would neither affect this parcel nor result in a conversion of this parcel into non-agricultural uses. None of the other areas potentially affected by construction of the Proposed Project Alternatives are located in proximity to properties with Williamson Act contracts. (Placer County 2020). The Project would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
c)	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))?	☐	☐	☐	☒

No land zoned as forest lands exists on or adjacent to areas potentially affected by construction of the Proposed Project Alternatives. The Project would have no impact in this area.

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
d) Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☒

The only location where forest land may be affected by the Project Alternatives is the area adjacent to Auburn Ravine. However, none of the Alternatives would result in a loss or conversion of this forest land. The Project would have no impact in this area.

Would the project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
e) 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?	☐	☐	☐	☒

The only areas that may be considered farmland occur along the Alternate 3 pipeline route. These areas are identified by DOC as Grazing Land. However, the pipeline associated with Alternative 3 would be constructed within the existing roadway ROW and, therefore, would have no effect on the adjacent Grazing land. Therefore, the Proposed Project would have no impact in this area.

4.3 Air Quality

4.3.1 Environmental Setting

The California Air Resources Board (CARB) and the U.S. Environmental Protection Agency (USEPA) focus on the following criteria pollutants to determine air quality: ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse particulate matter (PM_{10}), fine particulate matter ($PM_{2.5}$), and lead. In Placer County, the majority of criteria pollutant emissions come from mobile sources.

Toxic Air Contaminants (TACs) are separated into categories of carcinogens and noncarcinogens. Carcinogens, such as diesel particulate matter (diesel PM), are considered dangerous at any level of exposure. Noncarcinogens, however, have a minimum threshold for dangerous exposure. Common sources of TACs include, but are not limited to gas stations, dry cleaners, diesel generators, ships, trains, construction equipment, and motor vehicles.

Topography and Air Quality

The project is located in the western portion of Placer County, which is within the Sacramento Valley Air Basin (SVAB). The SVAB also comprises all of Butte, Colusa, Placer, Sacramento, Shasta, Sutter, Tehama, Yolo, and Yuba counties and the eastern portion of Solano County.

Ambient air quality is commonly characterized by climate conditions, the meteorological influences on air quality, and the quantity and type of pollutants released. The air basin is subject to a combination of topographical and climatic factors that influence the potential for high levels of regional and local air pollutants.

The air basin is relatively flat, bordered by mountains to the east, west, and north and by the San Joaquin Valley to the south. Air flows into the SVAB through the Carquinez Strait, moving across the Sacramento Delta, and bringing with it pollutants from the heavily populated San Francisco Bay Area. The climate is characterized by hot, dry summers and cool, rainy winters. Characteristics of SVAB winter weather are periods of dense and persistent low-level fog, which are most prevalent between storm systems. From May to October, the region's intense heat and sunlight lead to high ozone pollutant concentrations. Summer inversions are strong and frequent but are less troublesome than those that occur in the fall. Autumn inversions, formed by warm air subsiding in a region of high pressure, have accompanying light winds that do not provide adequate dispersion of air pollutants.

4.3.2 Air Quality (III) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒

As part of its enforcement responsibilities, the USEPA requires each state with nonattainment areas to prepare and submit a State Implementation Plan (SIP) that demonstrates the means to attain the federal standards. The SIP must integrate federal, state, and local plan components and regulations to identify specific measures to reduce pollution in nonattainment areas, using a combination of performance standards and market-based programs. Similarly, under state law, the California Clean Air Act requires an air quality attainment plan to be prepared for areas designated as nonattainment with regard to the federal and state ambient air quality standards. Air quality attainment plans outline emissions limits and control measures to achieve and maintain these standards by the earliest practical date.

The PCAPCD is the agency responsible for enforcing many federal and state air quality requirements and for establishing air quality rules and regulations. The PCAPCD attains and maintains air quality conditions in Placer County through a comprehensive program of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. As part of this effort, the PCAPCD has developed input to the SIP, which is required under the federal Clean Air Act for areas that are out of attainment for air quality standards. The SIP includes the PCAPCD's plans and control measures for attaining the ozone national ambient air quality standards.

The SIP plans and control measures are based on information derived from projected growth in Placer County in order to project future emissions and determine strategies and regulatory controls for the reduction of emissions. Growth projections are based on the general plans developed by Placer County and the incorporated cities in the County. As such, projects that propose development consistent with the growth anticipated by the respective general plan of the jurisdiction in which the proposed development is located would be consistent with the SIP. In the event that a project would propose a development that is less dense than that associated with the general plan, the project would likewise be consistent with the SIP. If a project, however, proposes a development that is denser than that assumed in the general plan, the project may be in conflict with the SIP and could therefore result in a significant impact on air quality.

The various Proposed Project Alternatives would not result in uses that would be inconsistent with the land use designations of the City of Lincoln or Placer County. As such, no impact would occur.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
b)	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?	☒	☐	☐	☐

By its very nature, air pollution is largely a cumulative impact. No single project is sufficient in size, by itself, to result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's individual emissions exceed its identified significance thresholds, the project would be cumulatively considerable. Projects that do not exceed significance thresholds would not be considered cumulatively considerable.

All of the Proposed Project alternatives will result in the emission of criteria air pollutants during construction. Since an air quality analysis has not yet been completed for the Proposed Project, it is not possible to determine the impact the Project would have on any criteria pollutant. As such, this is considered a potentially significant impact and will be further discussed in the EIR.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
c)	Expose sensitive receptors to substantial pollutant concentrations?	☒	☐	☐	☐

Sensitive receptors are defined as facilities or land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these sensitive receptors are residences, schools, hospitals, and daycare centers. CARB has identified the following groups of individuals as the most likely to be affected by air pollution: the elderly over age 65, children under age 14, athletes, and persons with cardiovascular and chronic respiratory diseases such as asthma, emphysema, and bronchitis. Residential uses occur all along the pipeline route associated with Alternative 3. The nearest sensitive receptor to the Alternatives 1, 2 and 4 sites are residences located approximately 600 to 700 feet from the site.

The Proposed Project will result in the emission of criteria air pollutants during construction. Since an air quality analysis has not yet been completed for the Proposed Project, it is not possible to determine the impact the Project would have on sensitive receptors. As such, this is considered a potentially significant impact and will be further discussed in the EIR.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
d)	Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	☒	☐	☐	☐

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to odors of other substances. In addition, people may have different reactions to the same odor; in fact, an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another. It is also important to note that an unfamiliar odor is more easily detected and is more likely to cause complaints than a familiar one. This is because of the phenomenon known as odor fatigue, in which a person can become desensitized to almost any odor and recognition only occurs with an alteration in the intensity.

The various alternatives of the Proposed Project could result in emissions causing unpleasant odors during construction and operation. As such, this is considered a potentially significant impact and will be further discussed in the EIR.

4.4 Biological Resources

4.4.1 Environmental Setting

The US Fish and Wildlife Service (USFWS), CDFW, and California Native Plant Society document species that may be rare, threatened, or endangered. Federally listed species are fully protected under the mandates of the federal ESA. "Take" of listed species incidental to otherwise lawful activity may be authorized by either the USFWS or the NMFS, depending on the species.

Under the California ESA, the CDFW has the responsibility for maintaining a list of threatened and endangered species. The CDFW also maintains lists of "candidate species" and "species of special concern," which serve as "watch lists." State-listed species are fully protected under the mandates of the California ESA. Take of protected species incidental to otherwise lawful management activities may be authorized under Section 2081 of the California Fish and Game Code.

Under Section 3503.5 of the California Fish and Game Code, it is unlawful to take, possess, or destroy any birds in the orders of Falconiformes or Strigiformes (raptors) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.

The Native Plant Protection Act (California Fish and Game Code Sections 1900-1913) prohibits the take, possession, or sale within the state of any rare, threatened, or endangered plants as defined by the CDFW. Project impacts on these species would not be considered significant unless the species are known to have a high potential to occur within the area of disturbance associated with the project.

4.4.2 Biological Resources (IV) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service (USFWS)?	☒	☐	☐	☐

The Project has not yet been evaluated for the potential to affect candidate, sensitive, or special status species. This will occur as a part of the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the California Department of Fish and Wildlife or USFWS?	☒	☐	☐	☐

The Project has not yet been evaluated for the potential to affect any riparian habitat or other sensitive natural community. This will occur as a part of the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☒	☐	☐	☐

The Project has not yet been evaluated for the potential to affect wetlands. This will occur as a part of the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☒	☐	☐	☐

The Project has not yet been evaluated for the potential to affect native resident or migratory wildlife corridors or impede the use of native wildlife nursery sites. This will occur as a part of the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☒	☐	☐	☐

The areas of Alternative 3 that are in Placer County are within the Placer County Tree Ordinance Area 2. Construction of the pipeline for Alternative1 would occur within the existing roadway ROW.

Within the City of Lincoln, City Municipal Code Chapter 18.69 and the Department of Public Works *Design Criteria & Procedures Manual* define the City policy and procedures for the protection of oak trees in the City. The City's policy is to preserve all oak trees possible through its development review process. Oak tree mitigation identification is through the City's design review process.

An evaluation of the potential for the Project to affect trees on the project site has not been completed at this time and will occur as a part of the EIR.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
f)	Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☒	☐	☐	☐

The Project is located in the area identified as being within the PCCP. The PCCP is a County-proposed solution to coordinate and streamline the permitting process by allowing local entities to issue state and federal permits. The proposed PCCP is an HCP under the Federal ESA and a NCCP under the California Natural Community Conservation Planning Act. As proposed, the PCCP would include the CARP to issue permits related to the federal Clean Water Act and the California Fish and Game Code. At this time, the PCCP has not been adopted and is currently undergoing environmental review under CEQA and NEPA. The Final PCCP EIR/EIS is currently out for public review until June 22, 2020 (Placer Conservation 2020). While the PCCP has not yet been adopted, there is a potential for it to be adopted prior to approval of the Proposed Project. As such, this impact area will be discussed in the Hemphill Diversion Structure EIR.

4.5 Cultural Resources

The Project is located within territory historically occupied by the Nisenan tribe of California Native Americans, sometimes referred to as the Southern Maidu. The Nisenan occupied the drainages of the Yuba, Bear, and American rivers and the lower drainages of the Feather River, bounded by the west bank of the Sacramento River to the west, the crest of the Sierra Nevada to the east, and a few miles south of the American River to the south. The northern boundary is not well established due to the Nisenan's linguistic similarity with neighboring groups, but extended somewhere between the Feather and Yuba rivers. Nisenan territory extended approximately 110 miles east to west and 100 miles north to south. Based primarily on linguistic variation, the Nisenan were the southern linguistic group of the Maidu tribe, and together with the Maidu and Konkow, form a subgroup of the California Penutian linguistic family. Distinction is made between the Northern Hill, Southern Hill and Valley Nisenan.

4.5.1 Cultural Resources (V) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☒	☐	☐	☐

A cultural resources survey has not been completed for areas potentially affected by construction of the Proposed Project Alternatives. As such, there is a potential for the Project to impact historical resources within the Project. The extent of this potential impact has not been determined at this time. As such, this will be discussed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☒	☐	☐	☐

A cultural resources survey has not been completed for areas potentially affected by construction of the Proposed Project Alternatives. As such, there is a potential for the Project to impact archaeological resources within the Project. The extent of this potential impact has not been determined at this time. As such, this will be discussed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	☒	☐	☐	☐

A cultural resources survey has not been completed for areas potentially affected by construction of the Proposed Project Alternatives. As such, there is a potential for the Project to impact any possible human remains within the Project. The extent of this potential impact has not been determined at this time. As such, this will be discussed in the EIR.

4.6 Energy

4.6.1 Environmental Setting

Introduction

Energy consumption is analyzed in this Initial Study due to the potential direct and indirect environmental impacts associated with the Project. Such impacts include the depletion of nonrenewable resources (e.g., oil, natural gas, coal) and emissions of pollutants during construction. The use of energy during operation of the various alternatives would be minimal and only due to periodic maintenance that may be required to maintain infrastructure associated with specific alternatives.

Electricity/Natural Gas Services

Pacific Gas and Electric (PG&E) provides electrical services to the Project area through state-regulated public utility contracts. PG&E's ability to provide its services concurrently for each project is evaluated during the development review process. The utility company is bound by contract to update its systems to meet any additional demand.

Energy Consumption

Electricity use is measured in kilowatt-hours (kWh), and natural gas use is measured in therms. Vehicle fuel use is typically measured in gallons (e.g., of gasoline or diesel fuel), although energy use for electric vehicles is measured in kWh.

The California Energy Commission (CEC) tracks the amount of electricity and natural gas consumed in California by county. The electricity and natural gas consumption in Placer County from 2014 to 2018 is shown in Table 4.6-1. As indicated, while the use of natural gas has increased since 2014, electricity demand has decreased.

Table 4.6-1. Non-Residential Electricity and Natural Gas Consumption in Placer County 2013-2017

Year	Non-Residential Electricity Consumption (kilowatt hours)	Non-Residential Natural Gas Consumption (Therms)
2018	1,495,613,543	28,746,568
2017	1,504,775,808	28,769,978
2016	1,536,053,019	26,989,047
2015	1,529,567,565	25,405,577
2014	1,546,175,447	24,737,927

Source: CEC 2020

4.6.2 Energy (VI) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?	☒	☐	☐	☐

The impact analysis focuses on the three sources of energy that are relevant to the Proposed Project: electricity, the equipment fuels necessary for project construction, and the automotive and diesel fuel used during Project operations. The amount of energy necessary to construct and operate the various alternatives for the Project and whether or not it is a wasteful, inefficient, or unnecessary consumption of energy resources has not been determined; as such this area will be further discussed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	☒	☐	☐	☐

The City of Lincoln or Placer County do not have a plan for renewable energy or energy efficiency. As discussed under Item a), the amount of energy necessary to construct and operate the Project and whether or not it is a wasteful, inefficient, or unnecessary consumption of energy resources has not been determined. How this will affect a state plan for renewable energy or energy efficiency has also not been determined at this time. For these reasons, this area will be further discussed in the EIR.

4.7 Geology and Soils

4.7.1 Environmental Setting

Geomorphic Setting

All alternatives of the Project are located in the northwestern portion of the Sierra Nevada geomorphic province of California. The Sierra Nevada is a tilted fault block nearly 400 miles long. Its east face is a high, rugged multiple scarp, contrasting with the gentle western slope (about 2 degrees) that disappears under sediments of the Great Valley. Deep river canyons are cut into the western slope. Their upper courses, especially in massive granites of the higher Sierra, are modified by glacial sculpturing, forming such scenic features as Yosemite Valley. The high crest culminates in Mt. Whitney, with an elevation of 14,495 feet above sea level near the eastern scarp. The metamorphic bedrock contains gold-bearing veins in the northwest-trending Mother Lode. The northern Sierra boundary is marked where bedrock disappears under the Cenozoic volcanic cover of the Cascade Range. (California Geographical Survey [CGS] 2002).

Site Soils

According to the NRCS Web Soil Survey website (NRCS 2020), Alternatives 1 and 2, which are essentially one project site, the only soil identified for this site is Xerofluvents, frequently flooded. This soil has a slight erosion potential and moderate runoff potential (NRCS 2020).

The Alternative 3 pipeline alignment, which includes Pipe Crossings A and B, includes 10 soil units, or types, as shown in Table 4.7-1 below. The majority of soil is Caperton-Andregg coarse sandy loams, making up between 68.5 percent and 77.0 percent of the site. Among many soil related attributes, the Web Soil Survey identifies drainage, flooding, erosion, runoff, and the linear extensibility potential for the Project soils. According to this survey, the Alternative 3 site is predominately underlain by soils that are somewhat excessively drained to well-drained and have a moderate to severe erosion potential. The project site soils have no frost action potential and a low linear extensibility (shrink-swell) (NRCS 2020).

As shown in Table 4.7-1, Alternative 4 includes four soil types: Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes, Pits and dumps, Xerofluvents, frequently flooded, and Xerorthents, placer areas. According to the Web Soil Survey, the Alternative 4 site is predominately underlain by soils that are somewhat excessively drained to somewhat poorly drained and have a slight to severe erosion potential. The site soils have no frost action potential and a low to moderate linear extensibility (shrink-swell) (NRCS 2020).

Table 4.7-1. Project Area Soil Characteristics

Soil	Percentage of Site		Drainage	Flooding Frequency Class	Erosion Hazard[1]	Runoff Potential[2]	Linear Extensibility (Rating)[3]	Frost Action[4]
Alternatives 1 and 2 (Hemphill Diversion Structure area)								
Xerofluvents, frequently flooded	100%		Somewhat excessively drained	Frequent	Slight	B	2.4	None
Alternative 3 (includes Pipe Crossings A and B)								
	Pipe Crossing							
	A	B						
Andregg coarse sandy loam, 2 to 9 percent slopes	8.7%	8.6%	Well drained	None	Moderate	B	1.5	None
Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	9.0%	8.8%	Well drained	None	Moderate	B	1.5	None
Andregg-Shenandoah complex, 2 to 15 percent slopes	2.2%	2.2%	Well drained	None	Moderate	B	1.5	None
Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	3.8%	3.7%	Somewhat excessively drained	None	Severe	D	1.5	None
Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	60.5 %	60.0 %	Somewhat excessively drained	None	Severe	D	1.5	None
Rubble land	2.7%	2.7%	Excessively drained	None	Not rated	Not rated	1.5	None
Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	8.6%	8.5%	Well drained	None	Moderate	C	2.4	None
Xerofluvents, frequently flooded	0.6%	1.6%	Somewhat excessively drained	Frequent	Slight	B	2.4	None
Xerorthents, placer areas	3.9%	3.8%	Well drained	Frequent	Not rated	Not rated	Not rated	None
Alternative 4 (Hemphill Canal area)								
Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	36.1%		Somewhat excessively drained	Not rated	Severe	D	1.5	None
Pits and dumps	6.4%		Not rated	Not rated	Not rated	Not rated	Not rated	None
Xerofluvents, frequently flooded	31.2%		Somewhat poorly drained	Frequent	Slight	B	4.5	None

Table 4.7-1. Project Area Soil Characteristics

Soil	Percentage of Site	Drainage	Flooding Frequency Class	Erosion Hazard[1]	Runoff Potential[2]	Linear Extensibility (Rating)[3]	Frost Action[4]
Alternatives 1 and 2 (Hemphill Diversion Structure area)							
Xerofluvents, frequently flooded	100%	Somewhat excessively drained	Frequent	Slight	B	2.4	None
Xerorthents, placer areas	26.7%	Well drained	Frequent	Not rated	Not rated	Not rated	None

Source: NRCS 2020

Notes:

1. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and offsite damage are likely, and erosion-control measures are costly and generally impractical.
2. Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation. Group A soils have a high infiltration rate (low runoff potential) when thoroughly wet. Group B soils have a moderate infiltration rate when thoroughly wet. Group C soils have a slow infiltration rate when thoroughly wet. Group D soils have a very slow infiltration rate (high runoff potential) when thoroughly wet.
3. Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.
4. Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Regional Seismicity and Fault Zones

In California, special definitions for active faults were devised to implement the Alquist-Priolo Earthquake Fault Zoning Act of 1972, which regulates development and construction in order to avoid the hazard of surface fault rupture. The State Mining and Geology Board established policies and criteria in accordance with the act, which defined an active fault as one which has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault was considered to be any fault that showed evidence of surface displacement during Quaternary time (last 1.6 million years). Because of the large number of potentially active faults in California, the State Geologist adopted additional definitions and criteria to limit zoning to only those faults with a relatively high potential for surface rupture. Thus, the term “sufficiently active” was defined as a fault for which there was evidence of Holocene surface displacement. This term was used in conjunction with the term “well-defined,” which relates to the ability to locate a Holocene fault as a surface or near-surface feature (CGS 2010).

Major faults within the region with the greatest potential to affect the Project’s Alternatives sites include the Foothills Fault System, located approximately four to eight miles east of the project site, and the Great Valley Fault System, located approximately 46 miles west of the project site (DOC 2020b). The Foothills Fault System consists of a series of northwest-trending faults. Of this system, the Bear Mountains Fault Zone is considered to be potentially active. The nearest fault is Deadman Fault, approximately four to eight miles east of the Project (DOC 2020b). This fault is a Late Quaternary Age (70,000 to 11,700 years) fault (DOC 2020b).

The Great Valley Fault System consists of 14 recognized fault segments extending from Coalinga in the south to Rumsey Hills in the north. The Dunnigan Hills Fault is located approximately 35 miles west-southwest of the project site and is a Late Quaternary Age fault. The Willows Fault Zone is located approximately 17 miles west southwest of the project site and is a Pre-Quaternary Age (older than 1.6 million years) fault (DOC 2020b).

Paleontological Resources

A paleontological records search was requested from the University of California Museum of Paleontology (UCMP) on June 15, 2020. The search included a review of the institution's paleontology specimen collection records for Placer County, including the Project area and vicinity. In addition, a query of the UCMP catalog records; a review of regional geologic maps from the California Geological Survey (CGS); a review of local soils data; and a review of existing literature on paleontological resources of Placer County by ECORP. The purpose of the 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.

The results of the search of the UCMP indicated that 64 paleontological specimens were recorded from 29 identified localities and 11 unidentified localities in Placer County. Paleontological resources include fossilized remains of birds, mammals, reptiles, and amphibians. No paleontological resources have been previously recorded within or near the Proposed Project area (UCMP 2020).

4.7.2 Geology and Soils (VI) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☒	☐
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☒	☐
iii) Seismic-related ground failure, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒

i) None of the Proposed Project Alternatives are located within an Alquist-Priolo Earthquake Zone (CGS 2010, 2015). There would be no impact related to fault rupture.

ii) According to CGS' Earthquake Shaking Potential for California mapping, the Proposed Project sites are located in an area which is distant from known, active faults and will experience lower levels of ground shaking less frequently. In most earthquakes, only weaker masonry buildings would be damaged. However, very infrequent earthquakes could still cause strong shaking in the area (CGS 2016). The Proposed Project includes the removal of an existing diversion structure and potentially the installation of an underground raw water pipeline. All construction would be required to comply with the NID Improvement Standards, including any required seismic mitigation standards. Because of the required compliance and the distance from active faults, all Alternatives of the Proposed Project would have a less than significant impact related to strong ground shaking.

iii) Liquefaction occurs when loose sand and silt that is saturated with water behaves like a liquid when shaken by an earthquake. Liquefaction can result in the following types of seismic-related ground failure:

- Loss of bearing strength – soils liquefy and lose the ability to support structures
- Lateral spreading – soils slide down gentle slopes or toward stream banks
- Flow failures – soils move down steep slopes with large displacement
- Ground oscillation – surface soils, riding on a buried liquefied layer, are thrown back and forth by shaking
- Flotation – floating of light buried structures to the surface
- Settlement – settling of ground surface as soils reconsolidate
- Subsidence – compaction of soil and sediment

Three factors are required for liquefaction to occur: (1) loose, granular sediment; (2) saturation of the sediment by groundwater; and (3) strong shaking. Because the Proposed Project is located in an area determined to have a low chance of seismic hazard and no habitable structures would be built as a part of the Project, the potential to expose people or structures to substantial adverse effects from liquefaction would be a non-factor. As such, the Project would have no impact in this area.

iv) All Alternatives identified for the Proposed Project are in areas with relatively flat topography, indicating no potential for landslides. As such, the Proposed Project would have no impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☒	☐

As shown in Table 4.7-1, the Project Alternative's soils have a moderate to severe erosion potential. A rating of "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised.

A predominate instigator of erosion on construction sites are storm events and the resulting stormwater runoff. All projects in California over one acre in size, which would include all of the various Alternatives proposed for the Project, require a stormwater pollution prevention plan (SWPPP) in order to comply with the RWQCB's General Construction Storm Water Permit. The SWPPP will identify best management practices (BMPs) to be implemented on the project site to minimize soil erosion. SWPPPs generally include the following BMPs:

- Diversion of offsite runoff away from the construction area;
- Prompt revegetation of proposed landscaped areas;
- Perimeter straw wattles or silt fences and/or temporary basins to trap sediment before it leaves the site;
- Regular sprinkling of exposed soils to control dust during construction during the dry season;
- Specifications for construction waste handling and disposal;
- Erosion control measures maintained throughout the construction period;
- Preparation of stabilized construction entrances to avoid trucks from imprinting debris on public roadways;
- Contained wash out and vehicle maintenance areas;
- Training of subcontractors on general construction area housekeeping;
- Construction scheduling to minimize soil disturbance during the wet weather season; and
- Regular maintenance and storm event monitoring.

The SWPPP is a "live" document and should be kept current by the person responsible for its implementation. Preparation of, and compliance with a required SWPPP would effectively prevent Proposed Project onsite erosion and the loss of topsoil from Project construction activities outside of the active stream channel. Therefore, the potential loss of topsoil due to erosion resulting from Project construction activities is found to be less than significant.

It is important to note that, while the impact of the Project on the loss of top soil due to erosion as discussed above is less than significant, removal of the diversion structure under Alternatives 2, 3, and 4 could result in the downstream transport of sediment that has accumulated in Auburn Ravine behind the diversion structure. This potential effect of the Project is discussed in Section 4.10 Hydrology and Water Quality of this Initial Study.

This impact is less than significant.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☒	☐

As discussed previously, all of the Alternative's project sites have no potential for landslides due to the flat topography in the area.

Lateral spreading is a form of horizontal displacement of soil toward an open channel or other "free" face, such as an excavation boundary. Lateral spreading can result from either the slump of low cohesion and unconsolidated material or, more commonly, by liquefaction of either the soil layer or a subsurface layer underlying soil material on a slope, resulting in gravitationally driven movement. One indicator of potential lateral expansion is frost action. Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing (NRCS 2020). As indicated in Table 4.7-1, the Web Soil Survey identifies the project site as having soils with no frost action potential. As such, the potential for impacts due to lateral spreading would be less than significant.

With the withdrawal of fluids, the pore spaces within the soils decrease, leading to a volumetric reduction. If that reduction is significant enough over an appropriately thick sequence of sediments, regional ground subsidence can occur. This typically only occurs within poorly lithified sediments and not within competent rock.[1] No oil, gas, or high-volume water extraction wells are known to be present in the Project area. According to the U.S. Geological Survey (USGS), the project site is not located in an area of land subsidence (USGS 2018). As such, the potential for impacts due to subsidence would be less than significant.

Collapse occurs when water is introduced to poorly cemented soils, resulting in the dissolution of the soil cementation and the volumetric collapse of the soil. In most cases, the soils are cemented with weak clay (argillic) sediments or soluble precipitates. This phenomenon generally occurs in granular sediments situated within arid environments. Collapsible soils will settle without any additional applied pressure

[1] The processes by which loose sediment is hardened to rock are collectively called lithification.

when sufficient water becomes available to the soil. Water weakens or destroys bonding material between particles that can severely reduce the bearing capacity of the original soil resulting in damage to buildings and foundations. Alternative 1 includes the removal of the diversion structure and the construction of an infiltration gallery. Alternative 2 includes construction of a fish ladder while, Alternative 3 includes the removal of the existing Hemphill Diversion Structure and the construction of an underground raw water pipeline. Alternative 4 includes the removal of the diversion structure and the abandonment of the Hemphill Canal. None of these Alternatives would be affected by collapse as no large structures are being built. As such, all of the Alternatives would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d)	Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☒	☐

Expansive soils are types of soil that shrink or swell as the moisture content decreases or increases. Structures built on these soils may experience shifting, cracking, and breaking damage as soils shrink and subside or expand. Expansive soils can be determined by a soil's linear extensibility. There is a direct relationship between linear extensibility of a soil and the potential for expansive behavior, with expansive soil generally having a high linear extensibility. Thus, granular soils typically have a low potential to be expansive, whereas clay-rich soils can have a low to high potential to be expansive.

According to the NRCS, linear extensibility values for the majority of the Project Alternatives sites are between 1.5 and 2.4 percent. Soils with linear extensibility in that range correlate to soils having a low expansion potential, as noted in Table 4.7-1. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent, moderate if 3 to 6 percent, high if 6 to 9 percent, and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. As shown in Table 4.7-1, 100 percent of the Alternatives 1, 2 and 3 site soils have a low shrink-swell potential. As such, the Project would have a less than significant impact in this area. Alternative 4, which includes the Hemphill Canal, has a low to moderate shrink-swell potential. However, this alternative would not include the construction of any structures, but only the removal on the existing Hemphill Diversion Structure and potentially filling in of the Hemphill Canal, bringing it to ground level. No new structures would be constructed as a part of this alternative. As such, Alternative 4 would have a less than significant impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
e)	Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☒

The Project does not involve the use of septic tanks or a septic system. The Proposed Project would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
f)	Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	☒	☐	☐	☐

A search of the UCMP failed to indicate the presence of paleontological resources in the Project area. Although paleontological resources sites were not identified in the Project area, there is the possibility that unanticipated paleontological resources will be encountered during ground-disturbing Project-related activities. As such, this would be considered a potentially significant impact and shall be discussed further in the EIR.

4.8 Greenhouse Gas Emissions

4.8.1 Environmental Setting

Greenhouse gases (GHGs) are released as byproducts of fossil fuel combustion, waste disposal, energy use, land use changes, and other human activities. This release of gases, such as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and chlorofluorocarbons, creates a blanket around the earth that allows light to pass through but traps heat at the surface, preventing its escape into space. While this is a naturally occurring process known as the greenhouse effect, human activities have accelerated the generation of GHGs beyond natural levels. The overabundance of GHGs in the atmosphere has led to an unexpected warming of the earth and has the potential to severely impact the earth's climate system.

Each GHG differs in its ability to absorb heat in the atmosphere based on the lifetime, or persistence, of the gas molecule in the atmosphere. CH_4 traps approximately 25 times more heat per molecule than CO_2, and N_2O absorbs 298 times more heat per molecule than CO_2 (IPCC 2014). Often, estimates of GHG emissions are presented in carbon dioxide equivalents (CO_2e). Expressing GHG emissions in CO_2e takes the contribution of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

4.8.2 Greenhouse Gas Emissions (VII) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☒	☐	☐	☐

GHG emissions contribute, on a cumulative basis, to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature. The combination of GHG emissions from past, present, and future projects contributes substantially to the phenomenon of global climate change and its associated environmental impacts and, as such, is addressed only as a cumulative impact.

The Proposed Project would result in greenhouse gases emission during construction. Since a GHG analysis has not yet been completed for the Proposed Project, it is not possible to determine the impact the Project would have on the environment because of GHG emissions. As such, this is considered a potentially significant impact and will be further discussed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☒	☐	☐	☐

The City of Lincoln does not currently have an applicable plan, policy, or regulation adopted for the purpose of reducing GHG emissions. However, the City is located in the greater Sacramento region and is a member of the Sacramento Area Council of Governments (SACOG). SACOG's Metropolitan Transportation Plan/Sustainable Communities Strategy 2016 (MTP/SCS) is the latest update of a long-range policy and planning program that establishes GHG emissions goals for automobiles and light-duty trucks for 2020 and 2035, and thus establishes an overall GHG target for the region applicable to these subsectors of the transportation sector. SACOG was tasked by CARB to achieve a nine percent per capita reduction compared to 2012 vehicle emissions by 2020, and a 16 percent per capita reduction by 2035, which CARB confirmed the region would achieve by implementing its MTP/SCS (SACOG 2016).

The Proposed Project would most likely not conflict with any adopted plans, policies, or regulations adopted for reducing GHG emissions. However, as identified under Issue a), Project-generated GHG emissions have not yet been determined; therefore, it is not possible to determine if the Project would conflict with California GHG reduction goals. As such, this is considered a potentially significant impact and will be further discussed in the EIR.

4.9 Hazards and Hazardous Materials

4.9.1 Environmental Setting

A material is considered hazardous if it appears on a list of hazardous materials prepared by a federal, state, or local agency or if it has characteristics defined as hazardous by such an agency. A hazardous material is defined by the California Health and Safety Code, § 25501 as follows:

> "Hazardous material" means any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment. "Hazardous materials" include, but are not limited to, hazardous substances, hazardous waste, and any material that a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment.

A hazardous material is defined in Title 22, § 662601.10, of the CCR as follows:

> A substance or combination of substances which, because of its quantity, concentration, or physical, chemical or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or (2) pose a substantial present or potential hazard to human health or environment when improperly treated, stored, transported or disposed of or otherwise managed.

The release of hazardous materials into the environment could potentially contaminate soils, surface water, and groundwater supplies.

Under Government Code § 65962.5, both the Department of Toxic Substances Control (DTSC) and the State Water Resources Control Board (SWRCB) are required to maintain lists of sites known to have hazardous substances present in the environment. Both agencies maintain up-to-date lists on their websites. A search of the DTSC (2020) and SWRCB (2020) lists identified no open cases of hazardous waste violations on, or within 0.5 mile of any of the four Alternatives identified for the Proposed Project.

The USEPA maintains the Enforcement and Compliance History Online (ECHO) program. The ECHO website provides environmental regulatory compliance and enforcement information for approximately 800,000 regulated facilities nationwide. The ECHO website includes environmental permit, inspection, violation, enforcement action, and penalty information about USEPA-regulated facilities. Facilities included on the site are Clean Air Act stationary sources; Clean Water Act facilities with direct discharge permits, under the National Pollutant Discharge Elimination System (NPDES); generators and handlers of hazardous waste, regulated under the Resource Conservation and Recovery Act; and public drinking water systems, regulated under the Safe Drinking Water Act. ECHO also includes information about USEPA cases under other environmental statutes. When available, information is provided on surrounding demographics, and ECHO includes other USEPA environmental data sets to provide additional context for analyses, such as Toxics Release Inventory data. According to the ECHO program, the various Alternative's project sites are not listed as having a hazardous materials violation (USEPA 2020).

4.9.2 Hazards and Hazardous Materials (VIII) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☒	☐

Typical incidents that could result in accidental release of hazardous materials involve leaking storage tanks, spills during transport, inappropriate storage, inappropriate use, and/or natural disasters. If not remediated immediately and completely, these and other types of incidents could cause toxic fumes and contamination of soil, surface water, and groundwater. Depending on the nature and extent of the contamination, groundwater supplies could become unsuitable for use as a domestic water source. Human exposure to contaminated soil or water could have potential health effects depending on a variety of factors, including the nature of the contaminant and the degree of exposure.

Hazardous materials must be stored in designated areas designed to prevent accidental release to the environment. California Building Code requirements prescribe safe accommodations for materials that present a moderate explosion hazard, high fire or physical hazard, or health hazards.

Hazardous materials regulations, which are codified in CCR Titles 8, 22, and 26, and their enabling legislation set forth in Chapter 6.95 of the California Health and Safety Code, were established at the state level to ensure compliance with federal regulations and to reduce the risk to human health and the environment from the routine use of hazardous substances. Protection against accidental spills and releases provided by this legislation includes physical and mechanical controls of fueling operations, including automatic shutoff valves; requirements that fueling operations are contained on impervious surface areas; oil/water separators or physical barriers in catch basins or storm drains; vapor emissions controls; leak detection systems; and regular testing and inspection of fueling stations.

As a result of existing hazardous materials regulations discussed above, the Proposed Project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. The Proposed Project's Alternatives would include the potential removal of the existing diversion structure, and either the construction of an infiltration gallery or fish ladder or pipeline. None of this potential construction would include substantial amounts of hazardous material. Any materials would be required to be used, stored, and disposed in accordance with existing regulations and product labeling and would not create a significant hazard to the public or to the environment. Therefore, the Project would have a less than significant impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☒	☐

As discussed in Issue a), the Project would not result in the routine transport, use, disposal, handling, or emission of any hazardous materials that would create a significant hazard to the public or the environment. Potential construction-related hazards could be created during the course of Project construction at the site, given that construction activities involve the use of heavy equipment, which uses small and incidental amounts of oils and fuels and other potentially flammable substances. The level of risk associated with the accidental release of hazardous substances is not considered significant due to the small volume and low concentration of hazardous materials used during construction. The construction contractor would be required to use standard construction controls and safety procedures, including all state and federal controls for heavy equipment operation within a streambed area, that would avoid and minimize the potential for accidental release of such substances into the environment. Standard construction practices would be observed such that any materials released are appropriately contained and remediated as required by local, state, and federal law.

All hazardous materials on the site would be handled in accordance with City, County, and State regulations. Because any hazardous materials used for operations would be in small quantities, long-term impacts associated with handling, storing, and disposing of hazardous materials from project operation would be less than significant.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒

There are no schools within 0.25 mile of any of the Project Alternatives sites. The Project would have no impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒

Under Government Code § 65962.5, both the DTSC and the SWRCB are required to maintain lists of sites known to have hazardous substances present in the environment. Both agencies maintain up-to-date lists on their websites. A search of the DTSC and SWRCB lists identified no open cases of hazardous waste violations within or near any of the Project's Alternatives sites. Therefore, the Proposed Project is not located on a parcel included on a list of hazardous materials sites compiled pursuant to Government Code § 65962.5 (DTSC 2020; SWRCB 2020). As a result, this would not create a significant hazard to the public or to the environment and would have no impact.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
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?	☐	☐	☐	☒

The nearest airport to the Project is the Lincoln Regional Airport, located more than four miles northwest of all Project's Alternatives sites. According to the Placer County Airport Land Use Compatibility Plan, the Proposed Project is located outside of all compatibility and influence zones (Placer County 2014). As such, the Project would have no impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☒	☐

Standard evacuation routes have not been designated in Placer County or Lincoln. However, the Placer County Office of Emergency Services, has an online link to an emergency preparedness web page stating that in the event of mandatory evacuation, residents will be advised of safe routes to follow, locations of shelters, and other actions that may need to be taken.

The Proposed Project does not include any actions that would impair or physically interfere with an adopted emergency response plan or emergency evacuation plan. All construction activities would not impede the use of surrounding roadways in an emergency evacuation. While Alternatives 1, 2 and 4 would not involve construction on or near a roadway, Alternative 3 would involve the construction of a pipeline in roadway ROW. All construction in a roadway ROW will require an encroachment permit from either Placer County or the City of Lincoln depending on location. This would allow for advanced notice, coordination, and the removal of any impediments on these roadways if an emergency evacuation is required in the area. As such, implementation of the Proposed Project would result in a less than significant impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
g)	Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	☐	☐	☒	☐

The Project area is in an area designated by California Department of Forestry and Fire Protection (CAL FIRE) as a Moderate Zone. Furthermore, no Very High Fire Hazard Severity zones are located nearby. Finally, the location of the Alternative's project sites makes it readily accessible by emergency personnel and vehicles in the event of a wildland fire. For these reasons, this impact would be less than significant.

4.10 Hydrology and Water Quality

4.10.1 Environmental Setting

Regional Hydrology

Surface Water

The project is located in the greater Sacramento River hydrologic region. The Sacramento River hydrologic region covers approximately 17.4 million acres (27,200 square miles). The region includes all or large portions of Modoc, Siskiyou, Lassen, Shasta, Tehama, Glenn, Plumas, Butte, Colusa, Sutter, Yuba, Sierra, Nevada, Placer, Sacramento, El Dorado, Yolo, Solano, Lake, and Napa counties. Small areas of Alpine and Amador counties are also within the region. Geographically, the region extends south from the Modoc Plateau and Cascade Range at the Oregon border, to the Sacramento-San Joaquin Delta (Department of Water Resources [DWR] 2003).

The project is located within boundaries of the American River watershed, which consists of four sub-watersheds: the Yuba, Bear, Upper American, and Lower American rivers. The Proposed Project is within the Bear River sub-watershed (SRWP 2020a).

The Bear River watershed drains approximately 300 square miles. The Bear River originates about 20 miles west of the crest of the Sierra Nevada in northern Placer County within the boundaries of the Tahoe National Forest. The Bear River is fed by the Drum Canal from Spaulding Lake (located on the South Yuba

River). Flowing out of the Drum Afterbay is the Middle Bear, which enters Dutch Flat Reservoir, where the waters of the Boardman Canal enter after running through Alta Powerhouse. The Bear River continues to roughly parallel Interstate 80. Just before the Bear River flows into Rollins Reservoir, it merges with Steephollow Creek, the largest tributary in the upper watershed. The Bear River discharges from Rollins Reservoir and flows southwest into Lake Combie, near the community of Meadow Vista and near an area with heavy development pressure. The Bear River turns west and is fed by Wolf Creek and then enters into Camp Far West Reservoir, the largest water body in the Bear River Watershed. The Bear joins the Feather River south of Yuba City/Marysville. The Bear River contains a large volume of mining sediment stored in its main channel that is subject to continual erosion. The high volume of mining sediment, in combination with restricting levees, has caused the Lower Bear channel to become deeply incised.

In highest rainfall years, winter flows average 3,400 - 5,600 cfs. In normal years, winter flows are 600–800 cfs. In the driest years, flows average only 20–65 cfs in winter months, down to 0 cfs in all other months. Bear River flow patterns are typical of foothill streams with high winter and spring flows and very low summer and fall flows. Bear River flows are regulated almost entirely by several storage reservoirs and numerous diversions (SRWP 2020b).

Groundwater

The Hemphill Diversion Structure site is not located in the defined boundaries of a groundwater basin; rather, the site borders the Sacramento Valley Groundwater Basin and the North American Subbasin, which is directly to the west. The North American Subbasin has a surface area of 351,000 acres (548 square miles). According to the 2003 California Groundwater Bulletin 118 Update, groundwater levels in southwestern Placer County and northern Sacramento County have generally decreased, with many wells experiencing declines at a rate of about 1.5 feet per year for the last 40 years or more. Some of the largest decreases have occurred in the area of the former McClellan Air Force Base. Groundwater levels in Sutter and northern Placer counties generally have remained stable, although some wells in southern Sutter County have experienced declines (DWR 2003). Since this publication, groundwater levels continue to decrease in the valley areas east of Lincoln from spring 2007 to spring 2017 from 10 - 30 feet, depending on location (DWR 2020). However, in the immediate vicinity of the Project, DWR indicates an average increase of 10 feet in ground surface to groundwater surface between 2012 and 2017 (DWR 2020).

The Lincoln Groundwater Management Plan (City of Lincoln 2003) estimates the North American Subbasin total groundwater in storage to be 4.9 million acre-feet (AF). The 2003 Bulletin 118 estimated inflows include natural recharge at 83,800 AF and applied water recharge at 29,800 AF. There was no artificial recharge. Estimated outflows include urban extraction at 109,900 AF and agricultural extraction at 289,100 AF (DWR 2003). The Sustainable Groundwater Management Act (SGMA) directs DWR to identify groundwater basins and sub basins in conditions of critical overdraft. As defined in the SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." The North American Groundwater Subbasin is not listed as a critically overdrafted basin (DWR 2018a). DWR is currently working on an update to the Bulletin 118 groundwater report. However, more up-to-date information of the North American Subbasin in not available at this time.

Project Site Hydrology

The Hemphill Diversion Structure is located in the Auburn Ravine watershed. The following description of Auburn Ravine was excerpted from the *Auburn Ravine/Coon Creek Ecosystem Restoration Plan* (Placer County 2002). Auburn Ravine originates on the north side of the City of Auburn. At its confluence with East Side Canal, Auburn Ravine drains approximately 79 square miles (See Figure 3). The elevation of the basin ranges from 1,600 to 30 feet AMSL. The stream flows through the middle of Auburn, where it is channelized, contained in a highly restricted natural channel, or passes through a variety of culverts. The land adjacent to this portion of the watershed is highly urbanized. Immediately west of the City of Auburn, the character of the channel changes, adjacent land uses change, and water from various sources is added to the channel. From the western edge of the City of Auburn to west of Lozanos Road, the channel is high gradient, incised in a narrow canyon, and consists of a number of cascades and pool riffle complexes. The geology is a combination of basalt and granite bedrock. Adjacent land use is generally rural residential with minimal encroachment by development on the channel and floodplain. Just east of Gold Hill Road, the channel gradient decreases to approximately two percent and the channel becomes dominated by pools, runs, and riffles. Channel substrate is dominated by various-sized gravels and coarse sediment. These habitats continue downstream into the City of Lincoln. Within Lincoln city limits, the channel transitions from a pool/riffle channel with high levels of sediment to a sand-bottomed, low-gradient stream. The stream retains this channel type downstream to its confluence with the East Side Canal. In this reach, the channel varies from unconfined with full access to the floodplain to tightly constrained between immediately adjacent levees.

The Auburn Ravine watershed is relatively small and very little of the stream flow is from natural runoff. Water has been imported into Auburn Ravine for over 150 years. Early settlers and miners developed canal systems to bring water into the watershed for a variety of uses. Currently, water is imported into the Auburn Ravine watershed from two primary sources: the Yuba/Bear River watershed and, to a lesser degree, the American River watershed. While winter stream flows are dominated by discharges from wastewater treatment facilities and runoff from rainfall events, summer flows are dominated by irrigation water deliveries to farms, golf courses, and ranches on the valley floor. This is a unique situation for small foothill streams where the normal situation is for stream flows to gradually decline over the spring, summer, and early fall until the first rainstorms occur.

Auburn Ravine has good summer flow conditions in the foothills and downstream to a point well west of Lincoln. Auburn Ravine's winter flow peaks can range from a few hundred cfs to an estimated 100-year flow event exceeding 17,000 cfs.

4.10.2 Hydrology and Water Quality (IX) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	☒	☐	☐	☐

In accordance with NPDES regulations, the State of California requires that any construction activity affecting more than one acre obtain a General Construction Activity Stormwater Permit (General Permit) to minimize the potential effects of construction runoff on receiving water quality. Performance standards for obtaining and complying with the General Permit are described in NPDES General Permit No. CAS000002, Waste Discharge Requirements, Order No. 2009-0009-DWQ.

General Permit applicants are required to submit Permit Registration Documents for the Project to the appropriate regional board, which include a Notice of Intent, risk assessment, site map, signed certification statement, an annual fee, and a SWPPP. The SWPPP includes pollution prevention measures (erosion and sediment control measures and measures to control non-stormwater discharges and hazardous spills), demonstration of compliance with all applicable local and regional erosion and sediment control standards, identification of responsible parties, and a detailed construction timeline. The SWPPP must also include implementation of BMPs to reduce construction effects on receiving water quality by implementing erosion control measures and reducing or eliminating non-stormwater discharges.

Examples of typical construction BMPs included in SWPPPs include, but are not limited to, using temporary mulching, seeding, or other suitable stabilization measures to protect uncovered soils; storing materials and equipment to ensure that spills or leaks cannot enter the storm drain system or surface water; developing and implementing a spill prevention and cleanup plan; and installing sediment control devices such as gravel bags, inlet filters, fiber rolls, or silt fences to reduce or eliminate sediment and other pollutants from discharging to the drainage system or receiving waters. SWPPP BMPs are recognized as effective methods to prevent or minimize the potential releases of pollutants into drainages, surface water, or groundwater. Strict SWPPP compliance, coupled with the use of appropriate BMPs, would reduce potential water quality impacts during construction activities.

SWPPP BMPs generally address construction stormwater impacts but do not address any water quality impacts caused by the removal of a dam such as the Hemphill Diversion Structure. Removal of the structure could result in the downstream transport of sediment that has accumulated in Auburn Ravine behind the diversion structure. As such, further analysis is required. Therefore, the potential for the Proposed Project to result in water quality impacts will be further analyzed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	☒	☐	☐	☐

The Proposed Project has been initiated to remove/modify the existing Hemphill Diversion Structure to allow for anadromous fish passage. None of the proposed Alternatives would result in the direct decrease of groundwater supplies or recharge. However, Alternative 4, which includes the removal of the diversion structure and the abandonment of the Hemphill Canal would result in the discontinuation of raw water service to a number of properties that currently use the canal for irrigation water. As such, Alternative 4 may result in an indirect impact to groundwater supply as those properties that currently obtain water for the canal will have to find other sources of water. This may include groundwater pumping. Additionally, implementation of Alternative 3 would result in the diversion of creek water at NID's Placer Yard on Gold Hill Road, upstream from the existing Hemphill Diversion Structure. This may also affect the potential for groundwater recharge. Therefore, this area of potential impact will be further analyzed in the EIR.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or through the addition of impervious surfaces, in a manner that would:	☒	☐	☐	☐
i) result in substantial erosion or siltation on- or off-site;	☒	☐	☐	☐
ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;	☐	☐	☒	☐
(iii) 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; or	☐	☐	☐	☒
(iv) impede or redirect flood flows?	☐	☐	☒	☐

i) The Proposed Project would occur in an existing creek and removal of the Hemphill Diversion Structure would potentially result in erosion and siltation impacts. As such, this area of impact will be further analyzed in the EIR.

ii) Implementation of the Proposed Project would involve the construction of a fish ladder or infiltration structure or underground pipeline. However, none of these alternatives would increase the amount of surface runoff to the area resulting in on- or offsite flooding. Therefore, the Proposed Project would have a less than significant impact on causing flooding on- or offsite.

iii) All storm drainage in the area is provided by natural drainage. None of the proposed alternatives would change this drainage. As such, the Proposed Project would have no impact in this area.

iv) The removal of the diversion structure and construction of a fish ladder or infiltration gallery or installation of a pipeline in existing roadway ROWs would not impede or redirect flood flows. While the fish ladder and infiltration gallery may result in a minor alteration to the existing creek bed, this would not be of such an extent to result the obstruction or redirection of flood flows. The Project would have a less than significant impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	☐	☐	☐	☒

The Project is the construction of a fish ladder or infiltration gallery or installation of a pipeline in existing roadway ROWs. Once completed, the Project would not result in an increase in the risk for the release of pollutants, as none will be involved with these alternatives, in an inundation event. The Project would have no impact in this area.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	☐	☐	☐	☒

The Project is the construction of a fish ladder or infiltration gallery or installation of a pipeline in existing roadway ROWs or potentially adjacent easement areas. None of these alternatives would conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan. The Project would have no impact in this area.

4.11 Land Use and Planning

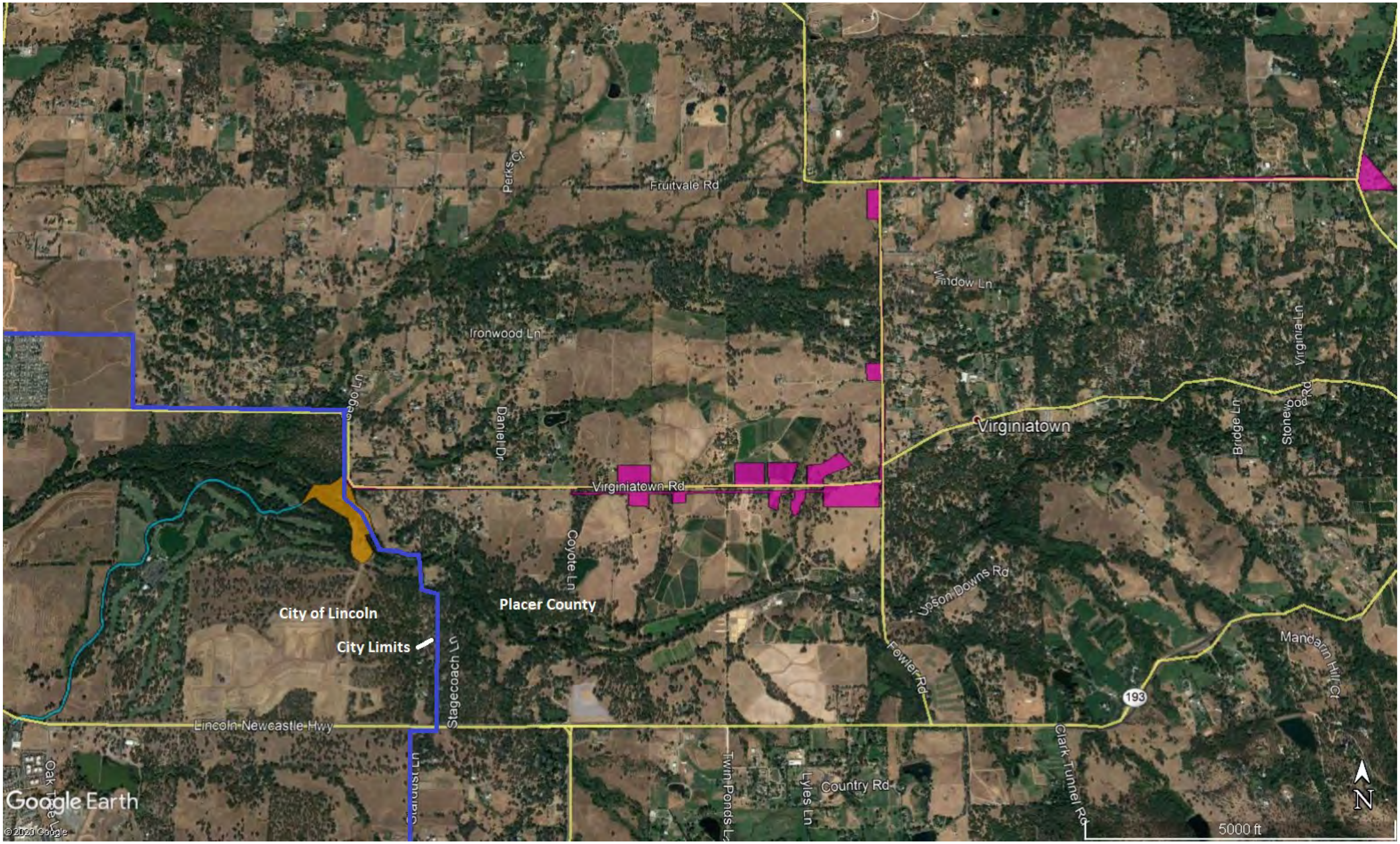
4.11.1 Environmental Setting

The majority of the pipeline path for Alternative 3 is located within Placer County, while the remainder is within the City of Lincoln. Most of Alternatives 1, 2, and 4 are within the City of Lincoln jurisdictional boundaries. However, the middle of Auburn Ravine appears to be the dividing line in this area between the City and County. So those parts of the diversion structure on the northern side of the creek are in the County while the parts in the southern side would be in the City. See Figure 12. *Jurisdictional Boundaries*.

The Project alternatives are located in a developing urban/rural interface area on the eastern edge of the Lincoln city limits. The Turkey Creek Estates subdivision is currently under construction immediately south of the Hemphill Diversion Structure. Adjacent uses include rural residential uses and vacant land to the east and north, the Turkey Creek Golf Course and Turkey Creek Estates to the south and west of the Hemphill Diversion Structure. Rural residential uses, scattered agricultural and grazing land, and vacant land surround the proposed pipeline alignment for Alternative 3. See Figure 4.

Shown in Table 4.11-1 are the General Plan land use designation and zoning districts for the proposed Alternatives.

Table 4.11-1. General Plan Land Use Designation and Zoning District	
General Plan Designation:	City of Lincoln: *Village 1 (V-1)* (includes portions of Alternative 3 and Alternatives 1, 2 and 4 and as they are within Lincoln city limits) Placer County: *Agriculture/Timberland – 10 ac min.* (includes portions of Alternative 3 within the Placer County unincorporated area)
Zoning:	City of Lincoln: *Village 1 Specific Plan – VPR (Village Park and Recreation), VLDR (Village Low Density Residential)* (includes Alternatives 1, 2 and 4 and portions of Alternative 3 as they are within Lincoln city limits) Placer County: *Farm-Building site - 10 acre minimum* (*F-B-X 10 AC. MIN.)* (includes portions of Alternative 3 within the Placer County unincorporated area)



ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Figure 12. Jurisdictional Boundaries
2020-104 Hemphill Diversion Structure Project

4.11.2 Land Use and Planning (X) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Physically divide an established community?	☐	☐	☐	☒

None of the Alternative's project sites are within an established community. Therefore, implementation of the Proposed Project will not divide an established community and would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b)	Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒

The Auburn Ravine/Coon Creek Ecosystem Restoration Plan addresses the removal of fish barriers within Auburn Ravine. The Proposed Project would include the removal of barriers related to the Hemphill Diversion Structure and is therefore consistent with this Plan. The Proposed Project would not conflict with any other applicable land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. No impact would occur.

4.12 Mineral Resources

4.12.1 Environmental Setting

The State-mandated Surface Mining and Reclamation Act of 1975 requires the identification and classification of mineral resources in areas within the state subject to urban development or other irreversible land uses that could otherwise prevent the extraction of mineral resources. These designations categorize land as Mineral Resource Zones (MRZ-1 through MRZ-4). The CGS identifies the greater area where the Proposed Project is located as being within the Auburn 15-minute Quadrangle and is classified as MRZ-1, areas where available geologic information indicates there is little likelihood for the presence of mineral resources (CGS 1983).

The City of Lincoln General Plan Background Report (2008a) provides information about the potential mineral resources in the City. According to this information, the General Plan Planning Area is designated as MRZ-4. Areas are designated MRZ-4 when geologic information does not indicate the presence or absence of minerals. Although designated MRZ-4, mineral resources located within the City's Planning Area include clay deposits, granite deposits, and sand and gravel resources. Clay resource extraction operations are located north of Ninth Street, and are transported to the Gladding-McBean plant, where the materials are extracted and stockpiled for use in their clay products (Lincoln 2008a).

The Placer County General Plan does not identify any areas of potential mineral resources.

4.12.2 Mineral Resources (XI) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒

As discussed above, the City, County or CGS does not identify any mineral resources in the Project vicinity, including on the project site. Therefore, no impacts would occur to mineral resources.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒

None of the Alternative’s project sites are identified as a mineral resource recovery site in the Lincoln or Placer County general plans. There would be no impact in this area.

4.13 Noise

4.13.1 Environmental Setting

Noise Fundamentals

Noise is generally defined as sound that is loud, disagreeable, or unexpected. The selection of a proper noise descriptor for a specific source is dependent on the spatial and temporal distribution, duration, and fluctuation of the noise. The noise descriptors most often encountered when dealing with traffic, community, and environmental noise include the average hourly noise level (in L_{eq}) and the average daily noise levels (in L_{dn}/CNEL).

Noise can be generated by a number of sources, including mobile sources, such as automobiles, trucks, and airplanes, and stationary sources, such as construction sites, machinery, and industrial operations. The rate depends on the ground surface and the number or type of objects between the noise source and the receiver. Mobile transportation sources, such as highways, and hard and flat surfaces, such as concrete or asphalt, have an attenuation rate of 3.0 A-weighted decibels (dBA) per doubling of distance. Soft surfaces, such as uneven or vegetated terrain, have an attenuation rate of about 4.5 dBA per doubling of distance from the source. Noise generated by stationary sources typically attenuates at a rate of approximately 6.0 to 7.5 dBA per doubling of distance from the source (USEPA 1971).

Sound levels can be reduced by placing barriers between the noise source and the receiver. In general, barriers contribute to decreasing noise levels only when the structure breaks the “line of sight” between the source and the receiver. Buildings, concrete walls, and berms can all act as effective noise barriers. Wooden fences or broad areas of dense foliage can also reduce noise but are less effective than solid barriers.

Vibration

Ground vibration can be measured several ways to quantify the amplitude of vibration produced. This can be through peak particle velocity or root mean square velocity. These velocity measurements measure maximum particle at one point or the average of the squared amplitude of the signal, respectively. Vibration impacts on people can be described as the level of annoyance and can vary depending on an individual’s sensitivity. Generally, low-level vibrations may cause window rattling but do not pose any threats to the integrity of buildings or structures.

4.13.2 Noise (XII) Environmental Checklist and Discussion

	Would the project result in	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a)	Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☒	☐	☐	☐

It is difficult to specify noise levels that are generally acceptable to everyone; what is annoying to one person may be unnoticed by another. Standards may be based on documented complaints in response to documented noise levels or based on studies of the ability of people to sleep, talk, or work under various noise conditions. However, all such studies recognize that individual responses vary considerably. Standards usually address the needs of the majority of the general public.

Construction of the various alternatives would result in an increase of noise levels in the Project vicinity. The noise levels generated during construction would vary greatly depending upon factors such as the type and specific model of the equipment, the operation being performed, the condition of the equipment and the prevailing wind direction. As such, without a comprehensive noise analysis, the potential for noise related impacts cannot be determined. Therefore, this area will be discussed in the EIR.

Would the project result in		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
b)	Generation of excessive groundborne vibration or groundborne noise levels?	☒	☐	☐	☐

Construction operations have the potential to result in varying degrees of temporary ground vibration and noise levels, depending on the specific construction equipment used and operations involved. As such, without a comprehensive noise analysis, the potential for excessive groundborne vibration or groundborne noise levels cannot be determined. Therefore, this area will be discussed in the EIR.

For a project		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
c)	Located within the vicinity of a private airstrip or 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?	☐	☐	☐	☒

The nearest airport to the Project is the Lincoln Regional Airport, located more than four miles northwest of the project site. The project site is neither located within an area covered by an airport land use plan nor within two miles of a public or private use airport. Thus, no impact would occur with implementation of the Proposed Project.

4.14 Population and Housing

4.14.1 Environmental Setting

The Alternative 1, 2 and 4 sites are located in the City of Lincoln, whereas Alternative 3 has areas in both Lincoln and Placer County. The California Department of Finance (DOF) provides estimated population and housing unit demographics by year throughout the state. The DOF estimates that the City had a population of 49,317 and the unincorporated County had a population of 115,247 as of January 1, 2020 (DOF 2020). There were 19,275 total housing units in the City and 58,326 in the unincorporated County of January 1, 2020 (DOF 2020).

4.14.2 Population and Housing (XIII) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Induce substantial population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	☐	☐	☐	☒

No new roads or extensions of existing roads are proposed. None of the Alternatives being considered include the construction of any new homes. Therefore, direct or indirect increases in population growth would not occur as a result of the Proposed Project.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

No residences would be removed as a result of any of the Alternatives. The Project would have no impact on existing housing.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒

As discussed under Issue b), the Project would not involve the removal or relocation of any housing and would therefore not displace a substantial number of people or necessitate the construction of any replacement housing. The Project would have no impact on existing housing.

4.15 Public Services

4.15.1 Environmental Setting

Public services include fire protection, police protection, parks and recreation, and schools. Generally, impacts in these areas are related to an increase in population from a residential development. Levels of service are generally based on a service-to-population ratio, except for fire protection, which is usually based on a response time. For example, the Lincoln General Plan Policy PFS-8.11 provides a Police

Department staffing ratio of 1.8 officers per 1,000 population. Further, General Plan Policy OSC-7.1 establishes a parkland-to-population ratio of five acres/1,000 residents or nine acres per 1,000 residents for those projects with development agreements. Finally, Policy PFS-8.4 requires the City to strive to maintain a firefighting capability sufficient to maintain a fire response time of five minutes or less as a general guideline for service provision and locating new fire stations (City of Lincoln 2008b).

Police Services

The Lincoln Police Department (LPD) would provide law enforcement services to the Hemphill Diversion Structure site. LPD personnel are organized into two divisions: Operations and Support. The Operations Division comprises the Patrol, Investigations and Communications. The Support Division comprises the Records Property and Evidence, Citizen Volunteers, and Animal Control. The Chief of Police is responsible for overseeing the entire operation of the LPD, including all units and department functions (LPD 2017). The City's Police Station is located at 770 7th Street, approximately 2.3 miles west of the Hemphill Diversion Structure site.

The Placer County Sheriff's Office (PCSO) provides law enforcement services to those portions of Alternative 3 located within the County. The PCSO provides law enforcement to the unincorporated areas, from the Sacramento County line to the Nevada state line at Lake Tahoe, plus providing contract law enforcement services to the City of Colfax and the Town of Loomis. The Sheriff's Office also provides jail services, coroner's services, court security, and marshal duties to the entire County (PCSO 2020). The nearest Sheriff's Office to the Proposed Project is located at 3140 Horseshoe Bar Road in Loomis, approximately six miles to the south.

Fire Services

The City of Lincoln Fire Department (LFD) provides fire protection and emergency medical services to the Hemphill Diversion Structure site. LFD responds to various emergency and non-emergency incidents including, but not limited to, all types of fire, medical emergencies, public assists, and hazardous situations. The City has three fire stations. The fire station closest to the Hemphill Diversion Structure site is Station #33 located at 17 McBean Park Drive, approximately 1.8 miles west of the site.

Portions of the Alterntive1 project site are located in the jurisdiction of the Placer County Fire Department (PCFD). The PCFD has eight career and five volunteer fire stations providing all risk fire and emergency medical services to a 475-square-mile territory. Through a long-standing Cooperative Fire Protection Agreement with CAL FIRE that was first initiated in 1974, PCFD integrates state and local firefighting resources, both career and volunteer, into an effective combination fire department. The nearest PCFD station to the Alternative 3 project site is located at 1112 Wise Road, approximately three miles to the northwest.

Schools

The Western Placer Unified School District (WPUSD) provides most of the educational services for the City and the area surrounding the Project. The WPUSD has seven elementary schools (grades K-5), two middle schools (grades 6-8), one high school (grades 9-12), and one continuation high school. The WPUSD also operates the ATLAS Learning Academy, which serves grades K-12 (WPUSD 2018). According to the California Department of Education, (DOE), the City also has three private schools (DOE 2017).

Parks

The City of Lincoln has 18 parks, ranging in size from 0.7 to 42 acres. The City will have approximately 178.3 acres of parkland with completion of the 15-acre Robert Jimenez Park, which is currently under construction. Based on the DOF 2018 estimated City population of 48,591, upon completion of the Robert Jimenez Park, the City's parkland-to-population ratio will be 3.67 acres of parks/1,000 population[2].

Placer County owns and manages 21 active park properties, 15 passive parks/ open space areas, seven beaches, and 44 miles of off-street trails. The County's standard level of service is five acres of active park per 1,000 people and five acres of open space/passive park (Placer County 2019).

4.15.2 Public Services (XIV) Environmental Checklist and Discussion

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a)	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:	☐	☐	☒	☐
	Fire Protection?	☐	☐	☒	☐
	Police Protection?	☐	☐	☒	☐
	Schools?	☐	☐	☐	☒
	Parks?	☐	☐	☐	☒
	Other Public Facilities?	☐	☐	☐	☒

Fire Protection

All of the Alternatives are located approximately two to three miles from the nearest fire station. The Proposed Project would not result in an increase in population and thereby not require additional fire facilities to serve this population. The Proposed Project would not require any additional LFD or PCFD

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[2] 178.3 acres of parks/(48,591/1,000) population = 3.67 acres of parks/1,000 population.

facilities, equipment, and/or staff and is not anticipated to create an additional burden on exiting fire facilities. Therefore, the Project would have a less than significant impact in this area.

Police Services

The Proposed Project would not result in a significant increase in demand for police protection resulting in new or expanded police facilities. Police facilities and the need for expanded facilities are based on the staffing levels these facilities must accommodate. Police staffing levels are generally based on the population/police officer ratio, and an increase in population is usually the result of an increase in housing or employment. None of the proposed alternatives would result in an increase in population to the area. As such, the Project would not result in the need for an increase in police protection or police facilities. Therefore, the Proposed Project would have a less than significant impact in this area.

Schools

The Proposed Project is removal of an existing diversions structure and potentially the construction of an infiltration gallery, a fish ladder or a pipeline. Because the Proposed Project would not increase the population or result in substantial employment gains, an increase of student population in the WPUSD would not occur; nor would additional educational facilities be required. Therefore, the Proposed Project would have no impact in this area.

Parks

As stated previously, the need for additional parkland is primarily based on an increase in population to an area. Given that the none of the proposed alternatives would result in an increase in the City’s or County’s population, the Project would not burden any parks in the surrounding area beyond capacity by generating additional recreational users. Therefore, the Proposed Project would not require the construction or expansion of park and recreational facilities and would not result in an increase in demand for parks and recreation facilities in the surrounding area. There would be no impact to parks from construction of the Proposed Project.

Other Public Facilities

The Proposed Project does not result in an increase in housing or population in the City or County resulting in an increased use of other public facilities. Therefore, the Project would have no impacts on other public facilities.

4.16 Recreation

4.16.1 Environmental Setting

The City of Lincoln has 18 parks and the County owns and manages 21 active park properties, 15 passive parks/open space areas, seven beaches, and 44 miles of off-street trails.

4.16.2 Recreation (XV) Materials Checklist

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒

The need for additional parkland is primarily based on an increase in population to an area. Given that the Proposed Project would not increase the City's or County's population, the Project would not burden any parks in the surrounding area beyond capacity by generating additional recreational users. Therefore, the Proposed Project would not increase the use of park and recreational facilities resulting in substantial physical deterioration of the facility. There would be no impact to recreational facilities from construction of the Proposed Project.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?	☐	☐	☐	☒

No recreational facilities are proposed as a part of the Project. The Proposed Project would have a no impact in this area.

4.17 Transportation/Traffic

4.17.1 Environmental Setting

Existing Street and Highway System

The Project is located in a rural, although developing urbanized area. Access to the Hemphill Diversion Structure site is provided by the Lincoln Newcastle Highway and Virginiatown Road. The Alternative 3 project site includes Virginiatown, Fowler and Fruitvale roads.

Alternative Transportation Modes

Bicycle Facilities. The City of Lincoln identifies Lincoln Newcastle Highway as having Class II bike lanes to the City boundary (Lincoln n.d.). According to the Placer County Regional Bikeway Plan (2018), the Lincoln Newcastle Highway within the County is identified for future bike lanes.

Public Transit. Public transportation bus service is provided in Placer County through Placer County Transit (PCT). However, no bus routes or stops are available within the Project area. The nearest bus route is the

Lincoln Circular located in the City of Lincoln with a stop at East Avenue and McBean Park Drive, approximately 1.75 miles from the Hemphill Diversion Structure site.

4.17.2 Transportation/Traffic (XVII.) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadways, bicycle and pedestrian facilities?	☐	☐	☒	☐

Because the Proposed Project would not directly or indirectly introduce a new population in the region, the total number of vehicle trips generated by the Project is not expected to change from existing conditions. Project construction will, however, result in temporary increases in local traffic due to the transport of construction personnel, equipment and material to the project site.

Construction is considered to have only short-term effects on traffic and circulation conditions within the area proposed for construction. There are no planned road closures as a result of Project construction and traffic control would be provided, as necessary. As such the Proposed Project's impact on the local circulation system would be less than significant.

Would the Project:	Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	☐	☐	☒	☐

CEQA Guidelines Section 15064.3, subdivision (b) provides criteria for analyzing transportation impacts based on a vehicle miles traveled (VMT) methodology instead of the now superseded (as of January 1, 2019) level of service (LOS) methodology. Pertinent to the Proposed Project are those criteria identified in Section 15064.3(b)(1) Land Use Projects. According to this section:

> "Vehicle miles traveled exceeding an applicable threshold of significance may indicate a significant impact. Generally, projects within one-half mile of either an existing major transit stop or a stop along an existing high- quality transit corridor[3] should be presumed to cause a less than significant transportation impact. Projects that decrease vehicle miles traveled in the project area

[3] "High-quality transit corridor" means an existing corridor with fixed route bus service with service intervals no longer than 15 minutes during peak commute hours. For the purposes of this Appendix, an "existing stop along a high-quality transit corridor" may include a planned and funded stop that is included in an adopted regional transportation improvement program.

> compared to existing conditions should be presumed to have a less than significant transportation impact."

However, Section 15064.3(b)(3) allows an agency to determine a project's transportation impact on a qualitative basis if a VMT methodology is unavailable, as is the case with the Proposed Project.

Section 15064.3(b)(3) is as follows:

> "Qualitative Analysis. If existing models or methods are not available to estimate the vehicle miles traveled for the particular project being considered, a lead agency may analyze the project's vehicle miles traveled qualitatively. Such a qualitative analysis would evaluate factors such as the availability of transit, proximity to other destinations, etc. For many projects, a qualitative analysis of construction traffic may be appropriate."

The Proposed Project would result in a short-term increase in the amount of traffic on the local roadways during construction. Following completion of the Project there would be no increase in traffic beyond current conditions. The Proposed Project would not increase the capacity of any of the affected roadways in the area and, as such, would not lead to a measurable and substantial increase in VMT. Therefore, the Proposed Project would have a less than significant impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
c)	Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒

No modifications to roadway features are proposed as part of the Project. Therefore, the Project would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant With Mitigation Incorporated	Less than Significant Impact	No Impact
d)	Result in inadequate emergency access?	☐	☐	☐	☒

No new developments or modifications to roadway features are proposed as part of the Project. Therefore, the Project would not result in any adverse impact on emergency access. As such, the Project would have no impact regarding emergency access.

4.18 Tribal Cultural Resources

4.18.1 Environmental Setting

The Project area is located within what is historically documented as the Nisenan tribal territory.

4.18.2 Tribal Cultural Resources (XVII) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or	☒	☐	☐	☐
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American Tribe.	☒	☐	☐	☐

A cultural resources survey, including tribal consultation, has not been completed for the Project. As such, there is a potential for the Project to impact tribal cultural resources on the on the site. The extent of this potential impact has not been determined at this time. As such, this will be discussed in the EIR.

4.19 Utilities and Service Systems

4.19.1 Environmental Setting

Other than NID raw water facilities, there are no other utilities or service systems located at the Hemphill Diversion Structure site.

Water Service

The Hemphill Diversion Structure is used during the irrigation season to facilitate the flow of water from the Auburn Ravine to the Hemphill Canal. The Hemphill Canal provides irrigation water for multiple parcels including, but not limited to, Turkey Creek Golf Course, Lincoln Hills Golf Course, Lincoln Crossing Community Association, and Lincoln Land Holdings as shown in Figure10. Auburn Ravine is part of the Bear River raw water system (NID 2016).

According to the NID Agricultural Water Management Plan (2016), NID serves nearly 6,000 agricultural customers with an average total reported irrigated acreage of 25,860 acres. Most agricultural water customers purchase water seasonally, from mid-April through mid-October, and the water is mainly used for irrigated pasture, vineyards, orchards, and family gardens.

Wastewater and Storm Drainage

Wastewater facilities are not provided on the Hemphill Diversion Structure site nor within the Alternative 3 project area. There are no formal storm drainage facilities in the Project area. Any existing storm drainage in the area is provided though natural drainages, including Auburn Ravine.

Solid Waste

Within the Lincoln city boundaries, the Lincoln Department of Public Services manages solid waste and green waste collection and disposal. The Western Placer Waste Management Authority (WPWMA) is the area's regional waste management agency. The WPWMA was established in 1978 through a joint exercise of powers agreement between Placer County and the cities of Lincoln, Rocklin and Roseville to own, operate and maintain a sanitary landfill and all related improvements (WPWMA 2020). The WPWMA's facilities consist of the Western Regional Sanitary Landfill and a Materials Recovery Facility which includes composting, household hazardous waste, and recycling and buyback facilities.

As shown in Table 4.19-1, the majority solid waste from the City and unincorporated County is disposed of at the Western Regional Landfill. According to the figures published by the California Department of Resources Recycling and Recovery (CalRecycle, 2020a), in 2018, the Western Regional Landfill received approximately 90.2 percent of Lincoln's and 98.0 percent of the unincorporated County's solid waste. As of June 2005, the Western Regional Landfill had a remaining capacity of 29 million cubic yards and a cease operation date of January 1, 2058 (CalRecycle 2020b).

Table 4.19-1. Solid Waste Disposal Facilities Used by the City of Lincoln and Placer County - 2018

Destination Facility	Solid Waste Disposal – 2018 (tons/year)		Landfill Information		
	City of Lincoln	Unincorporated Placer County	Remaining Capacity (cubic yards)	Remaining Capacity Date	Cease Operation Date
Azusa Land Reclamation Co. Landfill	3	-	51,512,201	9/30/12	1/1/2045
Foothill Sanitary Landfill	1	7	125,000,000	6/10/2010	12/31/2082
Forward Landfill, Inc.	21	21	22,100,000	12/31/2012	1/1/2020
Kettleman Hills		8	15,600,000	2/25/2020	NA
L and D Landfill	162	358	4,100,000	5/31/2005	1/1/2023
North County Landfill & Recycling	2	1	35,400,000	12/31/2009	12/31/2048
Potrero Hills Landfill	38	67	13,872,000	1/1/2006	2/14/2048
Recology Hay Road	2	39	30,433,000	7/28/2010	1/1/2077
Recology Ostrom Road LF Inc.	3,291	34	39,223,000	6/1/2007	12/31/2066
Sacramento County Landfill (Kiefer)	283	1,087	112,900,000	9/12/2005	1/1/2064
Vasco Road Sanitary Landfill	7	1	7,379,000	10/31/2016	12/31/2023
Western Regional Landfill	35,237	80,187	29,093,819	6/30/2005	1/1/2058
Yolo County Central Landfill	11	20	n/a	n/a	1/1/2081
Yearly Total	39,057	81,831			
Average per Resident (lbs/day)	4.5	5.0			
Average per Employee (lbs/day)	24.9	14.2			

Source: CalRecycle 2020a, 2020b, and 2020c

4.19.2 Utilities and Service Systems (XVIII) Environmental Checklist and Discussion

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Require or result in the relocation or construction of new or expanded water, or wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	☒	☐	☐	☐

Water

Alternatives 1 and 32 involve the construction of an infiltration gallery and the construction of a fish ladder and would not require new water infrastructure or treatment facilities. These alternatives would have no impact in this area.

Alternative 3 would require the installation of a new pipeline to provide water to the Hemphill Canal. No additional water treatment or infrastructure or the expansion of such facilities are required for the installation of the pipeline. The environmental effects of this pipeline and removal of the Hemphill Diversion Structure are discussed in this Initial Study under each impact area. Alternative 3 would have a less than significant impact in this area.

Alternative 4, the removal of the Hemphill Diversion Structure and abandonment of the Hemphill Canal, would result in the discontinuation of raw water service to those parcels currently served by the Hemphill Canal. Discontinuation of services would require those parcels currently served by the Hemphill Canal to obtain other sources of raw water. While discontinuation of service would not have a direct impact to water facilities, it may result in an indirect impact as new infrastructure may be required to serve these parcels. As such, Alternative 4 would have a potentially significant impact on water facilities and will be further analyzed in the EIR.

Wastewater

The Proposed Project includes four different alternatives designed to allow for anadromous fish passage beyond the Hemphill Diversion Structure. None of these alternatives would require wastewater service or facilities or impact any existing facilities in the area. The Proposed Project would have no impact to existing wastewater infrastructure or treatment facilities.

Storm Drainage

None of the four Alternatives would require storm drainage facilities. No new facilities would be required to serve the Project and the Project would have no impact in this area.

Electric Power

Alternative 1, the Riverbank Infiltration Gallery Alternative, would require the extension of electrical power to the project site. PG&E provides electrical services to the Project area through state-regulated public utility contracts. PG&E's ability to provide its services concurrently for each project is evaluated during the development review process. Existing electrical power poles are located on Virginiatown Road, approximately 300 feet from the Hemphill Diversion Structure site. New power poles and electrical lines will be required to be extended to the infiltration gallery. However, no new PG&E electric facilities, with the exception of possibly two new electrical poles, will be required to provide electricity to the project. Therefore, the project would have a less than significant impact in this area.

Natural Gas

None of the four Alternatives would require natural gas facilities. As such, the project would have no impact to natural gas facilities.

Telecommunications

None of the four alternatives would require telecommunication facilities. No new telecommunication facilities would be required to serve the project and the project would have no impact in this area.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b)	Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	☒	☐	☐	☐

Discontinuation of service as identified under Alternative 4 and discussed in Item a) above will require an analysis of the available water supply to serve those parcels that would no longer be served by the Hemphill Canal. As such, Alternative 4 would have a potentially significant impact on water supply and will be further analyzed in the EIR.

Would the Project:		Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c)	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?	☐	☐	☐	☒

Refer to Item a) above

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	☐	☐	☒	☐

The Proposed Project's alternatives would include the potential removal of the existing diversion structure, and either the construction of an infiltration gallery or fish ladder or pipeline. None of these alternatives would result in a substantial amount of solid waste and all solid waste generation would end upon completion of construction. As such, the Proposed Project would not substantially increase solid waste in the area and existing landfills have sufficient capacity to accommodate the relatively minor amounts of waste that would be generated by the Proposed Project. This is a less than significant impact.

Would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
e) Comply with federal, state, and local statutes and management and reduction regulations related to solid waste?	☐	☐	☒	☐

The Proposed Project is required to comply with all state and federal statutes regarding construction solid waste. This impact is considered less than significant.

4.20 Wildfire

4.20.1 Environmental Setting

The risk of wildfire is related to a variety of parameters, including fuel loading (vegetation), fire weather (i.e., winds, temperatures, humidity levels and fuel moisture contents), and topography (degree of slope). Steep slopes contribute to fire hazard by intensifying the effects of wind and making fire suppression difficult. Fuels such as grass are highly flammable because they have a high surface area to mass ratio and require less heat to reach the ignition point, while fuels such as trees have a lower surface area to mass ratio and require more heat to reach the ignition point.

The project site is not in an area designated by CAL FIRE (2007) as a Fire Hazard Severity Zone. Furthermore, no Very High Fire Hazard Severity Zones are located nearby. Finally, the location of the project site makes it readily accessible by emergency personnel and vehicles in the event of a wildland fire.

4.20.2 Wildfire (XX) Environmental Checklist and Discussion

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒

None of the Alternative's project sites are in an area designated by CAL FIRE (2007) as a Fire Hazard Severity Zone and no Very High Fire Hazard Severity Zones are located nearby. The Proposed Project does not include any actions that would impair or physically interfere with an adopted emergency response plan or emergency evacuation plan. No construction activities would impede the use of surrounding roadways in an emergency evacuation. The Project would have no impact in this area.

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	☐	☐	☐	☒

None of the Alternative's project sites are in an area designated by CAL FIRE as a Fire Hazard Severity Zone and no Very High Fire Hazard Severity Zones are located nearby. No inhabitable structures would be built or occupied as a part of the Project and the Project would have no impact in this area.

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	☐	☐	☐	☒

None of the Alternative's project sites are in an area designated by CAL FIRE as a Fire Hazard Severity Zone. Furthermore, no Very High Fire Hazard Severity Zones are located nearby. No new fuel breaks, emergency water sources would be required for development of the Project. While new power lines would be required for Alternative 3, these lines would not exacerbate fire risk in the area. The Project would have no impact in this area.

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	☐	☐	☐	☒

None of the Alternative's project sites are in an area designated by CAL FIRE as a Fire Hazard Severity Zone and no Very High Fire Hazard Severity Zones are located nearby. The Project would have no impact in this area.

4.21 Mandatory Findings of Significance

4.21.1 Mandatory Findings of Significance (XIX) Environmental Checklist and Discussion

Does the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
a) Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☒	☐	☐	☐

As discussed in Sections 4.4 Biological Resources and 4.5 Cultural Resources, the Proposed Project may have potential impacts to these resources. These areas will be discussed in the EIR.

Does the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
b) 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)?	☒	☐	☐	☐

Implementation of the Proposed Project, in conjunction with other approved or pending projects in the region, may have the potential to result in cumulatively considerable impacts to the physical environment. Cumulative impacts will be discussed in the EIR.

Does the Project:	Potentially Significant Impact	Less than Significant with Mitigation Incorporated	Less than Significant Impact	No Impact
c) Have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☒	☐	☐	☐

Direct and indirect impacts to human beings may occur as a result of implementation of the Proposed Project. As such, these will be discussed in the EIR.

SECTION 5.0 LIST OF PREPARERS

5.1 Nevada Irrigation District

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Doug Roderick, Engineering Manager

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Chris Stabenfeldt, Project Director

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APPENDIX 2.0

Project Description Appendices

APPENDIX 2.0 A

Photos

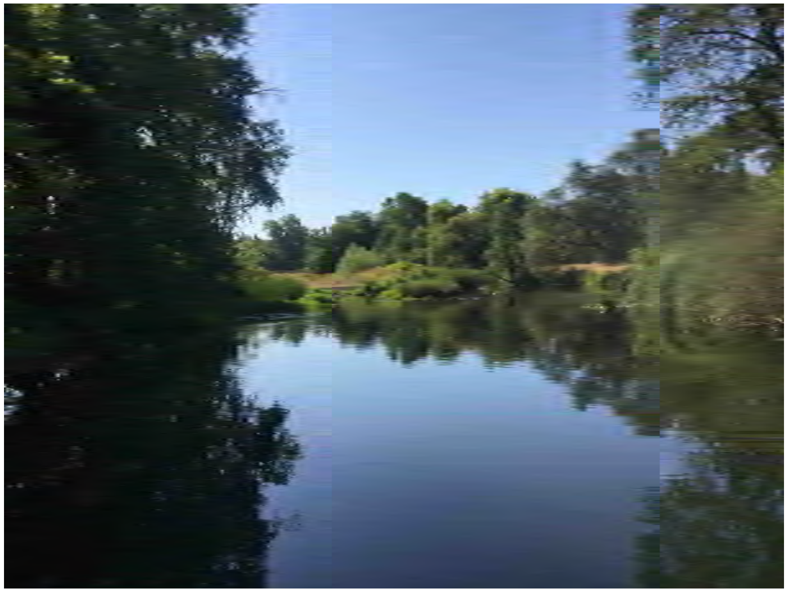

Photo 1. Auburn Ravine Upstream of Hemphill Diversion, facing SE, August 7, 2020

Photo 2. Riverine Riparian Downstream of Hemphill Diversion, facing E, July 28, 2020

Photo 3. Auburn Ravine looking upstream near Hemphill Division Structure, flashboards not in place

Photo 4. Hemphill Diversion Structure with flashboards installed

Photo 5. Hemphill Diversion Structure with flashboards installed

Photo 6. Hemphill Canal inlet

Photo 7. Hemphill Canal

Photo 8. Hemphill Canal within Turkey Creek Golf Course

Photo 9. Hemphill Canal within Turkey Creek Golf Course

Photo 10. Staging Area south of Auburn Ravine, looking north,

Photo 11. Staging area south of Auburn Ravine, looking south

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Representative Site Photographs

2020-104 Hemphill NID

Photo 12. Auburn Ravine near south staging area, August 6, 2020

Photo 13. Auburn Ravine near south staging area, August 6, 2020

Photo 14. Fruitvale Road, facing East, July 28, 2020

Photo 15. Mixed Oak Woodland btw Virginiatown Rd and Auburn Ravine, facing W, September 17, 2020

Photo 16. Virginiatown Road. facing west,July 28, 2020

Photo 17. Seasonal Wetland Swale in Grassland, facing SSW,July 28, 2020

Photo 18. NID Placer Yard, August 5, 2020

Photo 19. end of AR1 looking up to the Chevalier pipeline head within the Placer Yard

APPENDIX 2.0 B

Cost Estimate

Memorandum

TO: Doug Roderick, PE, Interim Engineering Manager

FROM: Tonia M. Tabucchi Herrera, PE, Senior Engineer
Adrian Schneider, PE, Senior Engineer

DATE: March 26, 2021

SUBJECT: **Hemphill Diversion Structure Project (FATR #7032) – Cost Estimates for Alternatives Under Review in DEIR**

ENGINEERING

BACKGROUND:

The Hemphill Diversion Structure Project (Project) Draft Environmental Impact Report (EIR) will be released for public comment and review on April 1, 2021. The Draft EIR identified seven (7) project objectives:

1) Provide passage for anadromous fish at Hemphill Diversion Structure through elimination or modification of the existing structure.
2) Provide for a project that limits operational and maintenance activities within Auburn Ravine.
3) Maintain NID's water rights (pre and post-1914) within Auburn Ravine.
4) Continue to provide raw water deliveries via the Hemphill Canal.
5) Minimize or eliminate fish passage into Hemphill Canal.
6) Provide for a project that reduces the risk of further upstream erosion.
7) Provide a project that is economically feasible to implement, operate, and maintain.

The goal of this memo is to provide cost estimates to assist in evaluating the Project as it relates to the above objective 7.

Staff, through consultation with experts in their field and past project practices and experiences, have developed cost estimates for the three (3) alternatives under review in the Draft EIR:

Alternative 1 - Riverbank Infiltration Gallery

Alternative 2 - Fish Passage

Alternative 3 - Pipeline

DESCRIPTION OF ALTERNATIVES:

Each alternative includes the removal of the diversion structure (dam). Due to the likely permitted work window (June through October), the Contractor would install a cofferdam and temporary bypass to allow water past the construction site into the ravine and to maintain service to the Hemphill Canal.

Alternative 1 - Riverbank Infiltration Gallery Alternative, would include the work noted above and the construction of an infiltration gallery within the south bank of the Auburn Ravine, downstream of the existing diversion structure.

The infiltration gallery would consist of the necessary piping, imported engineered compacted fill, rip-rap, a wet well system with two-20 cubic-feet per second pumps, and a backflush system.

Canal modification would occur at the discharge point of the pumps into the canal and upstream to the existing canal head intake structure. From the new discharge into the canal and upstream of the existing intake, the canal would be filled in with suitable material. A concrete discharge box, or armoring of the canal, would be required at the new point of entry into the canal.

Electrical would be brought to the site from Virginiatown Road. The electrical extension would be above ground.

Site stabilization, restoration, and north bank stabilization are included in the cost.

Alternative 2 - Fish Passage Alternative, would include the work noted above for the diversion removal and the construction of a nature-like fish passage within Auburn Ravine at the location of the existing diversion structure.

The nature-like fish passage would be a roughened rock ramp resembling a riffle within the stream channel with the upstream crest elevation being lower than the existing concrete dam crest.

A fish screen would be installed at the head of the Hemphill Canal. Additional canal modifications would include piping and/or lining and regrading a portion of the canal from the intake to the first service box. This work would include the replacement of existing culverts and modification/replacement of the existing gaging station.

Electrical would be brought to the site from Virginiatown Road to provide fish screen cleaning. The electrical extension would be above ground.

Alternative 3 - Pipeline Alternative, would include the work noted above for the diversion removal and the construction of a pipeline from the Auburn Ravine 1 Canal within the Placer Yard.

The approximately 4.5-mile, 24-inch diameter pipeline would be installed predominately in paved roadways from the Placer Yard facility extending along Fruitvale Road, Fowler Road, and Virginiatown Road. A portion of the pipeline would be installed cross-country. In order to reach the Hemphill Canal, the pipeline section crossing Auburn Ravine would be an aerial crossing.

Canal modification would occur at the new discharge point into the canal and upstream to the existing canal intake structure. From the new discharge point into the canal and upstream to the existing intake the canal would be filled in with suitable material. A concrete discharge box or armoring of the canal would be required at the new point of entry.

ENERGY COST ESTIMATE:

Alternative 1 cost estimates were calculated utilizing the proposed pump sizes, estimated amperage, and PG&E rates at other District facilities. The pumps are assumed to run for 24 hours, 182 irrigation service days, and 8 service days (if permitted to do so). The estimated energy cost for the pumps is approximately $40,000 per irrigation season. The cost estimate is subject to PG&E rates and actual pump design.

Alternative 2, automatic fish screening, will have energy costs associated with the automatic fish screening cleaning. During design, alternatives to electrical power will be considered and could include solar and self-propelled cleaning.

Alternative 3 would not require any energy to operate, relying on gravity feed.

COSTS TO BE DETERMINED:

Additional access costs:

A temporary construction and access easement to the south side of the ravine will be needed for construction of all alternatives. An existing private dirt road through an on-going developing parcel starts at HWY193 and terminates near the ravine. Alternatives 1 and 2 will require a permanent easement for access from the south side of the canal. Currently, the District has access via the berm on the south. However, there will be times that equipment necessary for on-going maintenance will require more efficient access.

Operation and Maintenance Costs:

The estimated costs provided are for the construction of the project only and do not include costs for Operation and Maintenance of the facility. If needed, this can be further explored to quantify for each alternative.

Qualitatively, Alternative 1 will have the highest operation and maintenance costs, while Alternative 3 is the lowest. Alternative 1 would most likely require periodic inspection and backflushing to ensure efficiency, and that the required delivery amounts are met for water sales. Alternative 2 may require adjustment of the nature-like rock placement after large storm events, or removal of any material caught that would affect migration. The screen system on the canal intake will require periodic inspection. The automatic cleaning should allow for any heavy cleaning such as sediment removal before or after irrigation season. Alternative 3, aerial crossing, would require periodic maintenance during the life of the facility, including painting and periodic operation of any isolation valves.

COST ESTIMATE ASSUMPTIONS:

Contingency was added to the cost estimate due to the conceptual level of the design. From conceptual design progressing to final, contingency would be eliminated. The percentage of the contingency is in-line with industry standards.

Estimating the cost for engineering (design), construction management, and administration is calculated as a percentage of the estimated construction cost. The industry standard is about 20% of construction cost. This assumes that a third party does the design, construction management, and administration. Most often, the District Staff provides construction management, inspection, and administration, so that percentage may be able to be lowered. Additionally, depending on the project selected, design also may be completed by District Staff, resulting in a further lower percentage.

The cost estimate for environmental protection and mitigation was included to account for the cost associated with implementing mitigation, which can include, but is not limited to, District hired consultants for pre-construction surveys, training, and monitoring, exclusion fencing, and additional permit requirements. This number will be refined with the final design and permitting.

Revegetation could be imposed by environmental mitigation, permitting, and the Storm Water Pollution Prevention Plan, in addition to those costs noted above. This cost assumes revegetation of areas disturbed as a result of construction outside of permanent access points to District facilities. This cost would be further refined based on the areas of disturbance and the type of revegetation required – hydroseeding versus plugs, for example.

Construction of Alternative 3 is assumed to be constructed by a Contractor. The cost of construction would be less if District crews construct the pipeline.

COST ESTIMATE SUMMARY:

Below are the costs per alternative. Costs include estimates for design, any additional studies, permitting, environmental mitigation, and construction. For a detailed breakdown, see the attached spreadsheet.

Alternative 1 Infiltration Gallery: $11,840,800

Alternative 2 Fish Passage: $4,343,300

Alternative 3 Pipeline: $14,415,200

Attachment: (1)

- Hemphill Conceptual Cost Estimates for Alternatives

HEMPHILL CONCEPTUAL COST ESTIMATES FOR ALTERNATIVES
March 2021

Alternative 1 - Infiltration Gallery

Item No.	Description	Estimated Quantity	Unit	Unit Price	Line Item Cost
1	Mobilization / Demobilization (10%)	1	LS	--	$608,800
2	Infiltration Gallery[a]	1	LS	$4,965,000	$4,965,000
3	Electrical[a]	1	LS	$200,000	$200,000
4	Dam demolition[a]	1	LS	$190,000	$190,000
5	Reconfigure Stream Bed[a]	1	LS	$475,000	$475,000
6	Upstream Erosion Control	1	LS	$100,000	$100,000
7	Permit Fees	1	LS	$75,000	$75,000
8	Studies and Consultant Reports	1	LS	$83,000	$83,000
				Bid Items Subtotal:	$6,696,800
				25% Contingency	$1,674,000
				~3% Bond Allowance:	$201,000
				8% Revegetation	$536,000
				Direct Cost Subtotal:	$9,107,800
				20% Engineering, construction management and administration:	$1,822,000
				~10% Environmental protection and mitigation:	$911,000
				Indirect Cost Subtotal:	$2,733,000
				Total Cost:	**$11,840,800**

Alternative 2 - Rock Ramp[b]

Item No.	Description	Estimated Quantity	Unit	Unit Price	Line Item Cost[d]
1	Mobilization / Demobilization (10%)	1	LS	--	$223,300
2	Storm Water Pollution Prevention Plan	1	LS	$40,000	$40,000
3	Temporary bypass of water	1	LS	$79,000	$79,000
4	Clearing / Grubbing and Debris Removal	0.5	AC	$16,000	$8,000
5	Sheeting, shoring, and bracing	1	LS	$37,000	$37,000
6	Dam demolition	1	LS	$190,000	$190,000
7	Engineered streambed material	2,000	CY	$88	$177,000
8	Boulder Weirs and Boulder Clusters	3,879	TON	$72	$278,000
9	Reprofile Irrigation Canal	1	LS	$600,000	$600,000
10	Grade/reprofile upstream of dam	800	CY	$82	$66,000
11	Fish Screen	1	LS	$400,000	$400,000
12	Permit Fees	1	LF	$75,000	$75,000
13	Studies and Consultant Reports	1	LS	$83,000	$83,000
14	Electrical[e]	1	LS	$200,000	$200,000
				Bid Items Subtotal:	$2,456,300
				25% Contingency	$614,000
				~3% Bond Allowance:	$74,000
				8% Revegetation	$197,000
				Direct Cost Subtotal:	$3,341,300
				20% Engineering, construction management and administration:	$668,000
				~10% Environmental protection and mitigation:	$334,000
				Indirect Cost Subtotal:	$1,002,000
				Total Cost:	**$4,343,300**

Alternative 3 - Pipeline

Item No.	Description	Estimated Quantity	Unit	Unit Price	Line Item Cost
1	Mobilization / Demobilization (10%)	1	LS	--	$741,200
2	Storm Water Pollution Prevention Plan	1	LS	$50,000	$50,000
3	Purchase and Installation of 24" pipe[c]	23,140	FT	$288	$6,664,000
4	Overhead Aerial Crossing	1	LS	$250,000	$250,000
5	Permit Fees	1	LS	$75,000	$75,000
6	Studies and Consultant Reports	1	LS	$83,000	$83,000
7	Dam Demolition	1	LS	$190,000	$190,000
8	Upstream Erosion Control	1	LS	$100,000	$100,000
				Bid Items Subtotal:	$8,153,200
				25% Contingency	$2,038,000
				~3% Bond Allowance:	$245,000
				8% Revegetation	$652,000
				Direct Cost Subtotal:	$11,088,200
				20% Engineering, construction management and administration:	$2,218,000
				~10% Environmental protection and mitigation:	$1,109,000
				Indirect Cost Subtotal:	$3,327,000
				Total Cost:	**$14,415,200**

Notes: [a] *Costs referenced from Westcon Construction ROM estimate 3/11/2021*

[b] *Rock Ramp costs provided by Northwest Hydraulic Consultants, February 2021. NID revised the Dam demo cost from median estimate of 650 CY at $200/CY total $130,000 to the amount quoted by Westcon Construction for "apples to apples" comparision as that portion of the job is required for all alternatives.*

[c] *Piping costs assume $12 per diameter inch of pipe*

[d] *Costs are rounded to the nearest thousand*

[e] *Cost for electrical for fish screen added*

APPENDIX 3.2

CalEEMod Modeling Outputs
(ECORP Consulting, Inc.)

Hemphill Diversion Structure - Alternative 1

Placer-Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 1 timing and duration per Section 2.0, Project Description

Off-road Equipment - Material haul trucks represented in Trips and VMT tab

Off-road Equipment - Equipment per Project Description

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker trips based on the number of estimated workers identified in the Project Description.

Hemphill Diversion Structure - Alternative 1 - Placer-Sacramento County, Summer

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	78.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	2/1/2023
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	10/16/2022
tblGrading	MaterialExported	0.00	9,000.00
tblGrading	MaterialImported	0.00	9,000.00
tblGrading	MaterialImported	0.00	3,300.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00

tblTripsAndVMT	WorkerTripNumber	20.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	0.00	16.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.0516	38.7353	46.2847	0.0982	0.8912	1.7909	2.4849	0.2385	1.7597	1.8593	0.0000	9,575.8668	9,575.8668	0.8876	0.0000	9,596.2148
2023	3.6585	34.5357	44.1987	0.0976	1.5741	1.4343	3.0083	0.4010	1.4170	1.8179	0.0000	9,511.5297	9,511.5297	0.7645	0.0000	9,530.6422
Maximum	**4.0516**	**38.7353**	**46.2847**	**0.0982**	**1.5741**	**1.7909**	**3.0083**	**0.4010**	**1.7597**	**1.8593**	**0.0000**	**9,575.8668**	**9,575.8668**	**0.8876**	**0.0000**	**9,596.2148**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.0516	38.7353	46.2847	0.0982	0.8912	1.7909	2.4849	0.2385	1.7597	1.8593	0.0000	9,575.8667	9,575.8667	0.8876	0.0000	9,596.2148
2023	3.6585	34.5357	44.1987	0.0976	1.5741	1.4343	3.0083	0.4010	1.4170	1.8179	0.0000	9,511.5297	9,511.5297	0.7645	0.0000	9,530.6422
Maximum	**4.0516**	**38.7353**	**46.2847**	**0.0982**	**1.5741**	**1.7909**	**3.0083**	**0.4010**	**1.7597**	**1.8593**	**0.0000**	**9,575.8667**	**9,575.8667**	**0.8876**	**0.0000**	**9,596.2148**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
2	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
3	Infiltration Gallery Installation	Site Preparation	10/16/2022	2/1/2023	5	78	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	2	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Diversion Structure Removal	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Diversion Structure Removal	Other Construction Equipment	1	6.00	172	0.42
Infiltration Gallery Installation	Excavators	2	8.00	158	0.38
Infiltration Gallery Installation	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Infiltration Gallery Installation	Skid Steer Loaders	2	8.00	65	0.37
Infiltration Gallery Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Infiltration Gallery Installation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Diversion Structure Removal	8	16.00	0.00	99.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infiltration Gallery Installation	7	16.00	0.00	2,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	0	16.00	0.00	413.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2877	9.4021	1.6162	0.0334	0.7224	0.0286	0.7510	0.1980	0.0274	0.2254		3,497.1922	3,497.1922	0.1017		3,499.7353
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.3418**	**9.4297**	**2.0146**	**0.0346**	**0.8538**	**0.0294**	**0.8832**	**0.2329**	**0.0281**	**0.2610**		**3,618.9312**	**3,618.9312**	**0.1043**		**3,621.5391**

3.2 Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2877	9.4021	1.6162	0.0334	0.7224	0.0286	0.7510	0.1980	0.0274	0.2254		3,497.192 2	3,497.192 2	0.1017		3,499.735 3
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.3418**	**9.4297**	**2.0146**	**0.0346**	**0.8538**	**0.0294**	**0.8832**	**0.2329**	**0.0281**	**0.2610**		**3,618.931 2**	**3,618.931 2**	**0.1043**		**3,621.539 1**

3.3 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	3.9897	34.9530	45.8423	0.0782		1.7893	1.7893		1.7583	1.7583		7,450.3330	7,450.3330	0.8822		7,472.3882
Total	**3.9897**	**34.9530**	**45.8423**	**0.0782**	**0.2432**	**1.7893**	**2.0325**	**0.0368**	**1.7583**	**1.7951**		**7,450.3330**	**7,450.3330**	**0.8822**		**7,472.3882**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.8400e-003	0.2561	0.0440	9.1000e-004	0.0197	7.8000e-004	0.0205	5.3900e-003	7.5000e-004	6.1400e-003		95.2625	95.2625	2.7700e-003		95.3318
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.0619**	**0.2837**	**0.4424**	**2.1300e-003**	**0.1511**	**1.5700e-003**	**0.1527**	**0.0403**	**1.4800e-003**	**0.0417**		**217.0016**	**217.0016**	**5.3600e-003**		**217.1356**

3.3 Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	3.9897	34.9530	45.8423	0.0782		1.7893	1.7893		1.7583	1.7583	0.0000	7,450.333 0	7,450.333 0	0.8822		7,472.388 2
Total	**3.9897**	**34.9530**	**45.8423**	**0.0782**	**0.2432**	**1.7893**	**2.0325**	**0.0368**	**1.7583**	**1.7951**	**0.0000**	**7,450.333 0**	**7,450.333 0**	**0.8822**		**7,472.388 2**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.8400e-003	0.2561	0.0440	9.1000e-004	0.0197	7.8000e-004	0.0205	5.3900e-003	7.5000e-004	6.1400e-003		95.2625	95.2625	2.7700e-003		95.3318
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.0619**	**0.2837**	**0.4424**	**2.1300e-003**	**0.1511**	**1.5700e-003**	**0.1527**	**0.0403**	**1.4800e-003**	**0.0417**		**217.0016**	**217.0016**	**5.3600e-003**		**217.1356**

3.4 Infiltration Gallery Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.7128	32.1408	42.8927	0.0737		1.6425	1.6425		1.6232	1.6232		7,011.4995	7,011.4995	0.7403		7,030.0066
Total	**3.7128**	**32.1408**	**42.8927**	**0.0737**	**0.0261**	**1.6425**	**1.6686**	**3.9500e-003**	**1.6232**	**1.6272**		**7,011.4995**	**7,011.4995**	**0.7403**		**7,030.0066**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2010	6.5670	1.1289	0.0233	0.6640	0.0200	0.6840	0.1775	0.0191	0.1966		2,442.6282	2,442.6282	0.0711		2,444.4044
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.2550**	**6.5945**	**1.5273**	**0.0245**	**0.7955**	**0.0208**	**0.8163**	**0.2123**	**0.0198**	**0.2322**		**2,564.3672**	**2,564.3672**	**0.0736**		**2,566.2082**

3.4 Infiltration Gallery Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.7128	32.1408	42.8927	0.0737		1.6425	1.6425		1.6232	1.6232	0.0000	7,011.4995	7,011.4995	0.7403		7,030.0066
Total	**3.7128**	**32.1408**	**42.8927**	**0.0737**	**0.0261**	**1.6425**	**1.6686**	**3.9500e-003**	**1.6232**	**1.6272**	**0.0000**	**7,011.4995**	**7,011.4995**	**0.7403**		**7,030.0066**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2010	6.5670	1.1289	0.0233	0.6640	0.0200	0.6840	0.1775	0.0191	0.1966		2,442.6282	2,442.6282	0.0711		2,444.4044
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0541	0.0276	0.3984	1.2200e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		121.7391	121.7391	2.5900e-003		121.8038
Total	**0.2550**	**6.5945**	**1.5273**	**0.0245**	**0.7955**	**0.0208**	**0.8163**	**0.2123**	**0.0198**	**0.2322**		**2,564.3672**	**2,564.3672**	**0.0736**		**2,566.2082**

3.4 Infiltration Gallery Installation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.4591	29.6107	42.8352	0.0737		1.4243	1.4243		1.4074	1.4074		7,011.8703	7,011.8703	0.7108		7,029.6404
Total	**3.4591**	**29.6107**	**42.8352**	**0.0737**	**0.0261**	**1.4243**	**1.4504**	**3.9500e-003**	**1.4074**	**1.4114**		**7,011.8703**	**7,011.8703**	**0.7108**		**7,029.6404**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1487	4.9001	0.9953	0.0227	1.4165	9.2500e-003	1.4258	0.3622	8.8500e-003	0.3710		2,382.5635	2,382.5635	0.0514		2,383.8478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0507	0.0249	0.3682	1.1700e-003	0.1314	7.8000e-004	0.1322	0.0349	7.2000e-004	0.0356		117.0958	117.0958	2.3300e-003		117.1540
Total	**0.1994**	**4.9250**	**1.3636**	**0.0239**	**1.5480**	**0.0100**	**1.5580**	**0.3970**	**9.5700e-003**	**0.4066**		**2,499.6594**	**2,499.6594**	**0.0537**		**2,501.0018**

3.4 Infiltration Gallery Installation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.4591	29.6107	42.8352	0.0737		1.4243	1.4243		1.4074	1.4074	0.0000	7,011.8703	7,011.8703	0.7108		7,029.6404
Total	**3.4591**	**29.6107**	**42.8352**	**0.0737**	**0.0261**	**1.4243**	**1.4504**	**3.9500e-003**	**1.4074**	**1.4114**	**0.0000**	**7,011.8703**	**7,011.8703**	**0.7108**		**7,029.6404**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1487	4.9001	0.9953	0.0227	1.4165	9.2500e-003	1.4258	0.3622	8.8500e-003	0.3710		2,382.5635	2,382.5635	0.0514		2,383.8478
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0507	0.0249	0.3682	1.1700e-003	0.1314	7.8000e-004	0.1322	0.0349	7.2000e-004	0.0356		117.0958	117.0958	2.3300e-003		117.1540
Total	**0.1994**	**4.9250**	**1.3636**	**0.0239**	**1.5480**	**0.0100**	**1.5580**	**0.3970**	**9.5700e-003**	**0.4066**		**2,499.6594**	**2,499.6594**	**0.0537**		**2,501.0018**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Unmitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 1

Placer-Sacramento County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 1 timing and duration per Section 2.0, Project Description

Off-road Equipment - Material haul trucks represented in Trips and VMT tab

Off-road Equipment - Equipment per Project Description

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker trips based on the number of estimated workers identified in the Project Description.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	78.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	2/1/2023
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	10/16/2022
tblGrading	MaterialExported	0.00	9,000.00
tblGrading	MaterialImported	0.00	9,000.00
tblGrading	MaterialImported	0.00	3,300.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00

tblTripsAndVMT	WorkerTripNumber	20.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	0.00	16.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.0503	38.8781	46.2448	0.0976	0.8912	1.7909	2.4855	0.2385	1.7598	1.8599	0.0000	9,504.3869	9,504.3869	0.8877	0.0000	9,524.9561
2023	3.6629	34.6163	44.2652	0.0970	1.5741	1.4345	3.0085	0.4010	1.4172	1.8181	0.0000	9,441.5941	9,441.5941	0.7708	0.0000	9,460.8651
Maximum	**4.0503**	**38.8781**	**46.2448**	**0.0976**	**1.5741**	**1.7909**	**3.0085**	**0.4010**	**1.7598**	**1.8599**	**0.0000**	**9,504.3869**	**9,504.3869**	**0.8877**	**0.0000**	**9,524.9561**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	4.0503	38.8781	46.2448	0.0976	0.8912	1.7909	2.4855	0.2385	1.7598	1.8599	0.0000	9,504.3869	9,504.3869	0.8877	0.0000	9,524.9561
2023	3.6629	34.6163	44.2652	0.0970	1.5741	1.4345	3.0085	0.4010	1.4172	1.8181	0.0000	9,441.5941	9,441.5941	0.7708	0.0000	9,460.8651
Maximum	**4.0503**	**38.8781**	**46.2448**	**0.0976**	**1.5741**	**1.7909**	**3.0085**	**0.4010**	**1.7598**	**1.8599**	**0.0000**	**9,504.3869**	**9,504.3869**	**0.8877**	**0.0000**	**9,524.9561**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
2	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
3	Infiltration Gallery Installation	Site Preparation	10/16/2022	2/1/2023	5	78	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	2	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Diversion Structure Removal	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Diversion Structure Removal	Other Construction Equipment	1	6.00	172	0.42
Infiltration Gallery Installation	Excavators	2	8.00	158	0.38
Infiltration Gallery Installation	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Infiltration Gallery Installation	Skid Steer Loaders	2	8.00	65	0.37
Infiltration Gallery Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Infiltration Gallery Installation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Diversion Structure Removal	8	16.00	0.00	99.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infiltration Gallery Installation	7	16.00	0.00	2,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	0	16.00	0.00	413.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2992	9.5967	1.8317	0.0326	0.7224	0.0295	0.7519	0.1980	0.0282	0.2262		3,413.9618	3,413.9618	0.1148		3,416.8306
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.3517**	**9.6312**	**2.1843**	**0.0337**	**0.8538**	**0.0303**	**0.8841**	**0.2329**	**0.0289**	**0.2618**		**3,522.3536**	**3,522.3536**	**0.1171**		**3,525.2809**

3.2 Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2992	9.5967	1.8317	0.0326	0.7224	0.0295	0.7519	0.1980	0.0282	0.2262		3,413.961 8	3,413.961 8	0.1148		3,416.830 6
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.3517**	**9.6312**	**2.1843**	**0.0337**	**0.8538**	**0.0303**	**0.8841**	**0.2329**	**0.0289**	**0.2618**		**3,522.353 6**	**3,522.353 6**	**0.1171**		**3,525.280 9**

3.3 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	3.9897	34.9530	45.8423	0.0782		1.7893	1.7893		1.7583	1.7583		7,450.333 0	7,450.333 0	0.8822		7,472.388 2
Total	**3.9897**	**34.9530**	**45.8423**	**0.0782**	**0.2432**	**1.7893**	**2.0325**	**0.0368**	**1.7583**	**1.7951**		**7,450.333 0**	**7,450.333 0**	**0.8822**		**7,472.388 2**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1500e-003	0.2614	0.0499	8.9000e-004	0.0197	8.0000e-004	0.0205	5.3900e-003	7.7000e-004	6.1600e-003		92.9953	92.9953	3.1300e-003		93.0735
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.0606**	**0.2959**	**0.4026**	**1.9800e-003**	**0.1511**	**1.5900e-003**	**0.1527**	**0.0403**	**1.5000e-003**	**0.0418**		**201.3871**	**201.3871**	**5.4700e-003**		**201.5237**

3.3 Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	3.9897	34.9530	45.8423	0.0782		1.7893	1.7893		1.7583	1.7583	0.0000	7,450.3330	7,450.3330	0.8822		7,472.3882
Total	**3.9897**	**34.9530**	**45.8423**	**0.0782**	**0.2432**	**1.7893**	**2.0325**	**0.0368**	**1.7583**	**1.7951**	**0.0000**	**7,450.3330**	**7,450.3330**	**0.8822**		**7,472.3882**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1500e-003	0.2614	0.0499	8.9000e-004	0.0197	8.0000e-004	0.0205	5.3900e-003	7.7000e-004	6.1600e-003		92.9953	92.9953	3.1300e-003		93.0735
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.0606**	**0.2959**	**0.4026**	**1.9800e-003**	**0.1511**	**1.5900e-003**	**0.1527**	**0.0403**	**1.5000e-003**	**0.0418**		**201.3871**	**201.3871**	**5.4700e-003**		**201.5237**

3.4 Infiltration Gallery Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.7128	32.1408	42.8927	0.0737		1.6425	1.6425		1.6232	1.6232		7,011.4995	7,011.4995	0.7403		7,030.0066
Total	**3.7128**	**32.1408**	**42.8927**	**0.0737**	**0.0261**	**1.6425**	**1.6686**	**3.9500e-003**	**1.6232**	**1.6272**		**7,011.4995**	**7,011.4995**	**0.7403**		**7,030.0066**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2090	6.7029	1.2794	0.0228	0.6640	0.0206	0.6846	0.1775	0.0197	0.1971		2,384.4956	2,384.4956	0.0802		2,386.4993
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.2614**	**6.7374**	**1.6320**	**0.0239**	**0.7955**	**0.0214**	**0.8169**	**0.2123**	**0.0204**	**0.2327**		**2,492.8873**	**2,492.8873**	**0.0825**		**2,494.9496**

3.4 Infiltration Gallery Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.7128	32.1408	42.8927	0.0737		1.6425	1.6425		1.6232	1.6232	0.0000	7,011.4995	7,011.4995	0.7403		7,030.0066
Total	**3.7128**	**32.1408**	**42.8927**	**0.0737**	**0.0261**	**1.6425**	**1.6686**	**3.9500e-003**	**1.6232**	**1.6272**	**0.0000**	**7,011.4995**	**7,011.4995**	**0.7403**		**7,030.0066**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day								lb/day			
Hauling	0.2090	6.7029	1.2794	0.0228	0.6640	0.0206	0.6846	0.1775	0.0197	0.1971		2,384.4956	2,384.4956	0.0802		2,386.4993
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0525	0.0345	0.3527	1.0900e-003	0.1314	7.9000e-004	0.1322	0.0349	7.3000e-004	0.0356		108.3918	108.3918	2.3400e-003		108.4502
Total	**0.2614**	**6.7374**	**1.6320**	**0.0239**	**0.7955**	**0.0214**	**0.8169**	**0.2123**	**0.0204**	**0.2327**		**2,492.8873**	**2,492.8873**	**0.0825**		**2,494.9496**

3.4 Infiltration Gallery Installation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day									lb/day		
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.4591	29.6107	42.8352	0.0737		1.4243	1.4243		1.4074	1.4074		7,011.8703	7,011.8703	0.7108		7,029.6404
Total	**3.4591**	**29.6107**	**42.8352**	**0.0737**	**0.0261**	**1.4243**	**1.4504**	**3.9500e-003**	**1.4074**	**1.4114**		**7,011.8703**	**7,011.8703**	**0.7108**		**7,029.6404**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category					lb/day									lb/day		
Hauling	0.1546	4.9745	1.1063	0.0222	1.4165	9.4600e-003	1.4260	0.3622	9.0500e-003	0.3712		2,325.4585	2,325.4585	0.0580		2,326.9073
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0493	0.0311	0.3237	1.0500e-003	0.1314	7.8000e-004	0.1322	0.0349	7.2000e-004	0.0356		104.2652	104.2652	2.0900e-003		104.3175
Total	**0.2038**	**5.0056**	**1.4300**	**0.0233**	**1.5480**	**0.0102**	**1.5582**	**0.3970**	**9.7700e-003**	**0.4068**		**2,429.7237**	**2,429.7237**	**0.0600**		**2,431.2248**

3.4 Infiltration Gallery Installation - 2023

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0261	0.0000	0.0261	3.9500e-003	0.0000	3.9500e-003			0.0000			0.0000
Off-Road	3.4591	29.6107	42.8352	0.0737		1.4243	1.4243		1.4074	1.4074	0.0000	7,011.8703	7,011.8703	0.7108		7,029.6404
Total	**3.4591**	**29.6107**	**42.8352**	**0.0737**	**0.0261**	**1.4243**	**1.4504**	**3.9500e-003**	**1.4074**	**1.4114**	**0.0000**	**7,011.8703**	**7,011.8703**	**0.7108**		**7,029.6404**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1546	4.9745	1.1063	0.0222	1.4165	9.4600e-003	1.4260	0.3622	9.0500e-003	0.3712		2,325.4585	2,325.4585	0.0580		2,326.9073
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0493	0.0311	0.3237	1.0500e-003	0.1314	7.8000e-004	0.1322	0.0349	7.2000e-004	0.0356		104.2652	104.2652	2.0900e-003		104.3175
Total	**0.2038**	**5.0056**	**1.4300**	**0.0233**	**1.5480**	**0.0102**	**1.5582**	**0.3970**	**9.7700e-003**	**0.4068**		**2,429.7237**	**2,429.7237**	**0.0600**		**2,431.2248**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Unmitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 2

Placer-Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 2 timing and duration per Section 2.0, Project Description

Off-road Equipment - Equipment per Section 2.0, Project Description

Off-road Equipment - 'Industrial Saws' used for Project Chainsaws. 'Rough Terrain Forklifts' used for Project Manlift.

Off-road Equipment - Material haul trucks represented in "Trip and VMT" Tab.

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker commutes derived from Section 2.0, Project Description.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	21.00
tblConstructionPhase	NumDays	10.00	45.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	5/30/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	5/2/2022
tblGrading	MaterialExported	0.00	3,200.00
tblGrading	MaterialExported	0.00	3,300.00
tblGrading	MaterialExported	0.00	9,000.00
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38

tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	0.00	24.00
tblTripsAndVMT	WorkerTripNumber	8.00	24.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	2.0208	23.8600	21.8958	0.0671	3.7013	0.7393	4.4406	0.7079	0.6823	1.3902	0.0000	6,730.1705	6,730.1705	1.0921	0.0000	6,757.4741
Maximum	**2.0208**	**23.8600**	**21.8958**	**0.0671**	**3.7013**	**0.7393**	**4.4406**	**0.7079**	**0.6823**	**1.3902**	**0.0000**	**6,730.1705**	**6,730.1705**	**1.0921**	**0.0000**	**6,757.4741**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	2.0208	23.8600	21.8958	0.0671	3.7013	0.7393	4.4406	0.7079	0.6823	1.3902	0.0000	6,730.1705	6,730.1705	1.0921	0.0000	6,757.4741
Maximum	**2.0208**	**23.8600**	**21.8958**	**0.0671**	**3.7013**	**0.7393**	**4.4406**	**0.7079**	**0.6823**	**1.3902**	**0.0000**	**6,730.1705**	**6,730.1705**	**1.0921**	**0.0000**	**6,757.4741**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Vegetation Clearing	Site Preparation	5/2/2022	5/30/2022	5	21	
2	Phase 2 - Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Phase 2 - Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
4	Phase 3 - Diversion Ditch Installation	Site Preparation	8/15/2022	10/15/2022	5	45	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Excavators	2	8.00	158	0.38
Phase 2 - Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Phase 3 - Diversion Ditch Installation	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 3 - Diversion Ditch Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Concrete/Industrial Saws	4	8.00	81	0.73
Phase 1 - Vegetation Clearing	Rough Terrain Forklifts	1	8.00	100	0.40
Phase 2 - Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Phase 2 - Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Other Construction Equipment	1	8.00	172	0.42
Phase 3 - Diversion Ditch Installation	Cranes	1	8.00	231	0.29
Phase 3 - Diversion Ditch Installation	Excavators	1	8.00	158	0.38
Phase 3 - Diversion Ditch Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Phase 1 - Vegetation Clearing	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Phase 2 - Material Import	0	24.00	0.00	413.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Diversion Ditch Installation	3	24.00	0.00	1,125.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Diversion Structure Removal	5	24.00	0.00	989.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Vegetation Clearing	5	24.00	0.00	400.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Phase 1 - Vegetation Clearing - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0172	0.0000	0.0172	2.6100e-003	0.0000	2.6100e-003			0.0000			0.0000
Off-Road	1.5433	12.6924	16.9585	0.0285		0.6526	0.6526		0.6484	0.6484		2,706.0818	2,706.0818	0.2378		2,712.0268
Total	**1.5433**	**12.6924**	**16.9585**	**0.0285**	**0.0172**	**0.6526**	**0.6698**	**2.6100e-003**	**0.6484**	**0.6510**		**2,706.0818**	**2,706.0818**	**0.2378**		**2,712.0268**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1327	4.3363	0.7454	0.0154	0.3332	0.0132	0.3464	0.0913	0.0126	0.1040		1,612.9100	1,612.9100	0.0469		1,614.0829
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.2428**	**4.3974**	**1.6295**	**0.0182**	**0.6397**	**0.0150**	**0.6547**	**0.1726**	**0.0143**	**0.1869**		**1,894.1082**	**1,894.1082**	**0.0527**		**1,895.4266**

3.2 Phase 1 - Vegetation Clearing - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0172	0.0000	0.0172	2.6100e-003	0.0000	2.6100e-003			0.0000			0.0000
Off-Road	1.5433	12.6924	16.9585	0.0285		0.6526	0.6526		0.6484	0.6484	0.0000	2,706.0818	2,706.0818	0.2378		2,712.0268
Total	**1.5433**	**12.6924**	**16.9585**	**0.0285**	**0.0172**	**0.6526**	**0.6698**	**2.6100e-003**	**0.6484**	**0.6510**	**0.0000**	**2,706.0818**	**2,706.0818**	**0.2378**		**2,712.0268**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1327	4.3363	0.7454	0.0154	0.3332	0.0132	0.3464	0.0913	0.0126	0.1040		1,612.9100	1,612.9100	0.0469		1,614.0829
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.2428**	**4.3974**	**1.6295**	**0.0182**	**0.6397**	**0.0150**	**0.6547**	**0.1726**	**0.0143**	**0.1869**		**1,894.1082**	**1,894.1082**	**0.0527**		**1,895.4266**

3.3 Phase 2 - Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2877	9.4021	1.6162	0.0334	0.7224	0.0286	0.7510	0.1980	0.0274	0.2254		3,497.1922	3,497.1922	0.1017		3,499.7353
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.3978**	**9.4632**	**2.5003**	**0.0362**	**1.0289**	**0.0304**	**1.0593**	**0.2793**	**0.0290**	**0.3083**		**3,778.3903**	**3,778.3903**	**0.1075**		**3,781.0790**

3.3 Phase 2 - Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2877	9.4021	1.6162	0.0334	0.7224	0.0286	0.7510	0.1980	0.0274	0.2254		3,497.1922	3,497.1922	0.1017		3,499.7353
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.3978**	**9.4632**	**2.5003**	**0.0362**	**1.0289**	**0.0304**	**1.0593**	**0.2793**	**0.0290**	**0.3083**		**3,778.3903**	**3,778.3903**	**0.1075**		**3,781.0790**

3.4 Phase 2 - Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.4317	0.0000	2.4317	0.3682	0.0000	0.3682			0.0000			0.0000
Off-Road	0.9154	9.1770	13.2497	0.0206		0.4375	0.4375		0.4025	0.4025		1,990.9664	1,990.9664	0.6439		2,007.0643
Total	**0.9154**	**9.1770**	**13.2497**	**0.0206**	**2.4317**	**0.4375**	**2.8692**	**0.3682**	**0.4025**	**0.7706**		**1,990.9664**	**1,990.9664**	**0.6439**		**2,007.0643**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0783	2.5585	0.4398	9.0800e-003	0.1966	7.7800e-003	0.2044	0.0539	7.4500e-003	0.0613		951.6627	951.6627	0.0277		952.3548
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.1884**	**2.6196**	**1.3239**	**0.0119**	**0.5031**	**9.5500e-003**	**0.5127**	**0.1352**	**9.0800e-003**	**0.1443**		**1,232.8609**	**1,232.8609**	**0.0335**		**1,233.6985**

3.4 Phase 2 - Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.4317	0.0000	2.4317	0.3682	0.0000	0.3682			0.0000			0.0000
Off-Road	0.9154	9.1770	13.2497	0.0206		0.4375	0.4375		0.4025	0.4025	0.0000	1,990.966 4	1,990.966 4	0.6439		2,007.064 3
Total	**0.9154**	**9.1770**	**13.2497**	**0.0206**	**2.4317**	**0.4375**	**2.8692**	**0.3682**	**0.4025**	**0.7706**	**0.0000**	**1,990.966 4**	**1,990.966 4**	**0.6439**		**2,007.064 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0783	2.5585	0.4398	9.0800e-003	0.1966	7.7800e-003	0.2044	0.0539	7.4500e-003	0.0613		951.6627	951.6627	0.0277		952.3548
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.1884**	**2.6196**	**1.3239**	**0.0119**	**0.5031**	**9.5500e-003**	**0.5127**	**0.1352**	**9.0800e-003**	**0.1443**		**1,232.860 9**	**1,232.860 9**	**0.0335**		**1,233.698 5**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0226	0.0000	0.0226	3.4200e-003	0.0000	3.4200e-003			0.0000			0.0000
Off-Road	0.6327	6.3109	5.4598	0.0116		0.2733	0.2733		0.2525	0.2525		1,108.2007	1,108.2007	0.3473		1,116.8837
Total	**0.6327**	**6.3109**	**5.4598**	**0.0116**	**0.0226**	**0.2733**	**0.2959**	**3.4200e-003**	**0.2525**	**0.2560**		**1,108.2007**	**1,108.2007**	**0.3473**		**1,116.8837**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1742	5.6914	0.9783	0.0202	0.4373	0.0173	0.4546	0.1199	0.0166	0.1364		2,116.9444	2,116.9444	0.0616		2,118.4838
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.2843**	**5.7525**	**1.8624**	**0.0230**	**0.7438**	**0.0191**	**0.7629**	**0.2012**	**0.0182**	**0.2194**		**2,398.1425**	**2,398.1425**	**0.0674**		**2,399.8275**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0226	0.0000	0.0226	3.4200e-003	0.0000	3.4200e-003			0.0000			0.0000
Off-Road	0.6327	6.3109	5.4598	0.0116		0.2733	0.2733		0.2525	0.2525	0.0000	1,108.2007	1,108.2007	0.3473		1,116.8837
Total	**0.6327**	**6.3109**	**5.4598**	**0.0116**	**0.0226**	**0.2733**	**0.2959**	**3.4200e-003**	**0.2525**	**0.2560**	**0.0000**	**1,108.2007**	**1,108.2007**	**0.3473**		**1,116.8837**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1742	5.6914	0.9783	0.0202	0.4373	0.0173	0.4546	0.1199	0.0166	0.1364		2,116.9444	2,116.9444	0.0616		2,118.4838
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1101	0.0611	0.8841	2.8200e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		281.1981	281.1981	5.8200e-003		281.3437
Total	**0.2843**	**5.7525**	**1.8624**	**0.0230**	**0.7438**	**0.0191**	**0.7629**	**0.2012**	**0.0182**	**0.2194**		**2,398.1425**	**2,398.1425**	**0.0674**		**2,399.8275**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Unmitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 2

Placer-Sacramento County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 2 timing and duration per Section 2.0, Project Description

Off-road Equipment - Equipment per Section 2.0, Project Description

Off-road Equipment - 'Industrial Saws' used for Project Chainsaws. 'Rough Terrain Forklifts' used for Project Manlift.

Off-road Equipment - Material haul trucks represented in "Trip and VMT" Tab.

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker commutes derived from Section 2.0, Project Description.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	21.00
tblConstructionPhase	NumDays	10.00	45.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	5/30/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	5/2/2022
tblGrading	MaterialExported	0.00	3,200.00
tblGrading	MaterialExported	0.00	3,300.00
tblGrading	MaterialExported	0.00	9,000.00
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38

tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	0.00	24.00
tblTripsAndVMT	WorkerTripNumber	8.00	24.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	2.0365	24.0617	21.8246	0.0658	3.7013	0.7401	4.4414	0.7079	0.6830	1.3909	0.0000	6,595.0570	6,595.0570	1.1022	0.0000	6,622.6118
Maximum	**2.0365**	**24.0617**	**21.8246**	**0.0658**	**3.7013**	**0.7401**	**4.4414**	**0.7079**	**0.6830**	**1.3909**	**0.0000**	**6,595.0570**	**6,595.0570**	**1.1022**	**0.0000**	**6,622.6118**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	2.0365	24.0617	21.8246	0.0658	3.7013	0.7401	4.4414	0.7079	0.6830	1.3909	0.0000	6,595.0569	6,595.0569	1.1022	0.0000	6,622.6118
Maximum	**2.0365**	**24.0617**	**21.8246**	**0.0658**	**3.7013**	**0.7401**	**4.4414**	**0.7079**	**0.6830**	**1.3909**	**0.0000**	**6,595.0569**	**6,595.0569**	**1.1022**	**0.0000**	**6,622.6118**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**	**0.0000**	**3.4700e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Vegetation Clearing	Site Preparation	5/2/2022	5/30/2022	5	21	
2	Phase 2 - Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Phase 2 - Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
4	Phase 3 - Diversion Ditch Installation	Site Preparation	8/15/2022	10/15/2022	5	45	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Excavators	2	8.00	158	0.38
Phase 2 - Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Phase 3 - Diversion Ditch Installation	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 3 - Diversion Ditch Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Concrete/Industrial Saws	4	8.00	81	0.73
Phase 1 - Vegetation Clearing	Rough Terrain Forklifts	1	8.00	100	0.40
Phase 2 - Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Phase 2 - Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Other Construction Equipment	1	8.00	172	0.42
Phase 3 - Diversion Ditch Installation	Cranes	1	8.00	231	0.29
Phase 3 - Diversion Ditch Installation	Excavators	1	8.00	158	0.38
Phase 3 - Diversion Ditch Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Phase 1 - Vegetation Clearing	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Phase 2 - Material Import	0	24.00	0.00	413.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Diversion Ditch Installation	3	24.00	0.00	1,125.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Diversion Structure Removal	5	24.00	0.00	989.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Vegetation Clearing	5	24.00	0.00	400.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Phase 1 - Vegetation Clearing - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0172	0.0000	0.0172	2.6100e-003	0.0000	2.6100e-003			0.0000			0.0000
Off-Road	1.5433	12.6924	16.9585	0.0285		0.6526	0.6526		0.6484	0.6484		2,706.0818	2,706.0818	0.2378		2,712.0268
Total	**1.5433**	**12.6924**	**16.9585**	**0.0285**	**0.0172**	**0.6526**	**0.6698**	**2.6100e-003**	**0.6484**	**0.6510**		**2,706.0818**	**2,706.0818**	**0.2378**		**2,712.0268**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1380	4.4260	0.8448	0.0150	0.3332	0.0136	0.3468	0.0913	0.0130	0.1043		1,574.5240	1,574.5240	0.0529		1,575.8472
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.2509**	**4.5026**	**1.5988**	**0.0175**	**0.6397**	**0.0154**	**0.6551**	**0.1726**	**0.0146**	**0.1873**		**1,824.6806**	**1,824.6806**	**0.0581**		**1,826.1320**

3.2 Phase 1 - Vegetation Clearing - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0172	0.0000	0.0172	2.6100e-003	0.0000	2.6100e-003			0.0000			0.0000
Off-Road	1.5433	12.6924	16.9585	0.0285		0.6526	0.6526		0.6484	0.6484	0.0000	2,706.0818	2,706.0818	0.2378		2,712.0268
Total	**1.5433**	**12.6924**	**16.9585**	**0.0285**	**0.0172**	**0.6526**	**0.6698**	**2.6100e-003**	**0.6484**	**0.6510**	**0.0000**	**2,706.0818**	**2,706.0818**	**0.2378**		**2,712.0268**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1380	4.4260	0.8448	0.0150	0.3332	0.0136	0.3468	0.0913	0.0130	0.1043		1,574.5240	1,574.5240	0.0529		1,575.8472
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.2509**	**4.5026**	**1.5988**	**0.0175**	**0.6397**	**0.0154**	**0.6551**	**0.1726**	**0.0146**	**0.1873**		**1,824.6806**	**1,824.6806**	**0.0581**		**1,826.1320**

3.3 Phase 2 - Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2992	9.5967	1.8317	0.0326	0.7224	0.0295	0.7519	0.1980	0.0282	0.2262		3,413.961 8	3,413.961 8	0.1148		3,416.830 6
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.4121**	**9.6733**	**2.5857**	**0.0351**	**1.0289**	**0.0312**	**1.0602**	**0.2793**	**0.0298**	**0.3091**		**3,664.118 3**	**3,664.118 3**	**0.1199**		**3,667.115 5**

3.3 Phase 2 - Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0373	0.0000	0.0373	5.6500e-003	0.0000	5.6500e-003			0.0000			0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0373**	**0.0000**	**0.0373**	**5.6500e-003**	**0.0000**	**5.6500e-003**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2992	9.5967	1.8317	0.0326	0.7224	0.0295	0.7519	0.1980	0.0282	0.2262		3,413.9618	3,413.9618	0.1148		3,416.8306
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.4121**	**9.6733**	**2.5857**	**0.0351**	**1.0289**	**0.0312**	**1.0602**	**0.2793**	**0.0298**	**0.3091**		**3,664.1183**	**3,664.1183**	**0.1199**		**3,667.1155**

3.4 Phase 2 - Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day							lb/day			
Fugitive Dust					2.4317	0.0000	2.4317	0.3682	0.0000	0.3682			0.0000			0.0000
Off-Road	0.9154	9.1770	13.2497	0.0206		0.4375	0.4375		0.4025	0.4025		1,990.966 4	1,990.966 4	0.6439		2,007.064 3
Total	**0.9154**	**9.1770**	**13.2497**	**0.0206**	**2.4317**	**0.4375**	**2.8692**	**0.3682**	**0.4025**	**0.7706**		**1,990.966 4**	**1,990.966 4**	**0.6439**		**2,007.064 3**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day							lb/day			
Hauling	0.0814	2.6115	0.4984	8.8700e-003	0.1966	8.0200e-003	0.2046	0.0539	7.6700e-003	0.0616		929.0139	929.0139	0.0312		929.7946
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.1943**	**2.6881**	**1.2524**	**0.0114**	**0.5031**	**9.7900e-003**	**0.5129**	**0.1352**	**9.3000e-003**	**0.1445**		**1,179.170 5**	**1,179.170 5**	**0.0364**		**1,180.079 5**

3.4 Phase 2 - Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					2.4317	0.0000	2.4317	0.3682	0.0000	0.3682			0.0000			0.0000
Off-Road	0.9154	9.1770	13.2497	0.0206		0.4375	0.4375		0.4025	0.4025	0.0000	1,990.966 4	1,990.966 4	0.6439		2,007.064 3
Total	**0.9154**	**9.1770**	**13.2497**	**0.0206**	**2.4317**	**0.4375**	**2.8692**	**0.3682**	**0.4025**	**0.7706**	**0.0000**	**1,990.966 4**	**1,990.966 4**	**0.6439**		**2,007.064 3**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0814	2.6115	0.4984	8.8700e-003	0.1966	8.0200e-003	0.2046	0.0539	7.6700e-003	0.0616		929.0139	929.0139	0.0312		929.7946
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.1943**	**2.6881**	**1.2524**	**0.0114**	**0.5031**	**9.7900e-003**	**0.5129**	**0.1352**	**9.3000e-003**	**0.1445**		**1,179.170 5**	**1,179.170 5**	**0.0364**		**1,180.079 5**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0226	0.0000	0.0226	3.4200e-003	0.0000	3.4200e-003			0.0000			0.0000
Off-Road	0.6327	6.3109	5.4598	0.0116		0.2733	0.2733		0.2525	0.2525		1,108.2007	1,108.2007	0.3473		1,116.8837
Total	**0.6327**	**6.3109**	**5.4598**	**0.0116**	**0.0226**	**0.2733**	**0.2959**	**3.4200e-003**	**0.2525**	**0.2560**		**1,108.2007**	**1,108.2007**	**0.3473**		**1,116.8837**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1811	5.8092	1.1088	0.0197	0.4373	0.0178	0.4551	0.1199	0.0171	0.1369		2,066.5628	2,066.5628	0.0695		2,068.2994
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.2940**	**5.8857**	**1.8628**	**0.0222**	**0.7438**	**0.0196**	**0.7634**	**0.2012**	**0.0187**	**0.2199**		**2,316.7194**	**2,316.7194**	**0.0746**		**2,318.5843**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.0226	0.0000	0.0226	3.4200e-003	0.0000	3.4200e-003			0.0000			0.0000
Off-Road	0.6327	6.3109	5.4598	0.0116		0.2733	0.2733		0.2525	0.2525	0.0000	1,108.2007	1,108.2007	0.3473		1,116.8837
Total	**0.6327**	**6.3109**	**5.4598**	**0.0116**	**0.0226**	**0.2733**	**0.2959**	**3.4200e-003**	**0.2525**	**0.2560**	**0.0000**	**1,108.2007**	**1,108.2007**	**0.3473**		**1,116.8837**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.1811	5.8092	1.1088	0.0197	0.4373	0.0178	0.4551	0.1199	0.0171	0.1369		2,066.5628	2,066.5628	0.0695		2,068.2994
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1129	0.0766	0.7540	2.5100e-003	0.3066	1.7700e-003	0.3083	0.0813	1.6300e-003	0.0829		250.1566	250.1566	5.1300e-003		250.2849
Total	**0.2940**	**5.8857**	**1.8628**	**0.0222**	**0.7438**	**0.0196**	**0.7634**	**0.2012**	**0.0187**	**0.2199**		**2,316.7194**	**2,316.7194**	**0.0746**		**2,318.5843**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Unmitigated	0.2795	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0495					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.2299					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.4000e-004	1.0000e-005	1.5200e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		3.2600e-003	3.2600e-003	1.0000e-005		3.4700e-003
Total	**0.2795**	**1.0000e-005**	**1.5200e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**3.2600e-003**	**3.2600e-003**	**1.0000e-005**		**3.4700e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 3

Placer-Sacramento County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	20.35	Acre	20.35	886,446.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 3 timing and duration per Section 2.0, Project Description

Off-road Equipment -

Off-road Equipment - Equipment per Section 2.0, Project Description

Grading -

Demolition -

Trips and VMT - Worker commute trips derived from Section 2.0, Project Description

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	133.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	6/14/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	6/1/2022
tblGrading	MaterialExported	0.00	1,930.00
tblGrading	MaterialImported	0.00	4,630.00
tblGrading	MaterialImported	0.00	3,300.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	20.00	28.00
tblTripsAndVMT	WorkerTripNumber	15.00	28.00
tblTripsAndVMT	WorkerTripNumber	18.00	28.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	5.5277	57.6125	41.4800	0.1203	19.4652	2.2909	21.7560	10.3071	2.1097	12.4168	0.0000	11,901.1191	11,901.1191	2.6732	0.0000	11,967.9486
Maximum	**5.5277**	**57.6125**	**41.4800**	**0.1203**	**19.4652**	**2.2909**	**21.7560**	**10.3071**	**2.1097**	**12.4168**	**0.0000**	**11,901.1191**	**11,901.1191**	**2.6732**	**0.0000**	**11,967.9486**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	5.5277	57.6125	41.4800	0.1203	19.4652	2.2909	21.7560	10.3071	2.1097	12.4168	0.0000	11,901.1191	11,901.1191	2.6732	0.0000	11,967.9486
Maximum	**5.5277**	**57.6125**	**41.4800**	**0.1203**	**19.4652**	**2.2909**	**21.7560**	**10.3071**	**2.1097**	**12.4168**	**0.0000**	**11,901.1191**	**11,901.1191**	**2.6732**	**0.0000**	**11,967.9486**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**	**0.0000**	**4.7500e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**	**0.0000**	**4.7500e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline Installation	Site Preparation	3/15/2022	9/15/2022	5	133	
2	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 20.35

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline Installation	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	3	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	1	8.00	81	0.73
Pipeline Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Pipeline Installation	Excavators	2	8.00	158	0.38
Pipeline Installation	Skid Steer Loaders	2	8.00	65	0.37
Pipeline Installation	Rollers	1	8.00	80	0.38
Pipeline Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Pipeline Installation	Off-Highway Trucks	2	8.00	402	0.38
Diversion Structure Removal	Rubber Tired Dozers	2	8.00	247	0.40
Material Import	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Material Import	Rubber Tired Dozers	3	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pipeline Installation	8	28.00	0.00	820.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Diversion Structure Removal	6	28.00	0.00	99.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	7	28.00	0.00	326.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Pipeline Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.5800e-003	0.0000	5.5800e-003	8.4000e-004	0.0000	8.4000e-004			0.0000			0.0000
Off-Road	1.8306	15.5612	18.2023	0.0444		0.6473	0.6473		0.5967	0.5967		4,276.3593	4,276.3593	1.3720		4,310.6585
Total	**1.8306**	**15.5612**	**18.2023**	**0.0444**	**5.5800e-003**	**0.6473**	**0.6529**	**8.4000e-004**	**0.5967**	**0.5975**		**4,276.3593**	**4,276.3593**	**1.3720**		**4,310.6585**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0430	1.4036	0.2413	4.9800e-003	0.1078	4.2700e-003	0.1121	0.0296	4.0800e-003	0.0337		522.0735	522.0735	0.0152		522.4532
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.1714**	**1.4749**	**1.2727**	**8.2700e-003**	**0.4655**	**6.3400e-003**	**0.4718**	**0.1244**	**5.9900e-003**	**0.1304**		**850.1380**	**850.1380**	**0.0220**		**850.6875**

3.2 Pipeline Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.5800e-003	0.0000	5.5800e-003	8.4000e-004	0.0000	8.4000e-004			0.0000			0.0000
Off-Road	1.8306	15.5612	18.2023	0.0444		0.6473	0.6473		0.5967	0.5967	0.0000	4,276.3593	4,276.3593	1.3720		4,310.6585
Total	**1.8306**	**15.5612**	**18.2023**	**0.0444**	**5.5800e-003**	**0.6473**	**0.6529**	**8.4000e-004**	**0.5967**	**0.5975**	**0.0000**	**4,276.3593**	**4,276.3593**	**1.3720**		**4,310.6585**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0430	1.4036	0.2413	4.9800e-003	0.1078	4.2700e-003	0.1121	0.0296	4.0800e-003	0.0337		522.0735	522.0735	0.0152		522.4532
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.1714**	**1.4749**	**1.2727**	**8.2700e-003**	**0.4655**	**6.3400e-003**	**0.4718**	**0.1244**	**5.9900e-003**	**0.1304**		**850.1380**	**850.1380**	**0.0220**		**850.6875**

3.3 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.061 9	3,686.061 9	1.1922		3,715.865 5
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**		**3,686.061 9**	**3,686.061 9**	**1.1922**		**3,715.865 5**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2271	7.4215	1.2758	0.0264	0.5702	0.0226	0.5928	0.1563	0.0216	0.1779		2,760.495 5	2,760.495 5	0.0803		2,762.502 9
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.3556**	**7.4928**	**2.3072**	**0.0296**	**0.9279**	**0.0247**	**0.9525**	**0.2512**	**0.0235**	**0.2747**		**3,088.560 0**	**3,088.560 0**	**0.0871**		**3,090.737 2**

3.3 Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2271	7.4215	1.2758	0.0264	0.5702	0.0226	0.5928	0.1563	0.0216	0.1779		2,760.4955	2,760.4955	0.0803		2,762.5029
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.3556**	**7.4928**	**2.3072**	**0.0296**	**0.9279**	**0.0247**	**0.9525**	**0.2512**	**0.0235**	**0.2747**		**3,088.5600**	**3,088.5600**	**0.0871**		**3,090.7372**

3.4 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.2432**	**1.2427**	**1.4858**	**0.0368**	**1.1553**	**1.1921**		**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.8400e-003	0.2561	0.0440	9.1000e-004	0.0197	7.8000e-004	0.0205	5.3900e-003	7.5000e-004	6.1400e-003		95.2625	95.2625	2.7700e-003		95.3318
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.1363**	**0.3274**	**1.0755**	**4.2000e-003**	**0.3773**	**2.8500e-003**	**0.3802**	**0.1002**	**2.6600e-003**	**0.1029**		**423.3270**	**423.3270**	**9.5600e-003**		**423.5661**

3.4 Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.2432**	**1.2427**	**1.4858**	**0.0368**	**1.1553**	**1.1921**	**0.0000**	**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	7.8400e-003	0.2561	0.0440	9.1000e-004	0.0197	7.8000e-004	0.0205	5.3900e-003	7.5000e-004	6.1400e-003		95.2625	95.2625	2.7700e-003		95.3318
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1285	0.0713	1.0315	3.2900e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		328.0645	328.0645	6.7900e-003		328.2343
Total	**0.1363**	**0.3274**	**1.0755**	**4.2000e-003**	**0.3773**	**2.8500e-003**	**0.3802**	**0.1002**	**2.6600e-003**	**0.1029**		**423.3270**	**423.3270**	**9.5600e-003**		**423.5661**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Unmitigated	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0675					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3140					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**		**4.7500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0675					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3140					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**		**4.7500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 3

Placer-Sacramento County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	20.35	Acre	20.35	886,446.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 3 timing and duration per Section 2.0, Project Description

Off-road Equipment -

Off-road Equipment - Equipment per Section 2.0, Project Description

Grading -

Demolition -

Trips and VMT - Worker commute trips derived from Section 2.0, Project Description

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	133.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	6/14/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	6/1/2022
tblGrading	MaterialExported	0.00	1,930.00
tblGrading	MaterialImported	0.00	4,630.00
tblGrading	MaterialImported	0.00	3,300.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	20.00	28.00
tblTripsAndVMT	WorkerTripNumber	15.00	28.00
tblTripsAndVMT	WorkerTripNumber	18.00	28.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	5.5450	57.8312	41.3787	0.1189	19.4652	2.2917	21.7569	10.3071	2.1105	12.4176	0.0000	11,750.5663	11,750.5663	2.6838	0.0000	11,817.6613
Maximum	**5.5450**	**57.8312**	**41.3787**	**0.1189**	**19.4652**	**2.2917**	**21.7569**	**10.3071**	**2.1105**	**12.4176**	**0.0000**	**11,750.5663**	**11,750.5663**	**2.6838**	**0.0000**	**11,817.6613**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2022	5.5450	57.8312	41.3787	0.1189	19.4652	2.2917	21.7569	10.3071	2.1105	12.4176	0.0000	11,750.5662	11,750.5662	2.6838	0.0000	11,817.6613
Maximum	**5.5450**	**57.8312**	**41.3787**	**0.1189**	**19.4652**	**2.2917**	**21.7569**	**10.3071**	**2.1105**	**12.4176**	**0.0000**	**11,750.5662**	**11,750.5662**	**2.6838**	**0.0000**	**11,817.6613**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**	**0.0000**	**4.7500e-003**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**	**0.0000**	**1.0000e-005**	**1.0000e-005**	**0.0000**	**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**	**0.0000**	**4.7500e-003**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline Installation	Site Preparation	3/15/2022	9/15/2022	5	133	
2	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 20.35

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Hemphill Diversion Structure - Alternative 3 - Placer-Sacramento County, Winter

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline Installation	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	3	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	1	8.00	81	0.73
Pipeline Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Pipeline Installation	Excavators	2	8.00	158	0.38
Pipeline Installation	Skid Steer Loaders	2	8.00	65	0.37
Pipeline Installation	Rollers	1	8.00	80	0.38
Pipeline Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Pipeline Installation	Off-Highway Trucks	2	8.00	402	0.38
Diversion Structure Removal	Rubber Tired Dozers	2	8.00	247	0.40
Material Import	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Material Import	Rubber Tired Dozers	3	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pipeline Installation	8	28.00	0.00	820.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Diversion Structure Removal	6	28.00	0.00	99.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	7	28.00	0.00	326.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Pipeline Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					5.5800e-003	0.0000	5.5800e-003	8.4000e-004	0.0000	8.4000e-004			0.0000			0.0000
Off-Road	1.8306	15.5612	18.2023	0.0444		0.6473	0.6473		0.5967	0.5967		4,276.3593	4,276.3593	1.3720		4,310.6585
Total	**1.8306**	**15.5612**	**18.2023**	**0.0444**	**5.5800e-003**	**0.6473**	**0.6529**	**8.4000e-004**	**0.5967**	**0.5975**		**4,276.3593**	**4,276.3593**	**1.3720**		**4,310.6585**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0447	1.4326	0.2734	4.8600e-003	0.1078	4.4000e-003	0.1122	0.0296	4.2100e-003	0.0338		509.6486	509.6486	0.0171		510.0769
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.1764**	**1.5220**	**1.1531**	**7.7900e-003**	**0.4655**	**6.4700e-003**	**0.4720**	**0.1244**	**6.1200e-003**	**0.1305**		**801.4979**	**801.4979**	**0.0231**		**802.0759**

3.2 Pipeline Installation - 2022

Mitigated Construction On-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Fugitive Dust					5.5800e-003	0.0000	5.5800e-003	8.4000e-004	0.0000	8.4000e-004			0.0000			0.0000
Off-Road	1.8306	15.5612	18.2023	0.0444		0.6473	0.6473		0.5967	0.5967	0.0000	4,276.3593	4,276.3593	1.3720		4,310.6585
Total	**1.8306**	**15.5612**	**18.2023**	**0.0444**	**5.5800e-003**	**0.6473**	**0.6529**	**8.4000e-004**	**0.5967**	**0.5975**	**0.0000**	**4,276.3593**	**4,276.3593**	**1.3720**		**4,310.6585**

Mitigated Construction Off-Site

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	lb/day										lb/day					
Hauling	0.0447	1.4326	0.2734	4.8600e-003	0.1078	4.4000e-003	0.1122	0.0296	4.2100e-003	0.0338		509.6486	509.6486	0.0171		510.0769
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.1764**	**1.5220**	**1.1531**	**7.7900e-003**	**0.4655**	**6.4700e-003**	**0.4720**	**0.1244**	**6.1200e-003**	**0.1305**		**801.4979**	**801.4979**	**0.0231**		**802.0759**

3.3 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836		3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**		**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.2362	7.5752	1.4458	0.0257	0.5702	0.0233	0.5935	0.1563	0.0223	0.1786		2,694.7979	2,694.7979	0.0906		2,697.0624
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.3679**	**7.6645**	**2.3255**	**0.0287**	**0.9279**	**0.0253**	**0.9532**	**0.2512**	**0.0242**	**0.2753**		**2,986.6472**	**2,986.6472**	**0.0966**		**2,989.0614**

3.3 Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	3.1701	33.0835	19.6978	0.0380		1.6126	1.6126		1.4836	1.4836	0.0000	3,686.0619	3,686.0619	1.1922		3,715.8655
Total	**3.1701**	**33.0835**	**19.6978**	**0.0380**	**18.0663**	**1.6126**	**19.6788**	**9.9307**	**1.4836**	**11.4143**	**0.0000**	**3,686.0619**	**3,686.0619**	**1.1922**		**3,715.8655**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category						lb/day								lb/day		
Hauling	0.2362	7.5752	1.4458	0.0257	0.5702	0.0233	0.5935	0.1563	0.0223	0.1786		2,694.7979	2,694.7979	0.0906		2,697.0624
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.3679**	**7.6645**	**2.3255**	**0.0287**	**0.9279**	**0.0253**	**0.9532**	**0.2512**	**0.0242**	**0.2753**		**2,986.6472**	**2,986.6472**	**0.0966**		**2,989.0614**

3.4 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553		3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.2432**	**1.2427**	**1.4858**	**0.0368**	**1.1553**	**1.1921**		**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1500e-003	0.2614	0.0499	8.9000e-004	0.0197	8.0000e-004	0.0205	5.3900e-003	7.7000e-004	6.1600e-003		92.9953	92.9953	3.1300e-003		93.0735
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.1399**	**0.3508**	**0.9296**	**3.8200e-003**	**0.3773**	**2.8700e-003**	**0.3802**	**0.1002**	**2.6800e-003**	**0.1029**		**384.8447**	**384.8447**	**9.1200e-003**		**385.0725**

3.4 Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					0.2432	0.0000	0.2432	0.0368	0.0000	0.0368			0.0000			0.0000
Off-Road	2.6392	25.7194	20.5941	0.0388		1.2427	1.2427		1.1553	1.1553	0.0000	3,746.781 2	3,746.781 2	1.0524		3,773.092 0
Total	**2.6392**	**25.7194**	**20.5941**	**0.0388**	**0.2432**	**1.2427**	**1.4858**	**0.0368**	**1.1553**	**1.1921**	**0.0000**	**3,746.781 2**	**3,746.781 2**	**1.0524**		**3,773.092 0**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	8.1500e-003	0.2614	0.0499	8.9000e-004	0.0197	8.0000e-004	0.0205	5.3900e-003	7.7000e-004	6.1600e-003		92.9953	92.9953	3.1300e-003		93.0735
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1317	0.0893	0.8797	2.9300e-003	0.3577	2.0700e-003	0.3597	0.0948	1.9100e-003	0.0968		291.8493	291.8493	5.9900e-003		291.9990
Total	**0.1399**	**0.3508**	**0.9296**	**3.8200e-003**	**0.3773**	**2.8700e-003**	**0.3802**	**0.1002**	**2.6800e-003**	**0.1029**		**384.8447**	**384.8447**	**9.1200e-003**		**385.0725**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Unmitigated	0.3817	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0675					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3140					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**		**4.7500e-003**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0675					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	0.3140					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Landscaping	1.9000e-004	2.0000e-005	2.0800e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005		4.4500e-003	4.4500e-003	1.0000e-005		4.7500e-003
Total	**0.3817**	**2.0000e-005**	**2.0800e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**		**4.4500e-003**	**4.4500e-003**	**1.0000e-005**		**4.7500e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX 3.3

Biological Resources Appendices
(ECORP Consulting, Inc.)

APPENDIX 3.3 A

Biological Resources Assessment
(ECORP Consulting, Inc.)

Biological Resources Assessment

Hemphill Diversion Structure Removal Project

Placer County, California

Prepared for:

Nevada Irrigation District

January 2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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LIST OF ACRONYMS AND ABBREVIATIONS

BA	Biological Assessment
BCC	Birds of conservation concern
BO	Biological opinion
BRA	Biological resources assessment
CARP	County Aquatic Resources Plan
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society

LIST OF ACRONYMS AND ABBREVIATIONS

CRPR	California Rare Plant Rank
CWA	Clean Water Act
CWR	Clean Water Rule
dbh	Diameter at breast height
DPS	Distinct Population Segment
ESA	Endangered Species Act
ESU	Evolutionarily Significant Unit
FR	Federal Register
GPS	Global Positioning System
HCP	Habitat Conservation Plan
IP	Individual Permit
LOP	Letter of Permission
LSA	Lake or Streambed Alteration
MBTA	Migratory Bird Treaty Act
MSL	Mean sea level
NCCP	Natural Community Conservation Plan
NID	Nevada Irrigation District
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
PCA	Placer Conservation Authority
PCCP	Placer County Conservation Program
Project	Hemphill Diversion Structure Removal Project
RWQCB	Regional Water Quality Control Board
SSC	Species of special concern
TRBL	Tricolored blackbird
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VELB	Valley elderberry longhorn beetle
WBWG	Western Bat Working Group

1.0 INTRODUCTION

On behalf of the Nevada Irrigation District (NID), ECORP Consulting, Inc. conducted a biological resource assessment (BRA) for the Hemphill Diversion Structure Removal Project (Project) located in Placer County, California. The purpose of this assessment was to collect information on the biological resources present or with the potential to occur in the Project Area.

1.1 Project Area Location

The Project Area is located along the extent of the Hemphill Canal from State Highway 193 through the Turkey Creek Golf Club to Auburn Ravine and the Hemphill diversion structure. From the diversion structure, the Project Area follows Virginiatown Road east to Fowler Road, north on Fowler Road to Fruitvale Road, and east on Fruitvale Road to the NID Placer Yard at 1900 Gold Hill Road (Figure 1. *Project Location and Vicinity*). The Project Area corresponds to portions of Sections 3-5 and 7-10, Township 12 North, and Range 7 East, and Sections 12-14, 17, and 18, Township 12 North, and Range 6 East within the "Gold Hill, California" and "Lincoln, California" 7.5-minute quadrangles (U.S. Geological Survey [USGS] 1954, photorevised 1973 and 1992, respectively). The approximate center of the Project Area is located at latitude 38.900371° and longitude -121.231062° (NAD83) within the Upper Coon-Upper Auburn Watershed (Hydrologic Unit Code #18020161; Natural Resources Conservation Service [NRCS], et al. 2017).

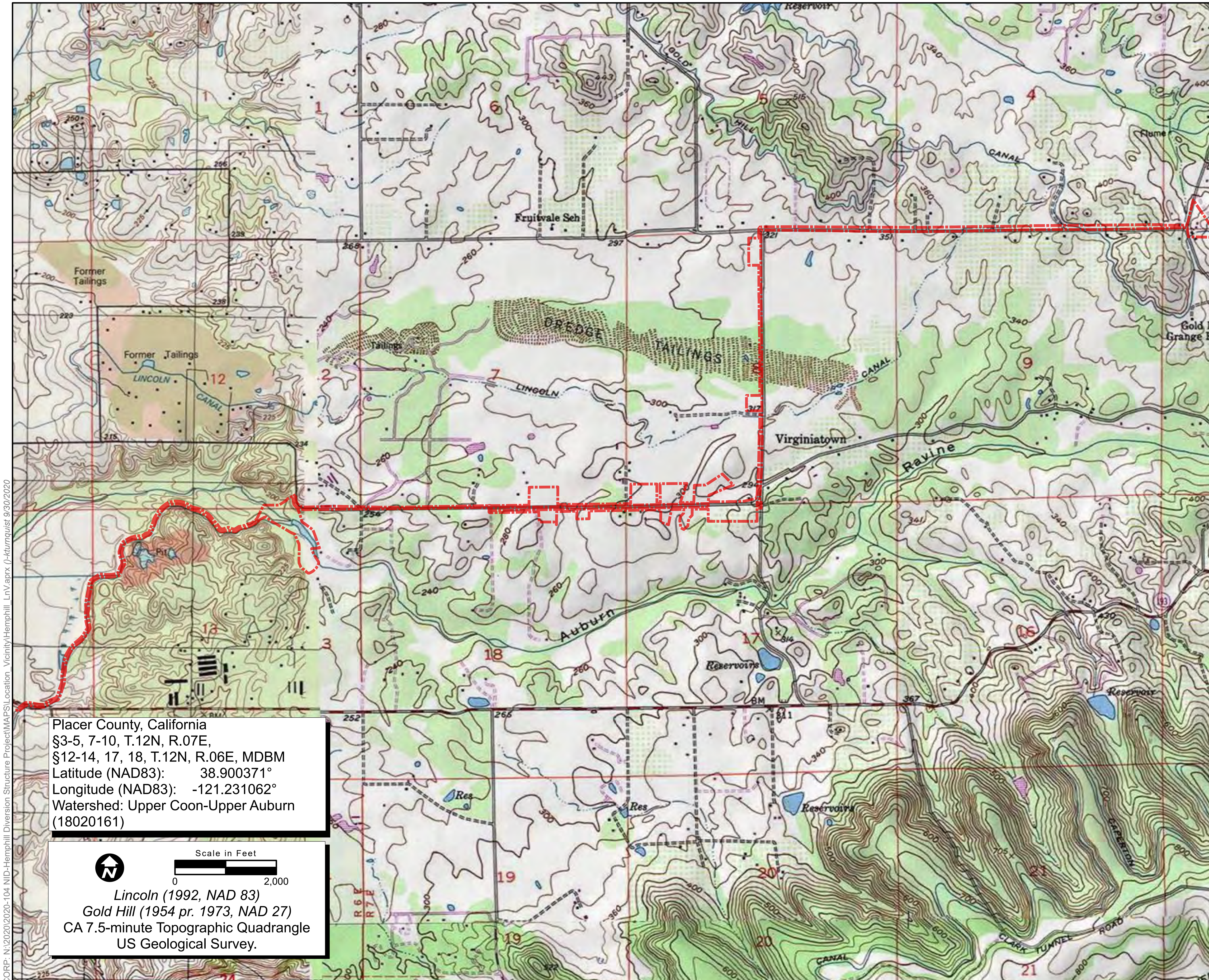
1.2 Project Description

The Hemphill diversion structure, located within Auburn Ravine in Placer County, California, is an approximately eight-foot-high concrete structure, with an approximately 40-foot-long concrete apron extending downstream. During the irrigation season (mid-April through mid-October), three-foot flashboards are installed on top of the diversion structure in order to facilitate flow into the Hemphill Canal, located just upstream of the Hemphill diversion structure along the left bank (looking downstream) of Auburn Ravine. The Project includes the removal of the diversion structure and Hemphill canal inlet structure. The removal of the diversion structure is required to allow for fish migration in the Auburn Ravine. The Placer County Conservation Program (PCCP) provides coverage for projects and activities associated with implementation of the conservation strategy. The PCCP conservation strategy provides for removal of fish passage barriers and other projects that improve fish passage. The PCCP has identified the Hemphill diversion structure removal and riparian zone restoration as a covered activity.

In addition, the Project includes the analysis of three alternatives, of which eight were considered, including five pipelines, a riverbank infiltration gallery, and a Renney well, all to provide irrigation water to the Hemphill Canal, and the abandonment and discontinuation of service of the Hemphill Canal.

1.3 Purpose of this Biological Resources Assessment

The purpose of this BRA is to assess the potential for occurrence of special-status plant and animal species and their habitats, and sensitive habitats such as wetlands and riparian communities within the Project Area.



Placer County, California
§3-5, 7-10, T.12N, R.07E,
§12-14, 17, 18, T.12N, R.06E, MDBM
Latitude (NAD83): 38.900371°
Longitude (NAD83): -121.231062°
Watershed: Upper Coon-Upper Auburn (18020161)

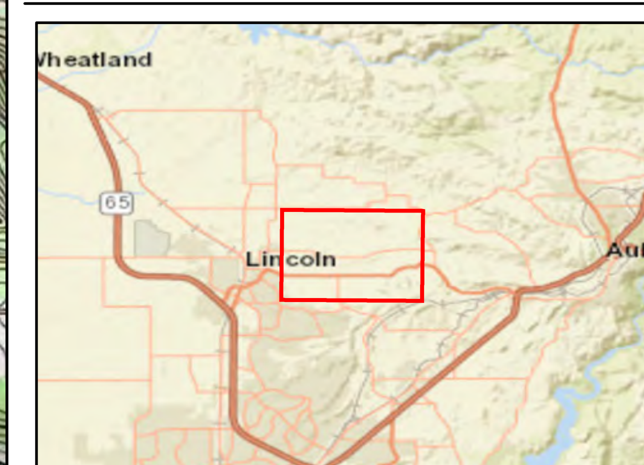
Scale in Feet
0 2,000

Lincoln (1992, NAD 83)
Gold Hill (1954 pr. 1973, NAD 27)
CA 7.5-minute Topographic Quadrangle
US Geological Survey.

Map Contents

Project Boundary - 98.05 ac.

Sources: Esri, USGS



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Map Date: 9/30/2020

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ENVIRONMENTAL CONSULTANTS

Figure 1. Project Location and Vicinity

2020-104 NID Hemphill Diversion Structure

This report generally describes potential Waters of the U.S. and State, including wetlands, identified within the Project Area that may be regulated by the U.S. Army Corps of Engineers (USACE) pursuant to Section 404 of the Clean Water Act (CWA). The information presented in this report is intended to support the California Environmental Quality Act (CEQA) and general planning purposes, and therefore does not meet the USACE Sacramento District's Minimum Standards for Acceptance of Aquatic Resources Delineations (USACE 2016).

For the purposes of this assessment, special-status species are defined as plants or animals that:

- are listed, proposed for listing, or candidates for future listing as threatened or endangered under the federal Endangered Species Act (ESA);
- are listed or candidates for future listing as threatened or endangered under the California ESA;
- meet the definitions of endangered or rare under § 15380 of the CEQA Guidelines;
- are identified as a species of special concern (SSC) by the California Department of Fish and Wildlife (CDFW);
- are birds identified as birds of conservation concern (BCC) by the U.S. Fish and Wildlife Service (USFWS);
- are considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California", "plants about which more information is needed or "plants of limited distribution – a watch list" (i.e., species with a California Rare Plant Rank [CRPR] of 1B, 2, 3, or 4);
- are plants listed as rare under the California Native Plant Protection Act (NPPA) (California Fish and Game Code, § 1900 et seq.); or
- are fully protected in California in accordance with the California Fish and Game Code, §§ 3511 (birds), 4700 (mammals), 5050 (amphibians and reptiles), and 5515 (fishes).

Only species that fall into one of the above-listed groups were considered for this assessment. While other species (i.e., special-status lichens, California Natural Diversity Database- (CNDDB-) tracked species with no special status) are sometimes found in database searches or within the literature, these species were not included within this analysis.

2.0 REGULATORY SETTING

2.1 Federal Regulations

2.1.1 Endangered Species Act

The ESA protects plants and animals that are listed as endangered or threatened by USFWS and the National Marine Fisheries Service (NMFS). Section 9 of the ESA prohibits, without authorization, the taking of listed wildlife, where take is defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct" (50 Code of Federal Regulations [CFR] 17.3). For plants, this statute governs removing, possessing, maliciously damaging, or destroying any listed plant under federal jurisdiction and removing, cutting, digging up, damaging, or destroying any listed plant in any other area in knowing violation of State law (16 U.S. Code [USC] 1538).

Under Section 7 of the ESA, federal agencies are required to consult with USFWS and/or NMFS if their actions, including permit approvals and funding, could adversely affect a listed (or proposed) species (including plants) or its critical habitat. Through consultation and the issuance of a biological opinion (BO), USFWS and NMFS 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 ESA provides for the issuance of incidental take permits where no other federal actions are necessary provided a habitat conservation plan is developed.

Section 7 Consultation

Section 7 of the ESA mandates that all federal agencies consult with USFWS and/or NMFS to ensure that federal agencies' actions do not jeopardize the continued existence of a listed species or adversely modify critical habitat for listed species. If direct and/or indirect effects will occur to critical habitat that appreciably diminish the value of critical habitat for both the survival and recovery of a species, the adverse modifications will require formal consultation with USFWS or NMFS. If adverse effects are likely, the federal lead agency must prepare a biological assessment (BA) for the purpose of analyzing the potential effects of the proposed project on listed species and critical habitat to establish and justify an "effect determination." Often a third-party, non-federal applicant drafts the BA for the lead federal agencies. The USFWS/NMFS reviews the BA; if it concludes that the project may adversely affect a listed species or its habitat, it prepares a BO. The BO may recommend "reasonable and prudent alternatives" to the project to avoid jeopardizing or adversely modifying habitat.

Critical Habitat

Critical Habitat is defined in Section 3 of the ESA as:

1. the specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the ESA, on which are found those physical or biological features essential to the conservation of the species and that may require special management considerations or protection; and

2. specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species.

For inclusion in a Critical Habitat designation, habitat within the geographical area occupied by the species at the time it was listed must first have features essential to the conservation of the species (16 USC 1533). Critical Habitat designations identify, to the extent known and using the best scientific data available, habitat areas that provide essential life cycle needs of the species (areas on which are found the primary constituent elements). Primary constituent elements are the physical and biological features that are essential to the conservation of the species and that may require special management considerations or protection. These include but are not limited to the following:

1. Space for individual and population growth and for normal behavior.

2. Food, water, air, light, minerals, or other nutritional or physiological requirements.

3. Cover or shelter.

4. Sites for breeding, reproduction, or rearing (or development) of offspring.

5. Habitats that are protected from disturbance or are representative of the historic, geographical, and ecological distributions of a species.

2.1.2 Magnuson-Stevens Fishery Conservation and Management Act

The 1996 Magnuson-Stevens Fishery Conservation and Management Act, as amended (16 USC 1801), requires federal agencies to consult with NMFS whenever a proposed action has a potential to adversely affect essential fish habitat (EFH). Although states are not required to consult with NMFS, NMFS is required to develop EFH conservation recommendations for any state agency activities with the potential to affect EFH. EFH is defined as "…those waters and substrates necessary to fish for spawning, breeding, feeding or growth to maturity" and includes the necessary habitat for managed fish to complete their life cycles and contribute to a sustainable fishery and healthy ecosystem. Although the concept of EFH is similar to the ESA definition of Critical Habitat, measures recommended by NMFS or a regional fisheries management council to protect EFH are advisory, rather than prescriptive (NMFS 1998).

2.1.3 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 under the MBTA, 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 non-game birds in § 3800, migratory birds in § 3513, and birds of prey in § 3503.5 of the California Fish and Game Code.

2.1.4 Clean Water Act

The federal CWA's 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 USACE. The USACE regulates discharge of dredged or fill material into Waters of the U.S. under Section 404 of the CWA. "Discharges of fill material" is defined as the addition of fill material into Waters of the U.S., including, but not limited to the following: placement of fill necessary for the construction of any structure, or impoundment requiring rock, sand, dirt, or other material for its construction; site-development fills for recreational, industrial, commercial, residential, and other uses; causeways or road fills; and fill for intake and outfall pipes, and subaqueous utility lines [33 CFR § 328.2(f)]. In addition, Section 401 of the CWA (33 U.S. Code 1341) requires any applicant for a federal license or permit to conduct any activity that may result in a discharge of a pollutant into Waters of the U.S. to obtain a certification that the discharge will comply with the applicable effluent limitations and water quality standards.

Projects involving activities that have no more than minimal individual and cumulative adverse environmental effects may meet the conditions of one of the Nationwide Permits already issued by USACE (Federal Register 82:1860, January 6, 2017). If impacts on wetlands could be substantial, an Individual Permit (IP) is required. 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).

Wetlands

Wetlands are "*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*" [51 Federal Register (FR) 41250, Nov. 13, 1986, as amended at 58 FR 45036, Aug. 25, 1993]. Wetlands can be perennial or intermittent.

To be determined a wetland, the following three criteria must be met:

- A majority of dominant vegetation species are wetland-associated species;
- Hydrologic conditions exist that result in periods of flooding, ponding, or saturation during the growing season; and
- Hydric soils are present.

Other Waters

Other waters are nontidal, perennial, and intermittent watercourses and tributaries to such watercourses [51 FR 41250, Nov. 13, 1986, as amended at 58 FR 45036, August 25, 1993]. The limit of USACE jurisdiction for nontidal watercourses (without adjacent wetlands) is defined in 33 CFR 328.4(c)(1) as the "ordinary high water mark" (OHWM). The OHWM is defined as the "line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" approximation of the lateral limit of USACE jurisdiction. The upstream limits of other waters are defined as the point where the OHWM is no longer perceptible.

Jurisdictional Assessment

On April 21, 2020, the USEPA and the Department of the Army published the Navigable Waters Protection Rule to define "Waters of the United States" in the FR (USACE and EPA 2020). The agencies are streamlining the definition so that it includes four categories of jurisdictional waters, provides clear exclusions for many water features that traditionally have not been regulated, and defines terms in the regulatory text that have never been defined before. The Navigable Waters Protection Rule regulates TNW and the core tributary systems that provide perennial or intermittent flow into them.

The four categories of federally regulated waters are:

- the territorial seas and TNW;
- perennial and intermittent tributaries to those waters;
- certain lakes, ponds, and impoundments; and
- wetlands adjacent to jurisdictional waters.

The final rule also details 12 categories of exclusions, features that are not "waters of the United States," such as features that only contain water in direct response to rainfall (e.g., ephemeral features), groundwater, many ditches, prior converted cropland, and waste treatment systems.

The final rule clarifies key elements related to the scope of federal CWA jurisdiction, including the following:

- Providing clarity and consistency by removing the proposed separate categories for jurisdictional ditches and impoundments.
- Refining the proposed definition of "typical year," which provides important regional and temporal flexibility and ensures jurisdiction is being accurately determined in times that are not too wet and not too dry.
- Defining "adjacent wetlands" as wetlands that are meaningfully connected to other jurisdictional waters, for example, by directly abutting or having regular surface water communication with jurisdictional waters.

The Navigable Waters Protection Rule is the second step in a two-step process to review and revise the definition of "waters of the United States" consistent with the February 2017 Presidential Executive Order entitled "Restoring the Rule of Law, Federalism, and Economic Growth by Reviewing the 'Waters of the United States.'" This final rule became effective on June 22, 2020 and has replaced the Step One Rule published in October 2019.

2.2 State and Local Regulations

2.2.1 Placer County Conservation Program

The Placer County Conservation Program (PCCP) is a regional effort that will provide development and infrastructure projects with streamlined federal and State permitting processes while creating a preserve system to protect habitat, open space, and agricultural lands (County of Placer et al. 2020a). The PCCP includes three separate, but complementary, components that support two sets of State and federal permits:

- Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan (HCP/NCCP) – protects fish and wildlife, and their habitats, and fulfills the requirements of the federal ESA and the California Natural Community and Conservation Planning Act.
- Western Placer County Aquatic Resources Plan (CARP) – protects streams, wetlands, and other water resources and fulfills the requirements of the federal CWA and analogous State laws and regulations.
- In-Lieu Fee Program – allows requirements under Section 404 of the CWA to be fulfilled by payment of a fee for compensatory mitigation of impacts on aquatic resources from activities covered under the HCP/NCCP and the CARP.

CARP is further described in Section 2.2.2. The PCCP was prepared by local agencies (who will become the Permittees) including Placer County, the City of Lincoln, South Placer Regional Transportation Authority, Placer County Water Agency, and the Placer Conservation Authority (PCA), an entity created to implement the PCCP on behalf of the other Permittees. The PCCP will allow the aforementioned local agencies to receive Incidental Take Permits for covered fish and wildlife species from USFWS, NMFS, and CDFW for activities and projects overseen by the PCA.

Table 1 provides a list of the PCCP Covered Species.

Table 1. PCCP Covered Species

Common Name	Scientific Name	Status *		
		ESA	CESA	Other Status
Birds				
Swainson's hawk	*Buteo swainsoni*	-	T	-
California black rail	*Laterallus jamaicensis coturniculus*	-	T	-
Burrowing owl	*Athene cunicularia*	-	-	SSC
Tricolored blackbird	*Agelaius tricolor*	-	T	-
Reptiles				
Giant garter snake	*Thamnophis gigas*	T	T	-
Northwestern pond turtle	*Actinemys marmorata*	-	-	SSC
Amphibians				
Foothill yellow-legged frog	*Rana boylii*	-	T/E	-
California red-legged frog	*Rana draytonii*	T	-	-
Fish				
Steelhead (California Central Valley Distinct Population Segment [DPS])	*Oncorhynchus mykiss*	T	-	-

Table 1. PCCP Covered Species

Common Name	Scientific Name	Status *		
		ESA	CESA	Other Status
Chinook salmon (Central Valley fall/late fall-run Evolutionarily Significant Unit [ESU])	*Oncorhynchus tshawytscha*	-	-	SC, SSC
Invertebrates				
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	T	-	-
Conservancy fairy shrimp	*Branchinecta conservatio*	E	-	-
Vernal pool fairy shrimp	*Branchinecta lynchi*	T	-	-
Vernal pool tadpole shrimp	*Lepidurus packardi*	E	-	-

* Status Abbreviations:
E – Endangered
T – Threatened
SC – Federal Species of Concern
SSC – California Species of Special Concern

2.2.2 Western Placer County Aquatic Resources Program

The Western Placer CARP is an independent program from the PCCP that uses the PCCP fees and conservation strategy to satisfy the mitigation requirements of impacting affected aquatic features, including Waters of the U.S. and Waters of the State in Placer County (County of Placer et al. 2020b). The purpose of the CARP is to provide a mechanism that streamlines the environmental permitting process as it pertains to impacts to aquatic features that fall under the jurisdiction of the USACE and RWQCB. For projects with impacts that exceed 3.0 acres in total, or exceed 1.0 acre of impacts to vernal pools, or result in the loss of more than a total of 1,000 linear feet of irrigation drainage ditch, a Letter of Permission (LOP) or IP will need to be obtained through the CARP. For projects that do not exceed these thresholds, a permit can be obtained through the CARP coverage under the PCCP Programmatic General Permit.

The CARP does not provide a streamlined process for obtaining a Notification of Lake or Streambed Alteration (LSA) Agreement with CDFW, which is required if a project would be impacting aquatic features under the jurisdiction of CDFW pursuant to Fish and Game Code Sections 1600-1616. Therefore, an LSA Agreement, if required due to Project impacts, should be obtained through the standard LSA Notification process. In addition to the aquatic features under the jurisdiction of the USACE and RWQCB, the PCCP/CARP also regulates activities being conducted within "Stream System," defined as primary streams and creeks as well as tributaries that contribute to the hydrology of primary streams and creeks located within the PCCP Plan Area.

2.2.3 California Endangered Species Act

The California ESA (California Fish and Game Code §§ 2050-2116) protects species of fish, wildlife, and plants listed by the State as endangered or threatened. Species identified as candidates for listing may also receive protection. Section 2080 of the California ESA prohibits the taking, possession, purchase, sale, and import or export of endangered, threatened, or candidate species, unless otherwise authorized by permit. Take is defined in Section 86 of the California Fish and Game Code as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." The California ESA allows for take incidental to otherwise lawful projects under permits issued by CDFW.

2.2.4 Fully Protected Species

The State of California first began to designate species as "fully protected" prior to the creation of the federal and California ESAs. Lists of fully protected species were initially developed to provide protection to those animals that were rare or faced possible extinction and included fish, amphibians and reptiles, birds, and mammals. Most fully protected species have since been listed as threatened or endangered under the federal and/or California ESAs. Fully protected species are identified in the California Fish and Game Code § 4700 for mammals, § 3511 for birds, § 5050 for reptiles and amphibians, and § 5515 for fish.

These sections of the California Fish and Game Code provide that fully protected species may not be taken or possessed at any time, including prohibition of CDFW from issuing incidental take permits for fully protected species under the California ESA. CDFW will issue licenses or permits for take of these species for necessary scientific research or live capture and relocation pursuant to the permit and may allow incidental take for lawful activities carried out under an approved NCCP within which such species are covered.

2.2.5 Native Plant Protection Act

The NPPA of 1977 (California Fish and Game Code §§ 1900-1913) was established 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." The NPPA prohibits the take of plants listed under the NPPA, but the NPPA contains a number of exemptions to this prohibition that have not been clarified by regulation or judicial rule. In 1984, the California ESA brought under its protection all plants previously listed as endangered under NPPA. Plants listed as rare under NPPA are not protected under the California ESA but are still protected under the provisions of the NPPA. The Fish and Game Commission no longer lists plants under the NPPA, reserving all listings to the California ESA.

2.2.6 California Fish and Game Code Special Protections for Birds

In addition to protections contained within the California ESA and California Fish and Game Code § 3511 described above, the California Fish and Game Code includes a number of sections that specifically protect certain birds.

Section 3800 states that it is unlawful to take nongame birds, such as those occurring naturally in California that are not resident game birds, migratory game birds, or fully protected birds, except when in accordance with regulations of the California Fish and Game Commission or a mitigation plan approved by CDFW for mining operations.

Section 3503 prohibits the take, possession, or needless destruction of the nest or eggs of any bird.

Section 3503.5 protects birds of prey (which includes eagles, hawks, falcons, kites, ospreys, and owls) and prohibits the take, possession, or destruction of any birds and their nests

Section 3505 makes it unlawful to take, sell, or purchase egrets, ospreys, and several exotic nonnative species, or any part of these birds.

Section 3513 specifically prohibits the take or possession of any migratory nongame bird as designated in the MBTA.

2.2.7 Lake or Streambed Alteration Agreements

Section 1602 of the California Fish and Game Code requires individuals or agencies to provide an LSA to CDFW for "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." CDFW reviews the proposed actions and, if necessary, proposed measures to protect affected fish and wildlife resources. The final proposal mutually agreed upon by CDFW and the applicant is the LSA Agreement.

2.2.8 Porter-Cologne Water Quality Act

The RWQCB implements water quality regulations under the federal CWA and the Porter-Cologne Water Quality Act. These regulations require compliance with the National Pollutant Discharge Elimination System (NPDES), including compliance with the California Storm Water NPDES General Construction Permit for discharges of stormwater runoff associated with construction activities. General Construction Permits for projects that disturb one or more acres of land require development and implementation of a Storm Water Pollution Prevention Plan. Under the Porter-Cologne Water Quality Act, the RWQCB regulates actions that would involve "discharging waste, or proposing to discharge waste, with any region that could affect the water of the state" [Water Code 13260(a)]. Waters of the State are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" [Water Code 13050 (e)]. The RWQCB regulates all such activities, as well as dredging, filling, or discharging materials into Waters of the State, that are not regulated by USACE due to a lack of connectivity with a navigable water body. The RWQCB may require issuance of a Waste Discharge Requirements for these activities.

2.2.9 California Environmental Quality Act

In accordance with CEQA Guidelines § 15380, a species or subspecies not specifically protected under the federal or California ESAs or NPPA may be considered endangered, rare, or threatened for CEQA review purposes if the species meets certain criteria specified in the Guidelines. These criteria include definitions similar to definitions used in the federal ESA, California ESA, and NPPA. Section 15380 was included in the CEQA Guidelines primarily to address situations in which a project under review may have a significant effect on a species that has not been listed under the federal ESA, California ESA, or NPPA, but that may meet the definition of endangered, rare, or threatened. Animal species identified as SSC by CDFW, and plants identified by the CNPS as rare, threatened, or endangered may meet the CEQA definition of rare or endangered.

Species of Special Concern

SSC are defined by CDFW as a species, subspecies, or distinct population of an animal native to California that are not legally protected under the federal ESA, California ESA, or California Fish and Game Code, but currently satisfies one or more of the following criteria:

- The species has been completely extirpated from the state or, as in the case of birds, it has been extirpated from its primary seasonal or breeding role.
- The species is listed as federally (but not State) threatened or endangered, or meets the State definition of threatened or endangered but has not formally been listed.
- The species has or is experiencing serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status.
- The species has naturally small populations that exhibit high susceptibility to risk from any factor that, if realized, could lead to declines that would qualify it for State threatened or endangered status.
- SSC are typically associated with habitats that are threatened.

Depending on the policy of the lead agency, projects that result in substantial impacts to SSC may be considered significant under CEQA.

U.S. Fish and Wildlife Service Birds of Conservation Concern

The 1988 amendment to the Fish and Wildlife Conservation Act mandates USFWS "identify species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under ESA." To meet this requirement, USFWS published a list of BCC (USFWS 2008) for the U.S. The list identifies the migratory and nonmigratory bird species (beyond those already designated as federally threatened or endangered) that represent USFWS' highest conservation priorities. Depending on the policy of the lead agency, projects that result in substantial impacts to BCC may be considered significant under CEQA.

Sensitive Natural Communities

The CDFW maintains the California Natural Community List (CDFW 2020b), which provides a list of vegetation alliances, associations, and special stands as defined in the *Manual of California Vegetation* (Sawyer et al. 2009), along with their respective State and global rarity ranks. Natural communities with a State rarity rank of 1, 2, or 3 are considered sensitive natural communities. Depending on the policy of the lead agency, impacts to sensitive natural communities may be considered significant under CEQA.

California Rare Plant Ranks

The CNPS maintains the Inventory of Rare and Endangered Plants of California (CNPS 2020), which provides a list of plant species native to California that are threatened with extinction, have limited distributions, and/or low populations. Plant species meeting one of these criteria are assigned to one of six CRPRs. The rank system was developed in collaboration with government, academia, non-governmental organizations, and private sector botanists, and is jointly managed by CDFW and CNPS. The CRPRs are currently recognized in the California Natural Diversity Database (CNDDB). The following are definitions of the CNPS CRPRs:

- Rare Plant Rank 1A – presumed extirpated in California and either rare or extinct elsewhere.
- Rare Plant Rank 1B – rare, threatened, or endangered in California and elsewhere.
- Rare Plant Rank 2A – presumed extirpated in California, but more common elsewhere.
- Rare Plant Rank 2B – rare, threatened, or endangered in California but more common elsewhere.
- Rare Plant Rank 3 – a review list of plants about which more information is needed.
- Rare Plant Rank 4 – a watch list of plants of limited distribution.

Additionally, CNPS has defined Threat Ranks that are added to the CRPR as an extension. Threat Ranks designate the level of threat on a scale of 1 through 3, with 1 being the most threatened and 3 being the least threatened. Threat Ranks are generally present for all plants ranked 1B, 2B, or 4, and for the majority of plants ranked 3. Plant species ranked 1A and 2A (presumed extirpated in California), and some species ranked 3, which lack threat information, do not typically have a Threat Rank extension. The following are definitions of the CNPS Threat Ranks:

- Threat Rank 0.1 – Seriously threatened in California (over 80 percent of occurrences threatened/high degree and immediacy of threat).
- Threat Rank 0.2 – Moderately threatened in California (20 to 80 percent occurrences threatened/moderate degree and immediacy of threat).
- Threat Rank 0.3 – Not very threatened in California (less than 20 percent of occurrences threatened/low degree and immediacy of threat or no current threats known).

Factors such as habitat vulnerability and specificity, distribution, and condition of occurrences, are considered in setting the Threat Rank; differences in Threat Ranks do not constitute additional or different protection (CNPS 2020).

Depending on the policy of the lead agency, substantial impacts to plants ranked 1A, 1B, 2, and 3 are typically considered significant under CEQA Guidelines § 15380. Significance under CEQA is typically evaluated on a case-by-case basis for plants ranked 4 and at the discretion of the CEQA lead agency.

California Oak Woodlands Conservation Act

The California Oak Woodlands Conservation Act was passed in 2001; this act provides funding for conservation and protection of California oak woodlands and requires that a lead agency analyze the potential effects of the project and whether or not the project may have a significant effect on the environment. If it is determined that the project may have significant effects on oak woodlands, this act requires mitigation for the conversion of oak woodlands. The law applies to all oak woodlands except those dominated by black oak *(Quercus kelloggii*).

California Environmental Quality Act Significance Criteria

Sections 15063-15065 of the CEQA Guidelines address how an impact is identified as significant. Generally, impacts to listed (rare, threatened, or endangered) species are considered significant. Assessment of "impact significance" to populations of non-listed species (e.g., SSC) usually considers the proportion of the species' range that will be affected by a project, impacts to habitat, and the regional and population level effects.

Specifically, § 15064.7 of the CEQA Guidelines encourages local agencies to develop and publish the thresholds that the 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. Appendix G 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 under 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.

2.2.10 Placer County General Plan

The Placer County General Plan Natural Resources element establishes goals, objectives, and policies regarding water resources (including wetlands and riparian areas), fish and wildlife habitat, and vegetation (Placer County 2013a). The goals listed below are applicable to the biological resources found at the Project site. Placer County General Plan policies require Placer County to identify and protect significant ecological resources and habitat, including wetland areas, stream environment zones, habitat for special-status plants and animals, and large areas of natural habitat.

- Goal 6.A To protect and enhance the natural qualities of Placer County's streams, creeks, and groundwater.
- Goal 6.B To protect wetland communities and related riparian areas throughout Placer County as valuable resources.
- Goal 6.C To protect, restore, and enhance habitats that support fish and wildlife species so as to maintain populations at viable levels.
- Goal 6.D To preserve and protect the valuable vegetation resources of Placer County.
- Goal 6.E To preserve and enhance open space lands to maintain the natural resources of the County.

2.2.11 Placer County Tree Preservation Article (Article 12.16)

The Placer County Tree Preservation Article (Article 12.16, Tree Preservation Article) requires tree permits for all development activities (except those that qualify under an exemption) within the protected zone of any protected tree on public or private land. The Tree Preservation Article does not allow for any person, firm, corporation, or County agency to harm, destroy, kill or remove any protected tree unless authorized by a tree permit or as permitted pursuant to approval of a discretionary project.

The Tree Preservation Article is applicable to all native trees, landmark trees, riparian zone trees, and certain commercial firewood operations, except as exempted, with a single main stem or trunk at least six inches diameter breast height (dbh), or a multiple trunk with an aggregate of at least 10 inches dbh. Foothill pine (*Pinus sabiniana*) are exempt from this article. In addition, certain plants commonly found as "brush," such as manzanita, are not considered to be trees in this article regardless of size.

3.0 METHODS

For the purposes of this BRA, special-status species are defined as plants or animals that:

- are listed or are proposed for listing as threatened or endangered under the ESA;
- are listed or candidates for future listing as threatened or endangered under the California ESA;
- are identified as an SSC by the CDFW;
- are considered by the CNPS to be "rare, threatened, or endangered in California," "plants about which more information is needed," or "plants of limited distribution – a watch list" (i.e., species with a CRPR of 1A, 1B, 2A, or 2B);
- are fully protected in California in accordance with the California Fish and Game Code, §§ 3511 (birds), 4700 (mammals), 5050 (amphibians and reptiles), and 5515 (fishes); or
- are Covered Species as defined by the PCCP.

Species that are tracked by the CNDDB, but have no other special status, are not considered to be special-status species in this BRA. This BRA reviews the potential for both PCCP Covered Species and all other remaining special-status species, as defined above, that have potential to occur within the Project Area. Both methods are described in the following sections.

3.1 Analysis of Placer County Conservation Program Covered Species

3.1.1 Assessment of Placer County Conservation Program Modeled Species Habitat Data

PCCP Appendix D provides species accounts for the Covered Species. The species accounts include Modeled Species Distribution in the Plan Area, which defines the modeled habitat for each species based on PCCP Land Cover types. Covered species were considered potentially occurring onsite if the Project Area supported the Land Cover type(s) identified in the species account as modeled habitat.

3.1.2 Field Assessment for Placer County Conservation Program Covered Species

A habitat assessment for PCCP Covered Species was conducted by ECORP biologists Keith Kwan and Hannah Stone on August 7 and 26, 2020. Information and observations from this habitat assessment were used to determine whether specific potential habitat features for PCCP Covered Species were present or likely to be present within the Project Area. Inaccessible portions of the Project Area were visually assessed in the field from accessible vantage points (e.g., public roads) and/or photo-assessed using Google Earth aerial photographs.

3.2 Analysis of Other Special-Status Species

3.2.1 Literature Review

The following resources were queried to determine whether any special-status species/habitat other than PCCP Covered Species have potential to occur within the Project Area (Attachment A):

- CDFW CNDDB record search for the "Gold Hill, California" and "Lincoln, California" 7.5-minute quadrangles and the 10 surrounding USGS quadrangles (CDFW 2020a);
- USFWS Information, Planning, and Consultation System Resource Report List for the Project Area (USFWS 2020); and
- CNPS' electronic Inventory of Rare and Endangered Plants of California for the "Gold Hill, California" and "Lincoln, California" 7.5-minute quadrangles and the ten surrounding USGS quadrangles (CNPS 2020).
- National Oceanic and Atmospheric Administration Fisheries West Coast Region Species (NOAA 2020)

3.2.2 Field Assessment for Other Special-Status Species

A field assessment for special-status species was conducted by ECORP biologists Keith Kwan and Hannah Stone on August 7 and 26, 2020. During this assessment, accessible portions of the Project Area were visually assessed by walking or driving roads. Vegetation communities occurring within the Project Area were characterized, and the following biological resource information was collected:

- Direct observations of special-status species;
- Animal and plant species directly observed;
- Habitat and vegetation communities; and
- Representative photographs of the Project Area (Attachment B).

Inaccessible portions of the Project Area were visually assessed in the field from accessible vantage points (e.g., public roads) and/or photo-assessed using Google Earth aerial photographs.

3.2.3 Evaluation of Special-Status Species

Based on PCCP modeled species habitat, species occurrence information from the literature review, and the field assessment, the list of special-status plant and animal species was analyzed for their potential to occur onsite (Table 4).

Each of the potentially occurring species was evaluated based on the following criteria:

- **Present** – Species was observed during field surveys or is known to occur within the Project Area based on documented occurrences within the CNDDB, PCCP, or other literature.
- **Potential to Occur** – Habitat (including soil and elevation requirements) for the species occurs within the Project Area based on site assessment, literature research, or PCCP Modeled Species Habitat data.
- **Low Potential to Occur** – Marginal or limited amounts of habitat occur, and/or the species is not known to occur within the vicinity of the Project Area based on CNDDB records and other available documentation.
- **Absent** – No suitable habitat (including soils and elevation requirements) and/or the species is not known to occur within the vicinity of the Project Area based on CNDDB records and other documentation.

3.2.4 Late-Season Special-Status Plant Survey

A focused late-season special-status plant survey was conducted by ECORP biologists Hannah Stone and Hannah Kang on June 28 and 29, 2020. Determinate-level field surveys were conducted in accordance with guidelines promulgated by USFWS (USFWS 2000), CDFW (CDFW 2019), and CNPS (CNPS 2001). The survey included accessible portions of the Project Area. If any special-status plants were found in the field, their location was recorded in the field using a post-processing capable Global Positioning System (GPS) unit with sub-meter accuracy (Juniper Systems, Inc. Geode GNS2 Multi-GNSS 10Hz Receiver with Apple iPad/iOS interface).

3.2.5 Focused Elderberry Shrub Survey

A focused elderberry shrub survey was conducted by ECORP biologists Eric Stitt, Hannah Stone, Krissy Walker-Berry, and Daniel Wong on August 18 and 26, September 3, 8, 15, and 17, 2020. For the elderberry survey, the Project Area was subdivided into a) the Project Area, b) the 165-foot buffer around the Project Area, and c) the Assessment Area. The 165-foot buffer was only surveyed within accessible areas. The entire Project Area and accessible areas within the 165-foot buffer were surveyed in accordance with USFWS guidelines (USFWS 2017). The biologists recorded the location of elderberry shrubs (host plant for the valley elderberry longhorn beetle (VELB; *Desmocerus californicus dimorphus)*) adjacent to the Project Area. Elderberry shrubs were recorded in the field using a post-processing capable GPS unit with sub-meter accuracy (Juniper Systems, Inc. Geode GNS2 Multi-GNSS 10Hz Receiver with Apple iPad/iOS interface). The Assessment Areas and portions of the 165-foot buffer were not accessible due to private property access but were visually assessed for the presence of elderberry shrubs.

3.2.6 Aquatic Resources Delineation

An aquatic resources delineation by ECORP biologists Keith Kwan and Hannah Stone on August 7 and 26, 2020. The aquatic resources delineation was conducted in accordance with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (Arid West Region Supplement; USACE 2008a). Non-wetland waters were identified in the field according to *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United* States (USACE 2008b), where applicable. The boundaries of aquatic resources were delineated through standard field methods (e.g., paired sample set analyses). *Munsell Soil Color Charts* (Munsell Color 2009) and the Web Soil Survey (NRCS 2020a) were used to aid in identifying hydric soils in the field. The *Jepson Manual, 2nd Edition* (Baldwin et al. 2012) was used for plant nomenclature and identification. Aquatic resources within the Project Area were recorded in the field using a post-processing capable GPS unit with sub-meter accuracy (Juniper Systems, Inc. Geode GNS2 Multi-GNSS 10Hz Receiver with Apple iPad/iOS interface).

Portions of the Project Area were located on private property with no access. These areas were visually assessed in the field from adjacent accessible lands and analyzed using aerial photography from online sources, such as Google Earth. As a consequence, site-specific field data for these areas is limited.

3.2.7 Field Assessment for Trees

An ECORP certified arborist conducted the field survey on August 10, 14, 17, 18, and September 3, 8, 10, 15, 16, 21, 22, and 25, 2020. During the field survey, the ECORP staff walked the accessible portions of the Project site and recorded data using a sub-meter accuracy GPS unit. Where access was not available, trees were mapped via aerial photograph review. Further, there were trees that were not surveyed, as it was not possible to obtain the necessary data for those trees.

Data collected included species, tree tag number, dbh, dripline radius, structure, and condition. In accordance with the Tree Preservation Code, all native trees with a dbh of six inches for single-trunked trees, or with an aggregate dbh of 10 inches for multi-trunked trees were surveyed. In addition, any large nonnative tree that could potentially be considered a "landmark tree" was also documented.

The survey results are intended for general project planning purposes only; therefore, these results should not be considered a detailed tree analysis (i.e., results do not include hazard assessment, tree health diagnosis, preservation/removal recommendations, or pruning advisement). The following terms define the collected data:

Dbh: Trunk diameter at 4.5 feet above grade. Occasional deviations from this height were required for trees with branching at this level or with unusual structural configurations (e.g., horizontal trunks). On multi-trunked trees (trees with multiple vertical trunks in contact at or near ground level), the report lists total aggregate diameter along with the total number of trunks that were measured.

Dripline Radius: The maximum distance from trunk to the edge of the canopy.

Condition: An estimate of the tree's overall health. This includes evaluation of foliage, evidence of wound healing, evidence of fungal attack, density of insect galls, and the amount and condition of attached deadwood. Condition was rated on a six-point scale (excellent, good, fair to good, fair, fair to poor, and poor).

Structure: An estimate of the tree's structural soundness, based on obvious external evidence. This evaluates the obvious potential for structural failure of one or more major branches or trunks, the environment and condition of the root crown, symmetry of the canopy, and any noticeable effects of crowding caused by adjacent trees. Structure was rated on a six-point scale (excellent, good, fair to good, fair, fair to poor, and poor).

In addition, where appropriate, notes were taken regarding any unusual features (e.g., large trunk cavities, obvious damage or disease, girdling by barbed wire).

4.0 RESULTS

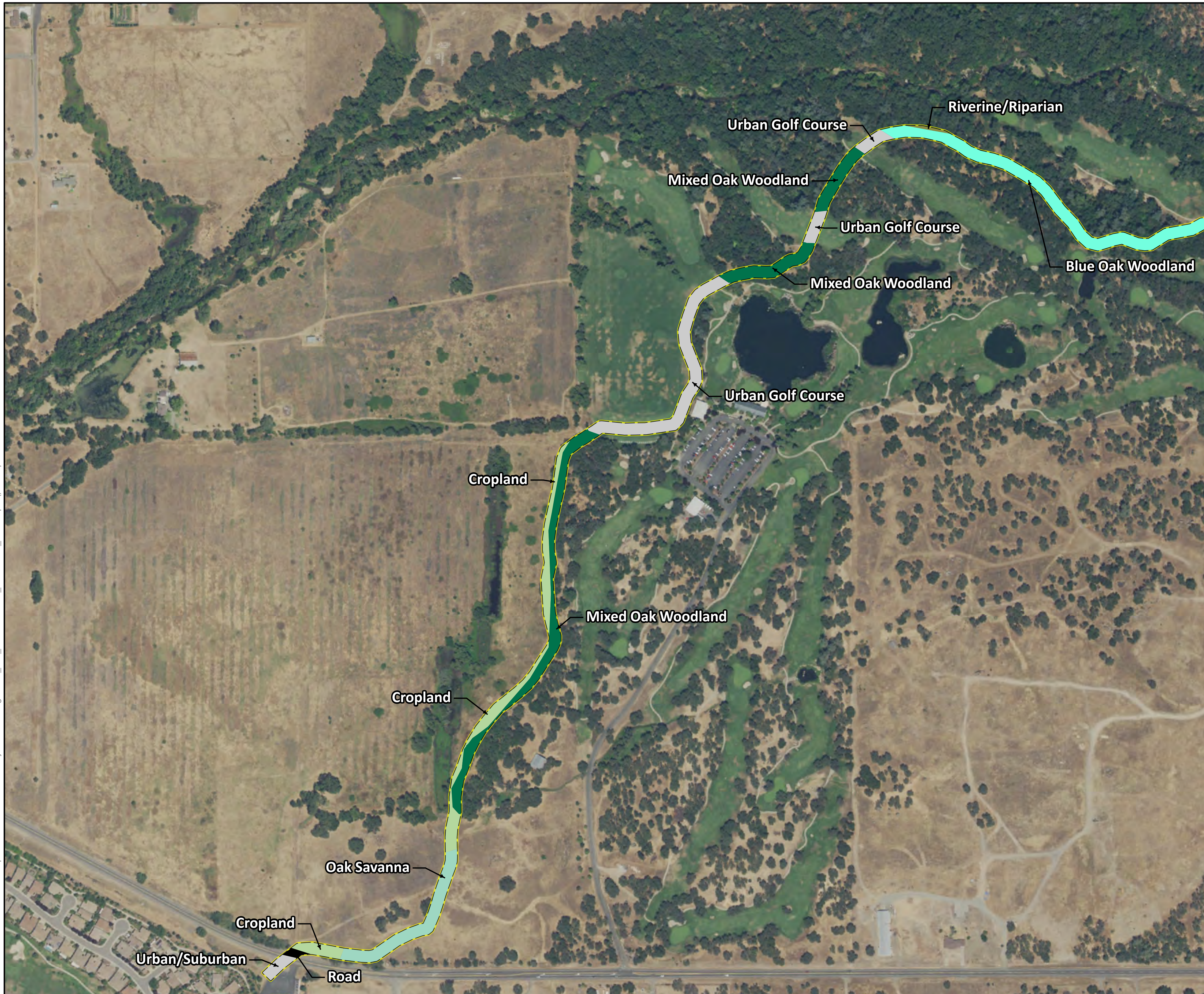
4.1 Site Characteristics and Land Use

The Project is located within flat to gently rolling terrain situated in the Sierra Nevada Foothills Subregion of the California Floristic Province (Baldwin et al. 2012). Elevations within the Project range from approximately 180 to 430 feet above mean sea level (MSL). Based on information gathered from the closest weather station, the average annual precipitation for the vicinity of the Study Area is approximately 20.3 inches (with the wettest period November-March), and average daily temperatures range from 41.5 degrees Fahrenheit (˚F) in winter to 91.2˚F in summer (National Oceanic and Atmospheric Administration [NOAA] 2020).

The Project Area is largely composed of developed areas including the Hemphill Canal, the Hemphill diversion structure, and associated dirt and gravel access roads; paved two-lane roads, portions of the Turkey Creek Golf Course, rural residences, agricultural fields, and the NID maintenance yard.

4.2 Placer County Conservation Program Land Cover Types and Vegetation Communities

PCCP Land Cover data within the Project Area were reviewed and shown in Figure 2. *Placer County Conservation Program Land Cover*. After the site assessment, revision to the type and extent of the PCCP Land Cover types were made to better reflect current field conditions and vegetation communities (Figure 3. *Revised Placer County Conservation Program Land Cover*). It is important to note that land cover and vegetation community mapping is approximate due limited access and the difficulty in mapping roadside habitat in much of the Project Area. The revised Land Cover types and acreages found within the Project Area from Figure 3 are summarized in Table 2. The following descriptions are based on the revised land cover map.



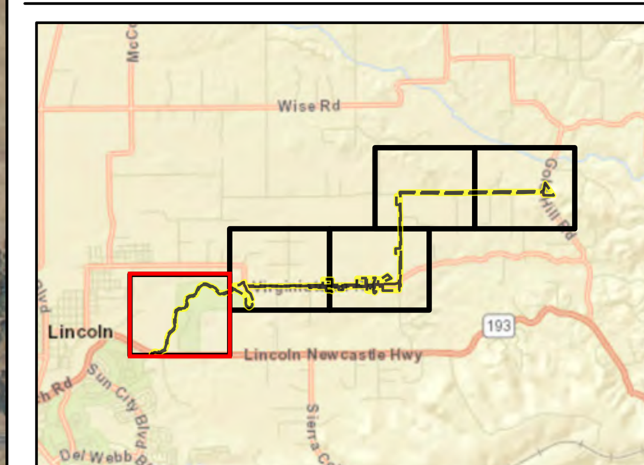
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Annual Grassland - 16.65 ac.
- Barren - 3.86 ac.
- Blue Oak Woodland - 2.63 ac.
- Cropland - 20.97 ac.
- Foothill Hardwood Woodland - <0.01 ac.
- Marsh Complex - 2.76 ac.
- Mixed Oak Woodland - 11.65 ac.
- Oak Savanna - 9.08 ac.
- Oak-Foothill Pine Wood - 0.09 ac.
- Orchard - 1.66 ac.
- Pasture - 4.17 ac.
- Riverine - <0.01 ac.
- Riverine/Riparian - 15.91 ac.
- Road - 0.07 ac.
- Rural Residential - 5.93 ac.
- Urban Golf Course - 2.12 ac.
- Urban/Suburban - 0.19 ac.
- Valley Foothill Riparian Woodland - <0.01 ac.
- Valley Oak Woodland - 0.30 ac.

Sources: NAIP 2018



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Map Date: 10/1/2020

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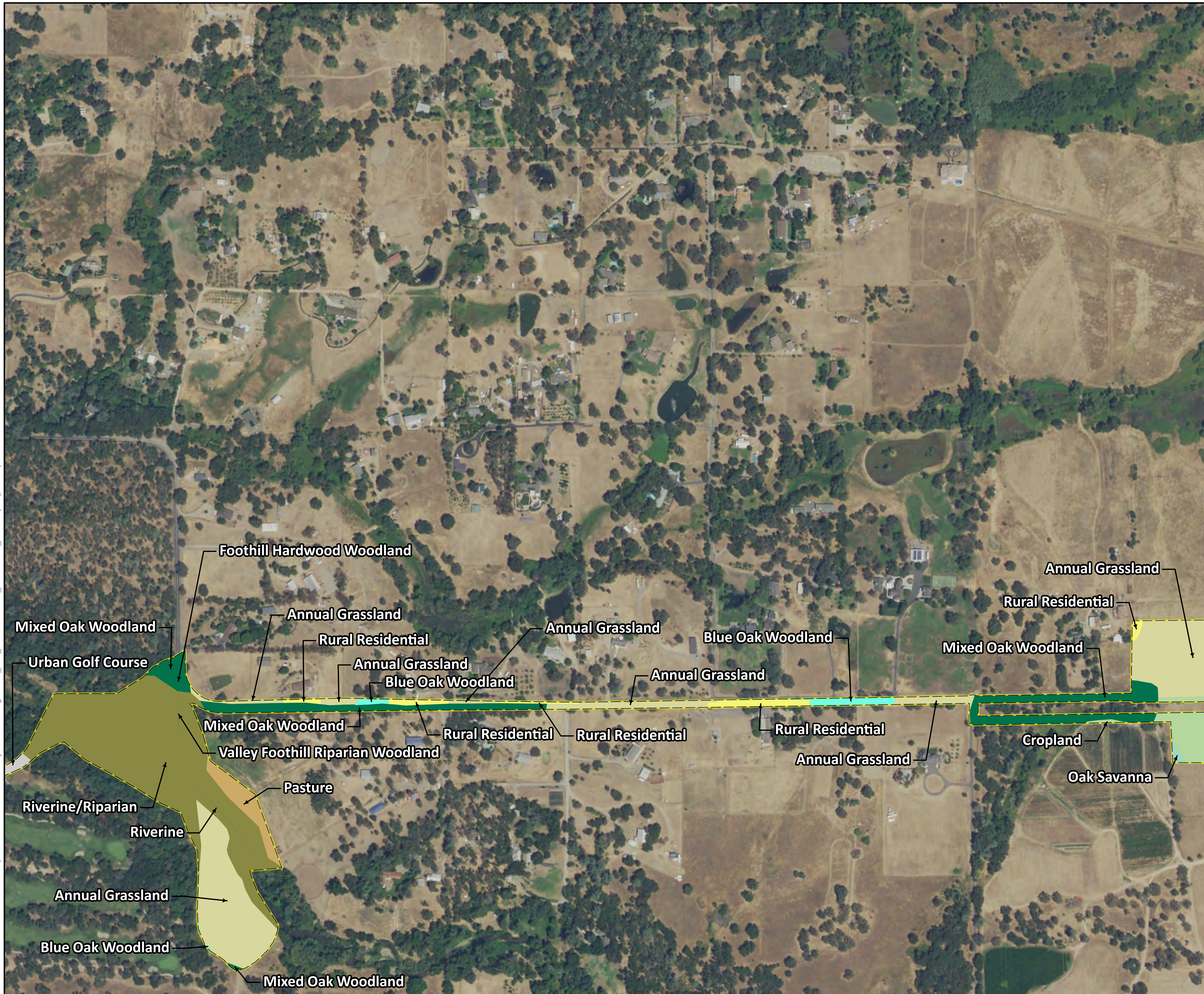
Scale in Feet
0 500

Figure 2. PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



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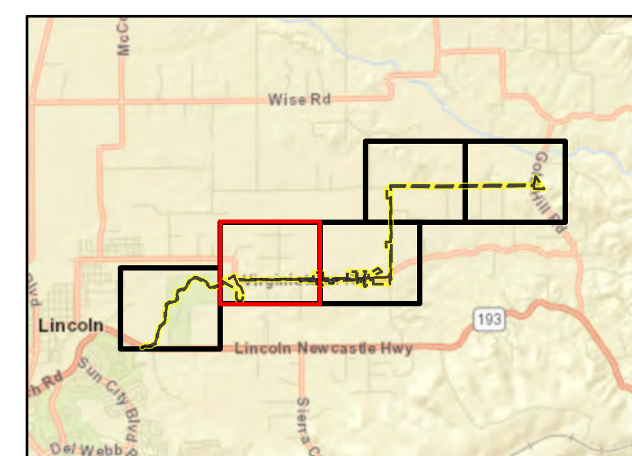

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Map Date: 10/1/2020

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Scale in Feet
0 500

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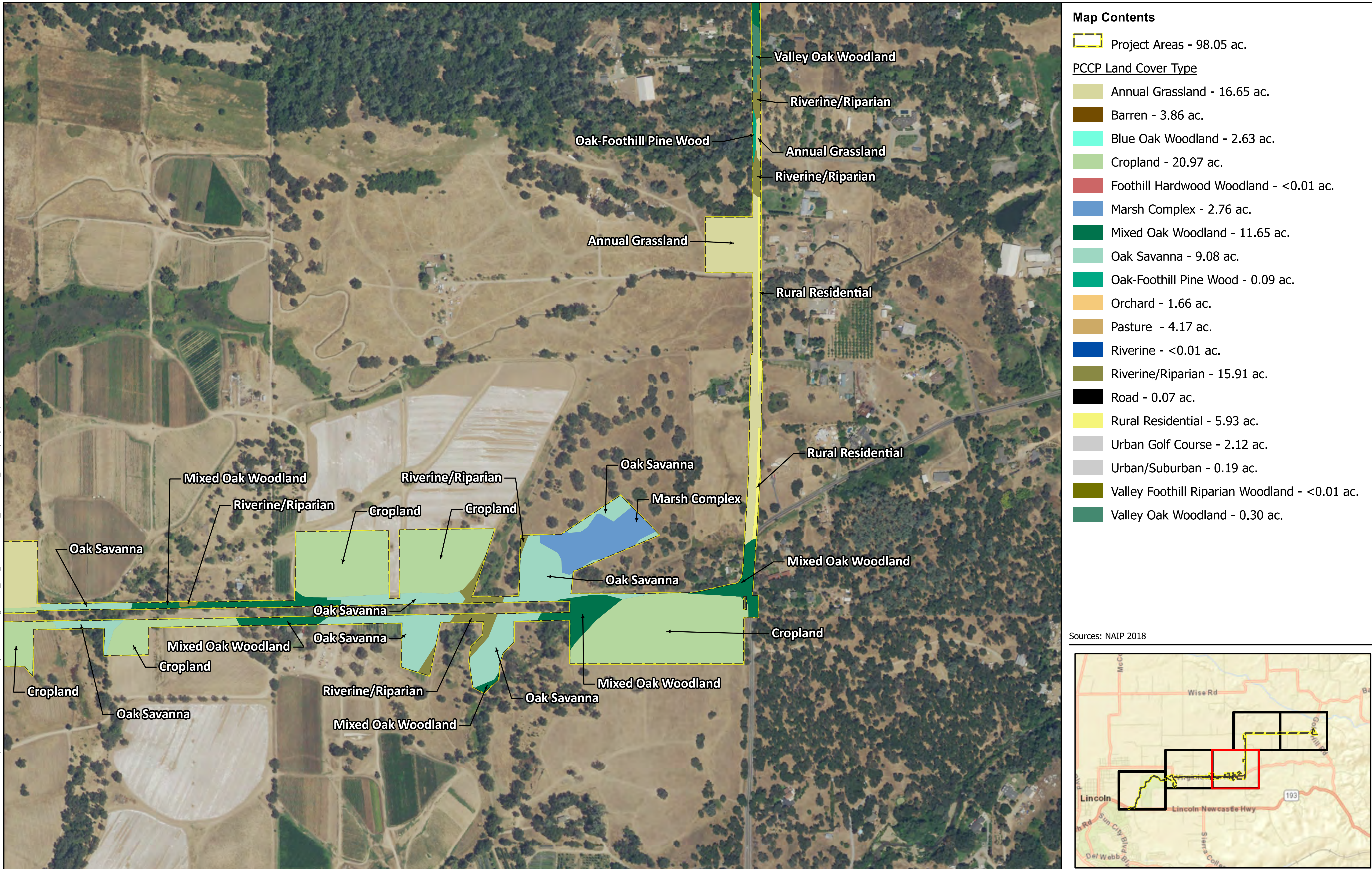

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Scale in Feet
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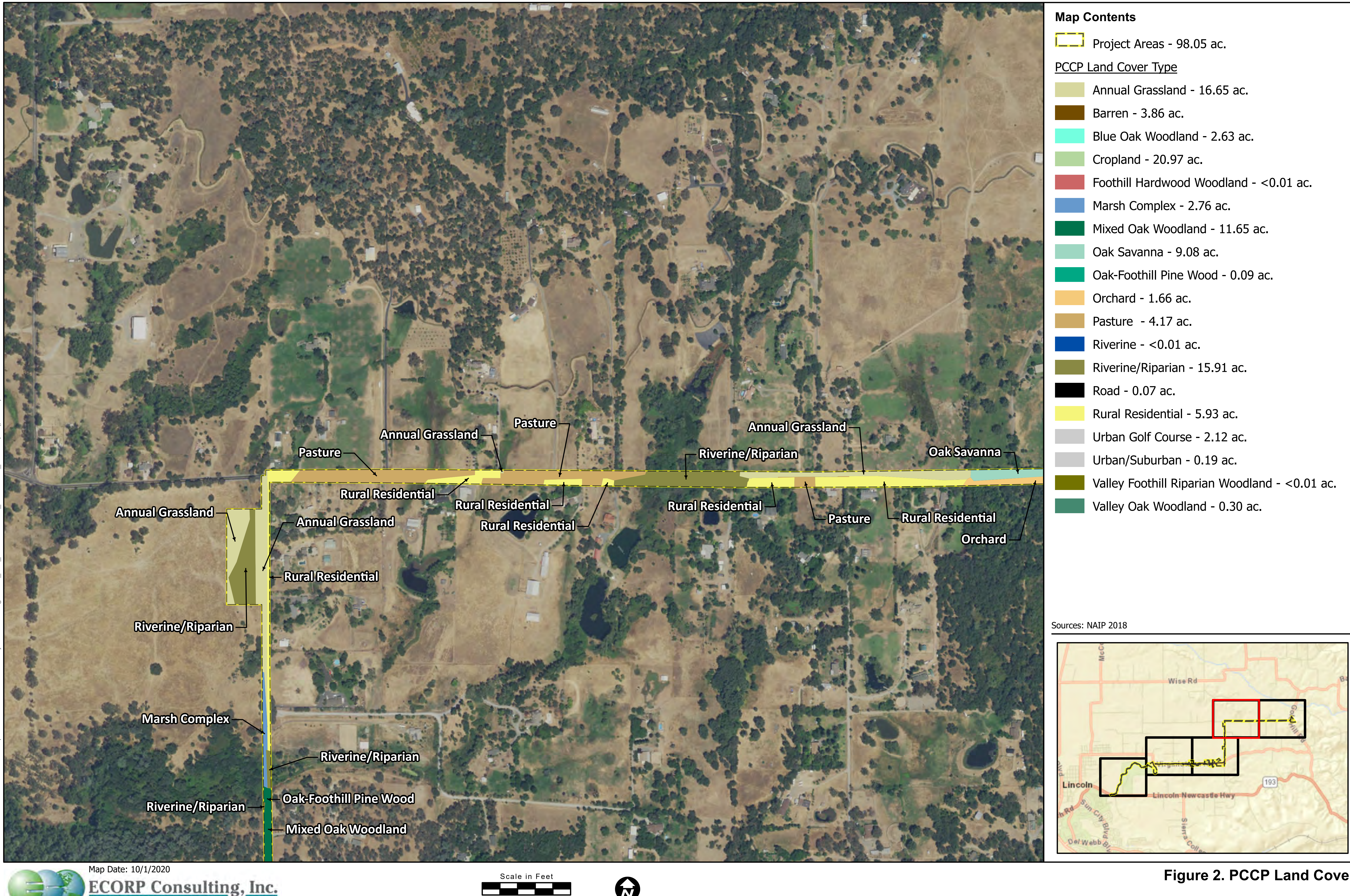

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Map Date: 10/1/2020

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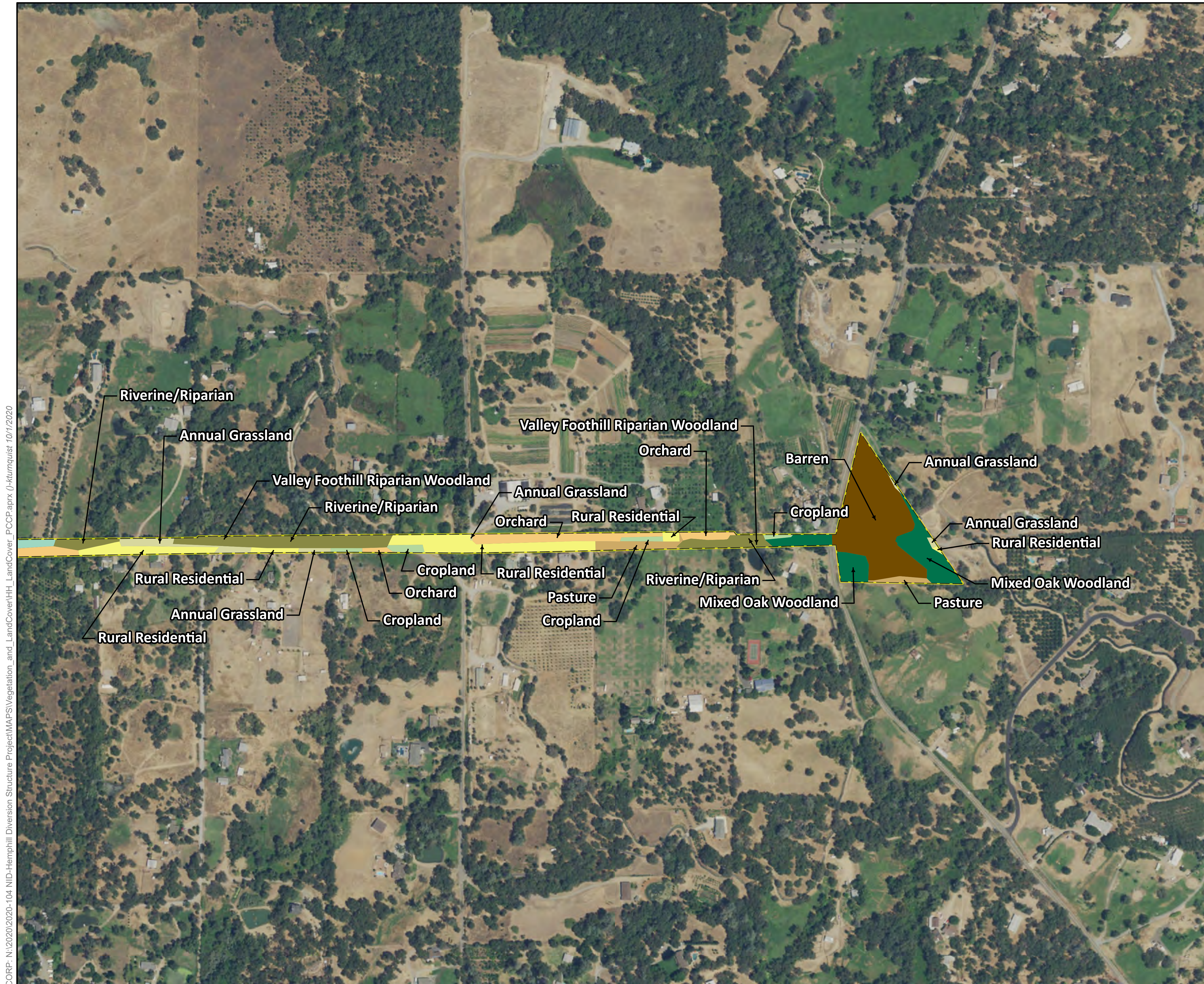
Figure 2. PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



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Map Date: 10/1/2020

ECORP Consulting, Inc.
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Scale in Feet
0 500

Figure 2. PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project

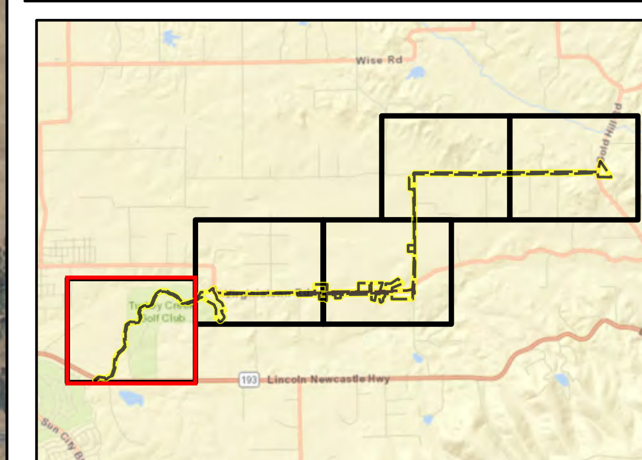
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Canal - 1.38 ac.
- Mixed Oak Woodland - 14.91 ac.
- Oak Savanna - 7.70 ac.
- Road - 12.91 ac.
- Urban Golf Course - 1.63 ac.
- Urban/Suburban - 0.16 ac.

Sources: NAIP 2018



ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Vegetation_and_LandCover\HH_LandCover_PCCP.aprx ()-kturnquist 11/9/2020

Map Date: 11/9/2020

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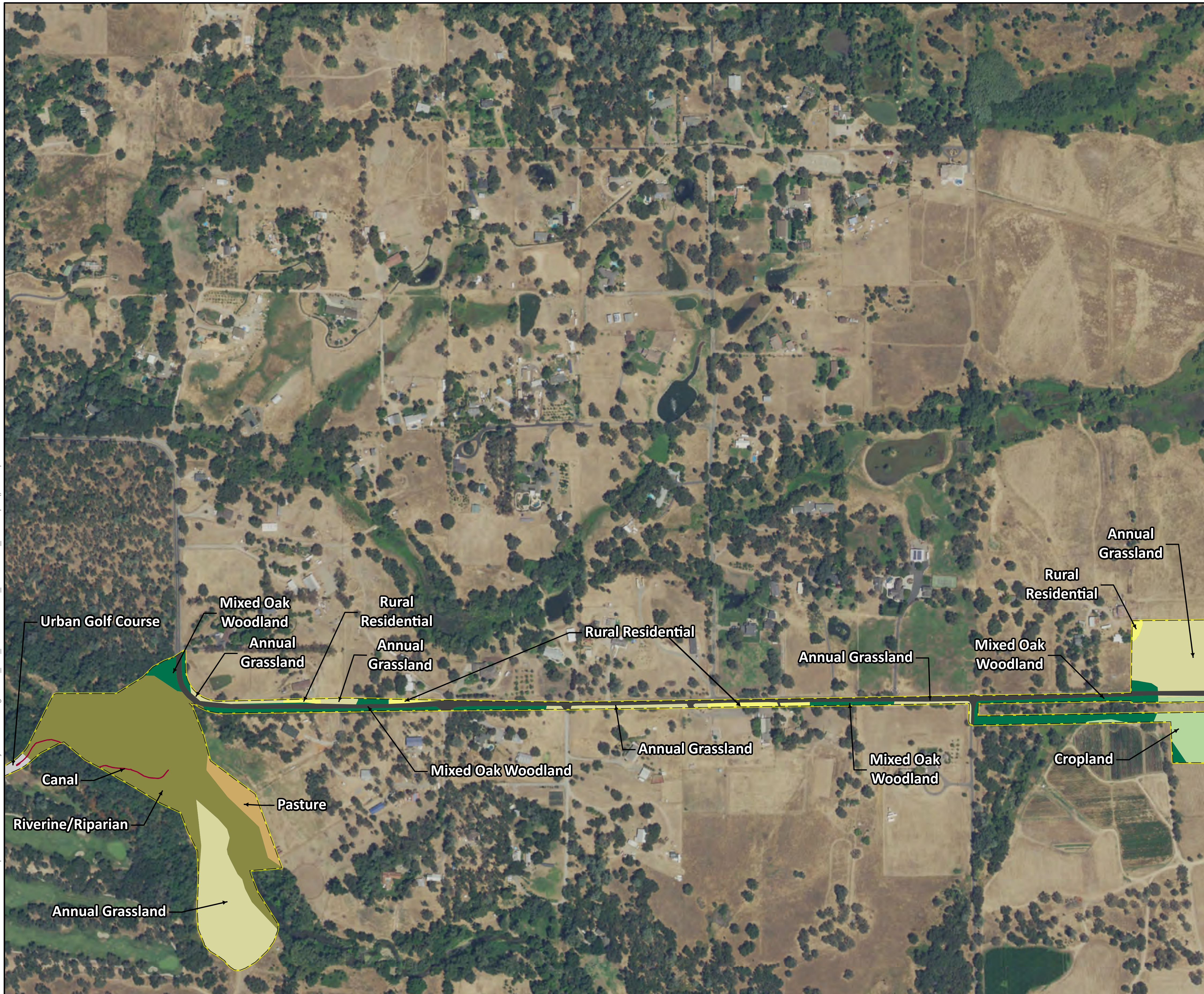
Scale in Feet
0 500

Figure 3. Revised PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



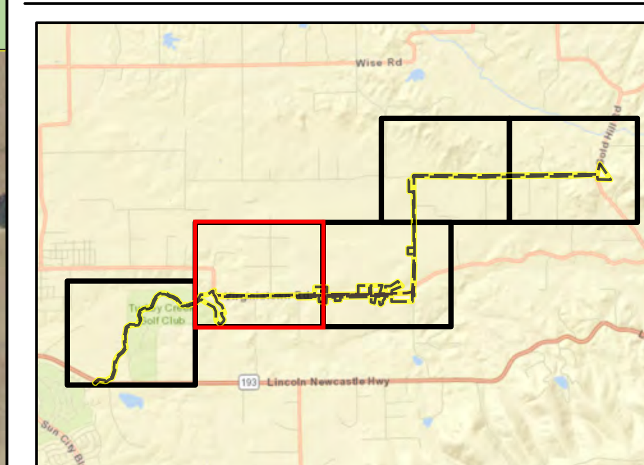
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Annual Grassland - 14.67 ac.
- Canal - 1.38 ac.
- Cropland - 18.99 ac.
- Mixed Oak Woodland - 14.91 ac.
- Oak Savanna - 7.70 ac.
- Pasture - 2.90 ac.
- Riverine/Riparian - 13.04 ac.
- Road - 12.91 ac.
- Rural Residential - 4.52 ac.
- Urban Golf Course - 1.63 ac.

Sources: NAIP 2018



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Map Date: 11/9/2020

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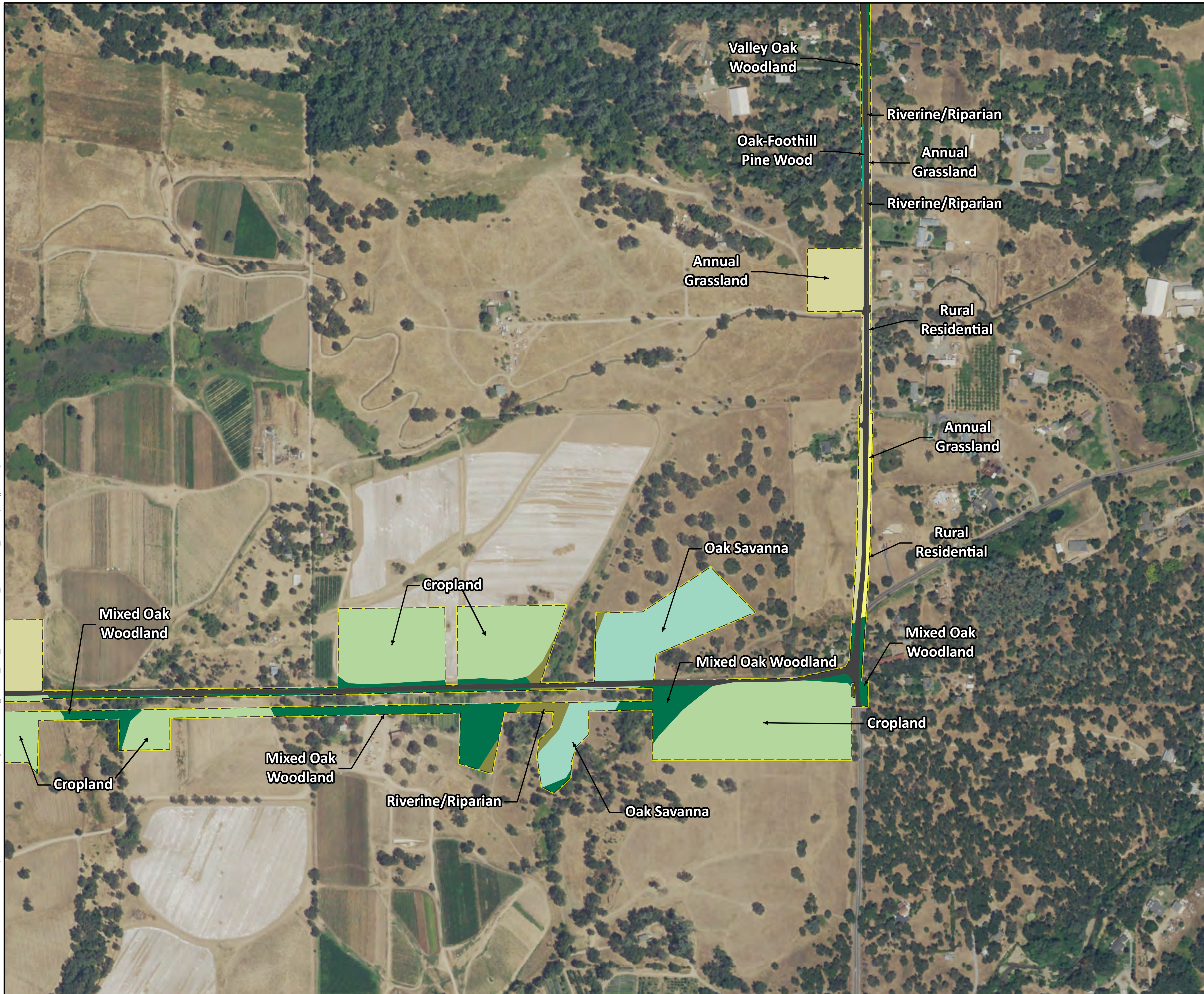
Scale in Feet
0 500

Figure 3. Revised PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



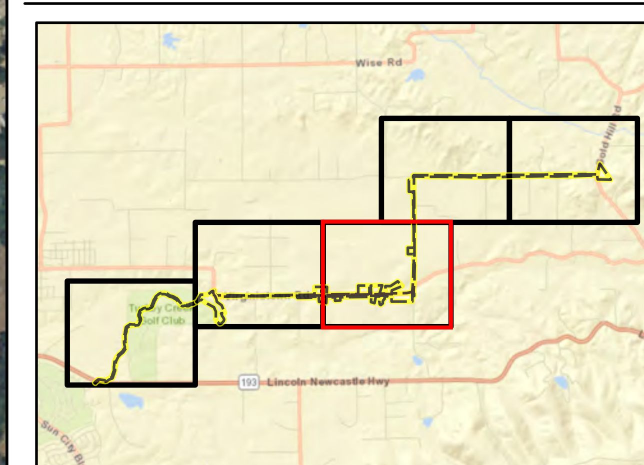
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Annual Grassland - 14.67 ac.
- Canal - 1.38 ac.
- Cropland - 18.99 ac.
- Mixed Oak Woodland - 14.91 ac.
- Oak Savanna - 7.70 ac.
- Oak-Foothill Pine Wood - 0.05 ac.
- Riverine/Riparian - 13.04 ac.
- Road - 12.91 ac.
- Rural Residential - 4.52 ac.
- Valley Oak Woodland - 0.10 ac.

Sources: NAIP 2018



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Map Date: 11/9/2020

ECORP Consulting, Inc.
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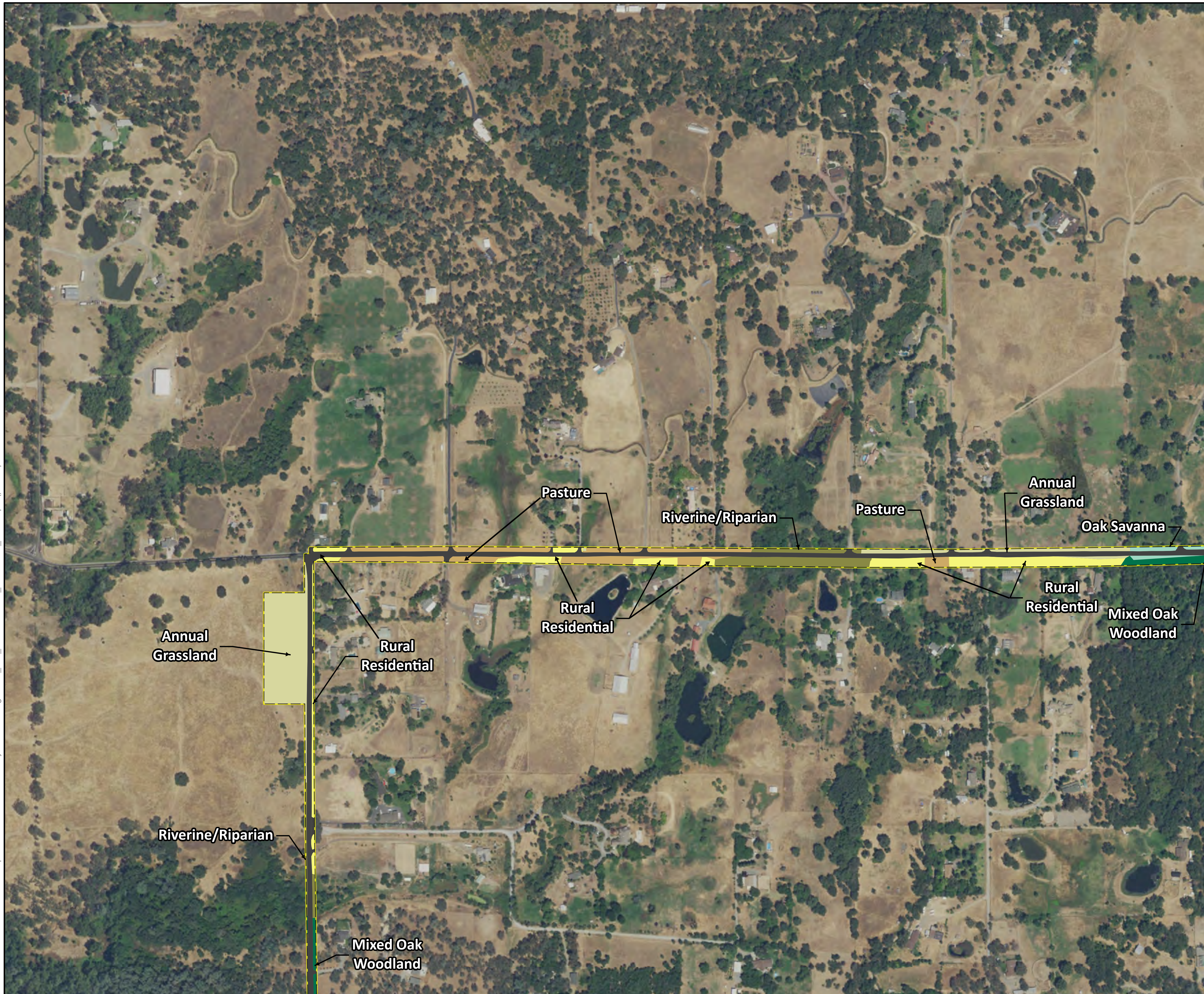
Scale in Feet
0 500

Figure 3. Revised PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



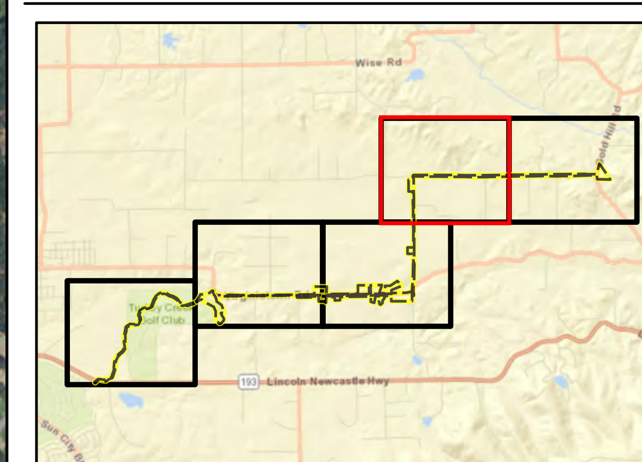
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Annual Grassland - 14.67 ac.
- Mixed Oak Woodland - 14.91 ac.
- Oak Savanna - 7.70 ac.
- Oak-Foothill Pine Wood - 0.05 ac.
- Pasture - 2.90 ac.
- Riverine/Riparian - 13.04 ac.
- Road - 12.91 ac.
- Rural Residential - 4.52 ac.

Sources: NAIP 2018



ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Vegetation_and_LandCover\HH_LandCover_PCCP.aprx ()-ktumquist 11/9/2020

Map Date: 11/9/2020

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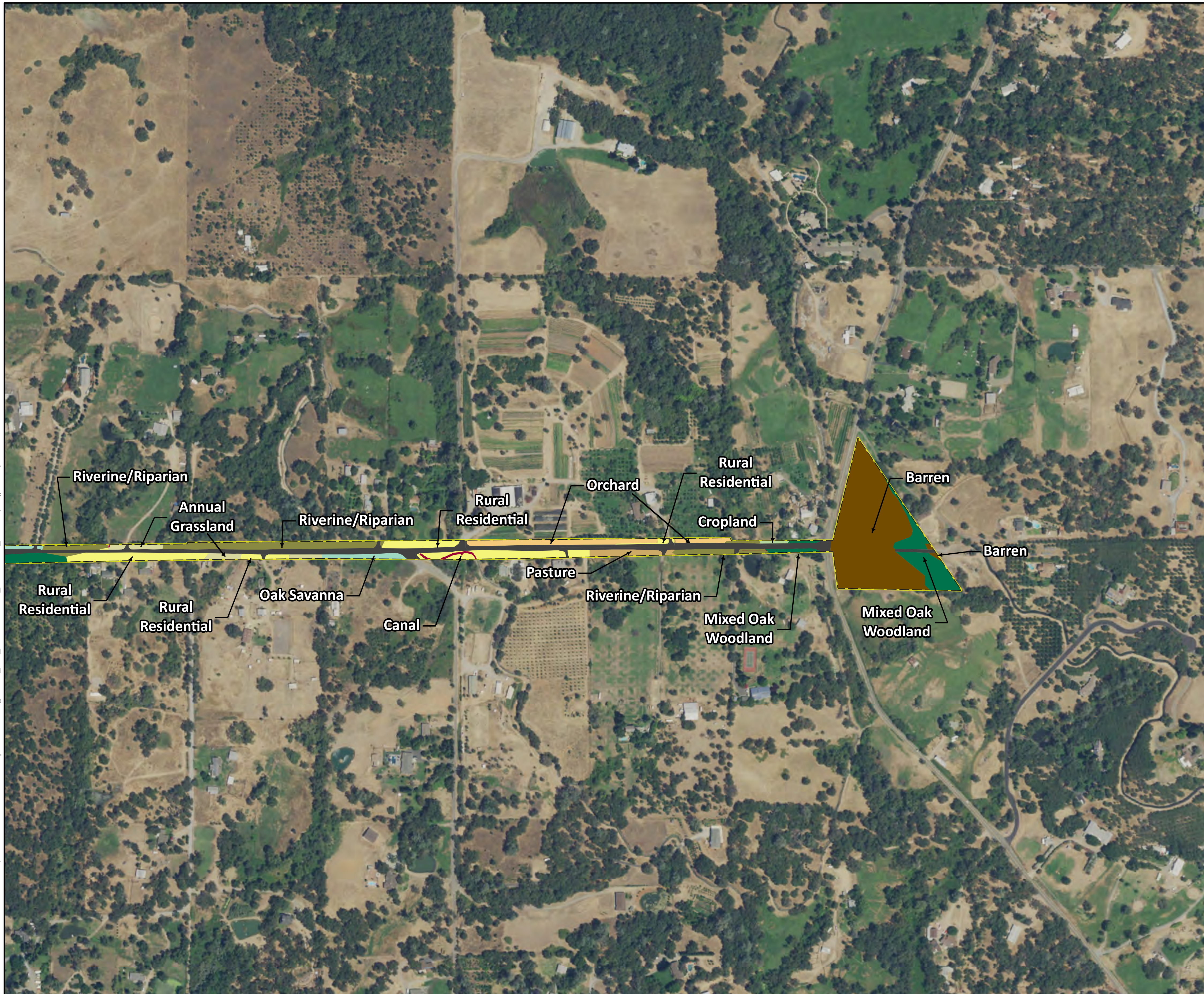
Scale in Feet
0 500

Figure 3. Revised PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project



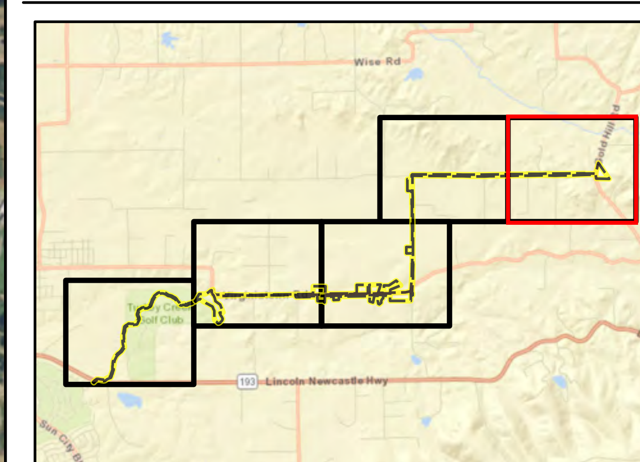
Map Contents

Project Areas - 98.05 ac.

PCCP Land Cover Type

- Annual Grassland - 14.67 ac.
- Barren - 4.47 ac.
- Canal - 1.38 ac.
- Cropland - 18.99 ac.
- Mixed Oak Woodland - 14.91 ac.
- Oak Savanna - 7.70 ac.
- Orchard - 0.63 ac.
- Pasture - 2.90 ac.
- Riverine/Riparian - 13.04 ac.
- Road - 12.91 ac.
- Rural Residential - 4.52 ac.

Sources: NAIP 2018



ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Vegetation_and_LandCover\HH_LandCover_PCCP.aprx ()-kturnquist 11/9/2020

Map Date: 11/9/2020

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Scale in Feet
0 500

Figure 3. Revised PCCP Land Cover

2020-104 NID-Hemphill Diversion Structure Project

Table 2. Land Cover Types within Project Area

PCCP Land Cover Type	Acreage
Annual Grassland	14.67
Barren	4.47
Canal	1.38
Cropland	18.99
Mixed Oak Woodland	14.91
Oak Savanna	7.70
Oak-Foothill Pine Woodland	0.05
Orchard	0.63
Pasture	2.90
Riverine/Riparian	13.04
Road	12.91
Rural Residential	4.52
Urban Golf Course	1.63
Urban/Suburban	0.16
Valley Oak Woodland	0.10
Total[1]:	98.05

[1] Land Cover Type acreage total may not equal the Total Project Acreage due to rounding.

Based on the site assessment, the PCCP Communities/Land Cover types present within the Project Area include Natural Communities (i.e., annual grassland, mixed oak woodland, oak savanna, oak-foothill pine woodland, riverine/riparian, and valley oak woodland), Semi-natural Communities (i.e., cropland, pasture) Other Agricultural Communities (i.e., orchard), and Urban (Non-natural) Communities (i.e., barren, canal, road, rural residential, urban golf course, and urban/suburban). A list of plant species identified during the special-status plants surveys within the Project Area is included in Attachment C.

4.2.1 Natural Communities

Annual Grassland

Annual grasslands are found on rural residential properties and fallow fields within the Project Area and are dominated by annual grasses that were either mowed or grazed at the time of the survey. Grasses were hard to identify due to the disturbance, but likely include common non-native species such as wild oats (*Avena* sp.) and brome (*Bromus* sp.). The dominant forb at the time of the survey was narrow tarplant (*Holocarpha virgata*). The annual grasslands within the Project Area are likely consistent with the *Avena* spp. - *Bromus* spp. Herbaceous Semi-Natural Alliance (Sawyer et al. 2009).

Mixed Oak Woodland

According to the PCCP, the mixed oak woodland land cover community includes woodlands with a canopy cover of 30 percent or greater that is dominated by blue oak (*Quercus douglasii*) but also includes interior live oak (*Quercus wislizenii*) and less than 10 percent canopy cover of foothill pine. Mixed oak woodland, dominated by interior live oak, occurs in drier habitats adjacent to the canal, in a remnant strip between the roads and residential properties, within the Project Area, and within the NID facility. The mixed oak woodland within the Study Area is consistent with the *Quercus wislizeni* - Forest & Woodland Alliance (Sawyer et al. 2009) and includes several predominant oak species. Interior live oaks are dominant or codominant with blue oak, and valley oaks are scattered throughout. Dominant understory vegetation includes poison-oak (*Toxicodendron diversilobum*), hedgehog dog-tail grass (*Cynosurus echinatus*), and field hedge parsley (*Torilis arvensis*).

Oak Savanna

The oak savanna land cover is characterized in the PCCP as an oak woodland with five percent to 30 percent canopy cover, which is dominated by blue oak. The oak savannah land cover community is located in larger rural residential properties. The dominant tree species in the oak savanna land cover community is blue oak, with scattered foothill pine. The understory is largely made up of species found in the annual grassland community such as wild oats, brome, and narrow tarplant. The oak savanna within the Project Area is likely consistent with the *Quercus lobata* Forest & Woodland Alliance and the *Avena* spp. - *Bromus* spp. Herbaceous Semi-Natural Alliance (Sawyer et al. 2009).

Oak-Foothill Pine Woodland

According to the PCCP, the oak-foothill pine woodland land cover is distinguished from other oak woodland types by having a foothill pine canopy of over 10 percent. The understory can be made up of shrubs including coyote brush (*Baccharis pilularis*), poison oak (*Toxicodendron diversilobum*), and manzanita (*Arctostaphylos viscida*), and/or non-native annual grasses. The oak-foothill pine woodland within the Project Area is likely consistent with the *Quercus wislizeni* - Forest & Woodland Alliance (Sawyer et al. 2009).

Riverine/Riparian Complex

The riverine/riparian complex is made up of two constituent habitats: the riverine habitat and the riparian habitat. The riverine habitat onsite is made up of the aquatic habitat, such as Auburn Ravine and other intermittent streams and drainages. The riparian habitat includes the vegetation generally associated with the watercourses. These include herbaceous understory plants, scrub-shrub vegetation, and trees. The riparian habitat within the Project Area is generally narrow due such factors as bank erosion particularly for Auburn Ravine, clearing for development or agriculture, and overgrazing. Dominant trees found in the riparian habitat onsite includes white alder (*Alnus rhombifolia*), valley oak, Fremont's cottonwood (*Populus fremontii*), Oregon ash (*Fraxinus latifolia*) Goodding's black willow (*Salix gooddingii*), and black walnut (*Juglans hindsii*). The woody understory consists of multiple willow species (sandbar willow [*Salix exigua*], arroyo willow [*Salix lasiolepis*], and Goodding's black willow). Dominant understory vegetation includes Himalayan blackberry (*Rubus armeniacus*) and rice cutgrass (*Leersia oryzoides*).

The vegetation communities found in the riparian habitat would likely include the *Alnus rhombifolia* Forest & Woodland Alliance and the *Juglans hindsii* and Hybrids Forest & Woodland Semi-Natural Alliance (Sawyer et al. 2009).

Valley Oak Woodland

The PCCP characterizes the valley oak woodland as a valley oak dominated woodland with a minimum of 30 percent canopy cover. Valley oak woodlands are generally found along water courses or active floodplains. Valley oak woodland occurs in more mesic areas along the canal, and between the creek and interior live oak woodlands. Valley oak is the dominant tree species, or co-dominant with interior live oak and/or blue oak. The valley oak woodland south of the creek near the diversion dam includes a stand of mature California buckeye (*Aesculus californica*) and scattered black walnuts within the subcanopy. Dominant understory vegetation includes poison oak, hedgehog dog-tail grass, and field hedge parsley. Valley oak woodland within the Project Area is consistent with the *Quercus lobata* Forest & Woodland Alliance (Sawyer et al. 2009).

4.2.2 Semi-Natural Communities

Cropland

The cropland land cover is made up of actively tilled and farmed fields of varying species that could include rows crops (e.g., corn), cereal crops (e.g., oats), strawberries, and legumes, among others. Some are rotated or left fallow periodically.

Pasture

The pasture land cover type was not defined in the PCCP, but several fields were identified in the PCCP Land Cover as pasture. In general, pastures can include irrigated or non-irrigated fields for livestock grazing. Many plants found in pastures are found in some annual grasslands, such as Italian ryegrass, but pastures could also include the preference for forage crops through planting or land use practices, such as irrigation.

4.2.3 Other Natural Communities

Orchard

Orchards are usually monotypic, tree-dominated habitat. Orchards onsite include a variety of fruit and nuts.

4.2.4 Urban (Non-Natural) Communities

Barren

These are areas that have been graded and cleared of vegetation. The barren land cover onsite includes the NID facility at Gold Hill Road and Fruitvale Road.

Canal

The NID Hemphill Canal is a managed water-conveyance system.

Road

These include paved roadways found throughout the Project Area.

Rural Residential

Rural residential land cover includes low density residential development found throughout the Project Area. This is a highly manipulated habitat that could include manicured lawns and many non-native horticultural trees and shrubs.

Urban Golf Course

The Turkey Creek Golf Club is located at the western portion of the Project Area. The urban golf course land cover type is intermixed with the canal and mixed oak woodland land covers.

Urban/Suburban

The urban/suburban land cover is limited to the residential development south of Highway 193 at the western terminus of the Project.

4.3 Soils

According to the Web Soil Survey (NRCS 2020a), 10 soil units, or types, have been mapped within the Project Area (Table 3) (Figure 4. *Natural Resources Conservation Service Soil Types*). These are:

- (106) – Andregg coarse sandy loam, 2 to 9 percent slopes
- (109) – Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- (113) – Andregg-Shenandoah complex,, 2 to 15 percent slopes
- (129) – Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- (130) – Caperton-Andregg coarse sandy loam, 2 to 15 percent slopes
- (173) – Pits and dumps
- (180) – Rubble land
- (184) – Sierra sandy loam, 9 to 15 percent slopes
- (194) – Xerofluvents, frequently flooded
- (197) – Xerorthents, placer areas

The Andregg series consist of moderately deep, well-drained soils underlain by weathered granitic bedrock. These soils formed in upland areas in the Loomis Basin. The Caperton series consists of shallow, somewhat excessively drained soils underlain by weathered granitic rock, dominantly quartz diorite. These soils formed in upland areas in the Loomis Basin. The Shenandoah series consists of moderately deep, somewhat poorly drained claypan soils underlain by weathered granite. These soils formed in upland

Figure 4. Natural Resources Conservation Service Soil Types

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

106 - Andregg coarse sandy loam, 2 to 9 percent slopes

109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes

113 - Andregg-Shenandoah complex, 2 to 15 percent slopes

129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes

130 - Caperton-Andregg coarse sandy loam, 2 to 15 percent slopes

173 - Pits and dumps

180 - Rubble land

184 - Sierra sandy loam, 9 to 15 percent slopes

194 - Xerofluvents, frequently flooded

197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
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Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 11/9/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 11/9/2020

Figure 4. Natural Resources Conservation Service Soil Types

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loam, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

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Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 11/9/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 11/9/2020

Figure 4. Natural Resources Conservation Service Soil Types

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
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- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loam, 2 to 15 percent slopes
- 173 - Pits and dumps
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- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

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Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 11/9/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 11/9/2020

Figure 4. Natural Resources Conservation Service Soil Types

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
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Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
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Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 11/9/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 11/9/2020

Figure 4. Natural Resources Conservation Service Soil Types

Map Features

Project Boundary - 98.05 ac.

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Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 11/9/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 11/9/2020

areas of foothills. The Sierra series consist of deep, well-drained soils underlain by weathered granitic bedrock.

Pits and Dumps are sand and gravel pits, refuse dumps, and rock quarries. Rubble Land is cobbly and stony mine debris and tailings from dredge or hydraulic mining. Xerofluvents, frequently flooded, consist of narrow stringers of somewhat poorly drained recent alluvium adjacent to stream channel. Xerorthents, placer areas, consist of stony, cobbly, and gravelly material commonly adjacent to streams that have been placer mined.

Eight of these soil units contain hydric soil components (NRCS 2020b) (Table 3).

Table 3. Soil Units Occurring within the Project Area[1]

Soil Unit	Hydric Components[2]	Hydric Component Landform
106 – Andregg coarse sandy loam, 2 to 9 percent slopes	Unnamed	Drainageways
109 – Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	Xerofluvents	Drainageways
109 – Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	Unnamed	Drainageways
113 – Andregg-Shenandoah complex, 2 to 15 percent slopes	Shenandoah	Hills
113 – Andregg-Shenandoah complex, 2 to 15 percent slopes	Xerofluvents	Drainageways
113 – Andregg-Shenandoah complex, 2 to 15 percent slopes	Unnamed	Drainageways
129 – Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	Unnamed	Drainageways
130 – Caperton-Andregg coarse sandy loam, 2 to 15 percent slopes	Unnamed	Drainageways
173 – Pits and dumps	Unnamed	Drainageways
180 – Rubble land	None	None
184 – Sierra sandy loam, 9 to 15 percent slopes	None	None
194 – Xerofluvents, frequently flooded	Xerofluvents, frequently flooded	Drainageways
194 – Xerofluvents, frequently flooded	Unnamed	Drainageways
197 – Xerorthents, placer areas	Unnamed	Drainageways

[1]Source: NRCS 2020a
[2]Source: NRCS 2020b

4.4 Evaluation of Special-Status Species and Habitat

Table 4 lists all the special-status plant and animal species identified in the literature review as having potential to occur within the Project Area. Included in this table is the listing status for each species, a brief habitat description, whether there is modeled habitat present for PCCP covered species, and a determination on the potential to occur within the Project Area. Following the table is a brief description and discussion of each special-status species that has potential to occur in the Project Area.

Table 4. Potentially Occurring Special-Status Species						
	Status					
Common Name (Scientific Name)	ESA	CESA/ NPPA	Other	Habitat Description	Survey Period	Potential To Occur On-Site
Plants						
Jepson's onion *(Allium jepsonii)*	–	–	1B.2	Serpentinite or volcanic soils in chaparral, cismontane woodland, and lower montane coniferous forests (984'–4,331').	April–August	Absent-outside of elevational range and no suitable habitat onsite.
Sanborn's onion *(Allium sanbornii* var. *sanbornii)*	–	–	4.2	Chaparral, cismontane woodland, and lower montane coniferous forests, usually with gravelly, serpentinite soils (853'–4,954').	May–September	Absent-outside of elevational range.
Mexican mosquito fern *(Azolla microphylla)*	–	–	4.2	Marshes and swamps, ponds or slow-moving bodies of water (98'–328').	August	Potential-there is suitable habitat present onsite.
Big-scale balsamroot *(Balsamorhiza macrolepis* var. *macrolepis)*	–	–	1B.2	Chaparral, cismontane woodland, and valley and foothill grassland, sometimes on serpentinite soils (148'–5,102').	March–June	Potential-there is suitable habitat present onsite.
Valley brodiaea (*Brodiaea rosea* ssp. *vallicola*)	–	–	4.2	Occurs in old alluvial terraces and silt, sandy, or gravelly soils in vernal pools and swale within Valley and foothill grassland (33'–1,100').	April–May	Potential-there is suitable habitat present onsite.
Stebbins' morning-glory *(Calystegia stebbinsii)*	FE	CE	1B.1	Gabbroic or serpentine soils in chaparral and cismontane woodland (607'–3,576').	April–July	Absent-there is no suitable habitat onsite.
Chaparral sedge *(Carex xerophila)*	–	–	1B.2	Serpentinite or gabbroic soils within chaparral, cismontane woodland, and lower montane coniferous forest (1,444'–2,526').	March–June	Absent-there is no suitable habitat onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status: ESA	Status: CESA/ NPPA	Status: Other	Habitat Description	Survey Period	Potential To Occur On-Site
Pine Hill ceanothus *(Ceanothus roderickii)*	FE	CR	1B.1	Rocky serpentinite or gabbroic soil in chaparral and cismontane woodland (804'–3,576').	April–June	Absent-there is no suitable habitat onsite.
Red Hills soaproot *(Chlorogalum grandiflorum)*	–	–	1B.2	Serpentinite or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest, occasionally on non–ultramafic soils (804'–5,545').	May–June	Absent-outside of elevational range.
Hispid bird's-beak *(Chloropyron molle* ssp. *hispidum)*	–	–	1B.1	Alkaline soils in meadows and seeps, playas, and valley and foothill grasslands (3'–509').	June–September	Low potential-There is no suitable habitat onsite. However, marginal habitat may be present within areas that are inaccessible (i.e. private property).
Brandegee's clarkia *(Clarkia biloba* ssp. *brandegeeae)*	–	–	4.2	Chaparral, cismontane woodlands, and lower montane coniferous forest often along roadcuts (246'–3,002').	May–July	Low potential-there is marginal habitat present onsite.
Streambank spring beauty *(Claytonia parviflora* ssp. *grandiflora)*	–	–	4.2	Occurs in rocky cismontane woodland (820'–3,937').	February–May	Absent-outside of elevational range.
Bisbee Peak rush-rose *(Crocanthemum suffrutescens)*	–	–	3.2	Often gabbroic or Ione soil or in burned or disturbed areas within chaparral (246'–2,198').	April–August	Absent-there is no suitable habitat onsite.

Table 4. Potentially Occurring Special-Status Species						
	Status					
Common Name (Scientific Name)	ESA	CESA/ NPPA	Other	Habitat Description	Survey Period	Potential To Occur On-Site
Dwarf downingia *(Downingia pusilla)*	–	–	2B.2	Mesic areas in valley and foothill grassland, and vernal pools. Species appears to have an affinity for slight disturbance (i.e., scraped depressions, ditches) (Baldwin et al. 2012; CDFW 2018) (3'–1,460').	March–May	Potential-there is suitable habitat present onsite.
Stinkbells *(Fritillaria agrestis)*	–	–	4.2	Clay and sometimes serpentinite soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (33'–5,102').	March–June	Low potential-there is marginal habitat present onsite.
Butte County fritillary *(Fritillaria eastwoodiae)*	–	–	3.2	Chaparral, cismontane woodland, and openings in lower montane coniferous forest and occasionally is found on serpentinite soils (164'–4,921').	March–June	Low potential-there is marginal habitat present onsite.
El Dorado bedstraw *(Galium californicum* ssp. *sierrae)*	FE	CR	1B.2	Gabbroic soil in chaparral, cismontane woodland and lower montane coniferous forest communities (328'–1,919').	May–June	Absent-there is no suitable habitat onsite.
Boggs Lake hedge-hyssop *(Gratiola heterosepala)*	–	CE	1B.2	Marshes, swamps, lake margins, and vernal pools (33'–7,792').	April–August	Potential-there is suitable habitat present onsite.
Ahart's dwarf rush *(Juncus leiospermus* var. *ahartii)*	–	–	1B.2	Mesic areas in valley and foothill grassland. Species has an affinity for slight disturbance such as farmed fields (USFWS 2005) (98'–751').	March–May	Potential-there is suitable habitat present onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status: ESA	Status: CESA/ NPPA	Status: Other	Habitat Description	Survey Period	Potential To Occur On-Site
Red Bluff dwarf rush *(Juncus leiospermus* var. *leiospermus)*	–	–	1B.1	Vernally mesic areas in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools (115'–4,101').	March–June	Potential-there is suitable habitat present onsite.
Dubious pea *(Lathyrus sulphureus* var. *argillaceus)*	–	–	3	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest (492'–3,051').	April–May	Low potential-there is marginal habitat present onsite.
Legenere *(Legenere limosa)*	–	–	1B.1	Various seasonally inundated areas including wetlands, wetland swales, marshes, vernal pools, artificial ponds, and floodplains of intermittent drainages (USFWS 2005) (3'–2,887').	April–June	Potential-there is suitable habitat present onsite.
Humboldt lily *(Lilium humboldtii* ssp. *humboldtii)*	–	–	4.2	Occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest (295'–4,199').	May–August	Low Potential-there is marginal habitat present onsite.
Pincushion navarretia *(Navarretia myersii* ssp. *myersii)*	–	–	1B.1	Often acidic soils in vernal pools (66'–1,083').	April–May	Potential- No suitable habitat was observed onsite. However, suitable habitat may be present within areas that are inaccessible (i.e. private property).
Adobe navarretia *(Navarretia nigelliformis* ssp. *nigelliformis)*	–	–	4.2	Clay and sometimes serpentinite soils in vernally mesic valley and foothill grasslands and sometimes in vernal pools (328'–3,281').	April–June	Potential-there is suitable habitat present onsite.

Table 4. Potentially Occurring Special-Status Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Sacramento Orcutt grass *(Orcuttia viscida)*	FE	CE	1B.1	Vernal pools (98'–328').	April–July	Low potential- No suitable habitat was observed onsite. However, suitable habitat may be present within areas that are inaccessible (i.e. private property).
Layne's ragwort (*Packera layneae*)	FT	CR	1B.2	Rocky serpentinite or gabbroic soil in chaparral and cismontane woodland communities (656'–3,560').	April–August	Absent-there is no suitable habitat onsite.
Sanford's arrowhead *(Sagittaria sanfordii)*	–	–	1B.2	Shallow marshes and freshwater swamps (0'–2,133').	May–October	Potential-there is suitable habitat present onsite.
Oval-leaved viburnum *(Viburnum ellipticum)*	–	–	2B.3	Chaparral, cismontane woodland, and lower montane coniferous forest communities (705'–4,593').	May–June	Absent-outside of elevational range.
Brazilian watermeal *(Wolffia brasiliensis)*	–	–	2B.3	Assorted shallow freshwater marshes and swamps (66'–328').	April–December	Potential-there is suitable habitat present onsite.
El Dorado County mule ears *(Wyethia reticulata)*	–	–	1B.2	Clay or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest communities (607'–2,067').	April–August	Absent-outside of geographic range.
Invertebrates						
Conservancy fairy shrimp (*Branchinecta conservatio)*	FE	-	PCCP	Vernal pools/wetlands.	November-April	Absent-The PCCP does not model habitat for this species due to its highly restricted distribution in Placer County. There are no vernal pool grasslands mapped onsite.

Table 4. Potentially Occurring Special-Status Species						
Common Name (Scientific Name)	Status: ESA	Status: CESA/ NPPA	Status: Other	Habitat Description	Survey Period	Potential To Occur On-Site
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	-	PCCP	Vernal pools/wetlands.	November-April	Absent-The PCCP modeled habitat for this species is vernal pool grassland complex, which is not present onsite.
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	-	PCCP	Elderberry shrubs.	Any season	Potential-The PCCP modeled habitat for this species is defined as valley oak woodland and riverine/riparian below 650 feet msl. PCCP modeled habitat is present onsite.
Vernal pool tadpole shrimp (*Lepidurus packardi*)	FE	-	PCCP	Vernal pools/wetlands.	November-April	Absent-The PCCP modeled habitat for this species is vernal pool grassland complex, which is not present onsite.
Fish						
Delta smelt (*Hypomesus transpacificus*)	FT	CE	-	Sacramento-San Joaquin delta.	N/A	Absent-the Project is not located in the Delta.
Chinook salmon (Central Valley fall/late fall-run ESU) (*Oncorhynchus tshawytscha*)	-	-	NMFS, SSC, PCCP	Anadromous; undammed cold-water rivers and streams having riffles with large gravel substrates and relatively deep pools.	N/A	Present (CDFW 2015; Helix 2019)
Chinook salmon (Central Valley spring-run ESU) (*Oncorhynchus tshawytscha*)	FT	CT	-	Anadromous; undammed cold-water rivers and streams having riffles with large gravel substrates and relatively deep pools.	N/A	Absent-this ESU does not occur on Auburn Ravine.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Steelhead (CA Central Valley DPS) (*Oncorhynchus mykiss*)	FT	-	PCCP	Anadromous; undammed cold-water rivers and streams having riffles with gravel substrates and relatively deep pools.	N/A	Present (Helix 2020)
Pacific lamprey (*Lampetra tridentata*)			SSC	Anadromous; undammed streams rivers, streams, and creeks with gravel spawning substrates.	N/A	Present
Amphibians						
California red-legged frog (*Rana draytonii*)	FT	-	SSC, PCCP	Lowlands or foothills at waters with dense shrubby or emergent riparian vegetation. Adults must have aestivation habitat to endure summer dry down.	May 1-November 1	Potential-PCCP modeled breeding habitat is defined by the following land-cover types: lacustrine (excluding the largest reservoirs such as Camp Far West, Folsom), fresh emergent wetlands, seasonal wetlands, riverine, valley foothill riparian, stock ponds, urban riparian, and urban wetland at elevations above 200 feet. PCCP modeled breeding habitat is present onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Foothill yellow-legged frog *Northeast/Northern Sierra Clade* (*Rana boylii*)	-	CT	SSC, PCCP	Foothill yellow-legged frogs can be active all year in warmer locations but may become inactive or hibernate in colder climates. At lower elevations, foothill yellow-legged frogs likely spend most of the year in or near streams. Adult frogs, primarily males, will gather along main-stem rivers during spring to breed. *Sutter County and the following watershed subbasins in Nevada, Placer, Sierra, and Yuba counties: Lower American, North Fork American, Upper Bear, Upper Coon-Upper Auburn, and Upper Yuba.*	May - October	Absent-PCCP modeled year-round habitat for foothill yellow-legged frog is defined by riverine land-cover above 500 feet in elevation. The Study Area is situated below 500 feet in elevation.
Western spadefoot (*Spea hammondii*)	-	-	SSC	California endemic species of vernal pools, swales, wetlands and adjacent grasslands throughout the Central Valley.	March-May	Potential-ephemeral wetlands onsite represent suitable aquatic habitat.

Table 4. Potentially Occurring Special-Status Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Reptiles						
Blainville's ("Coast") horned lizard (*Phrynosoma blainvillii*)	-	-	SSC	Formerly a wide-spread horned lizard found in a wide variety of habitats, often in lower elevation areas with sandy washes and scattered low bushes. Also occurs in Sierra Nevada foothills. Requires open areas for basking, but with bushes or grass clumps for cover, patches of loamy soil or sand for burrowing and an abundance of ants (Stebbins and McGinnis 2012).). In the northern Sacramento area, this species appears restricted to the foothills between 1000 to 3000 feet from Cameron Park (El Dorado County) north and west to Grass Valley and Nevada City.	Apr-Oct	Low Potential- grassland habitat onsite represents marginally suitable habitat.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Giant garter snake (*Thamnophis gigas*)	FT	CT	PCCP	Freshwater ditches, sloughs, and marshes in the Central Valley. Almost extirpated from the southern parts of its range.	April-October	Absent-PCCP modeled aquatic habitat includes the following land-cover types below 100 feet in elevation: ponds, fresh emergent marsh, flooded rice, and riverine (only smaller, low-gradient streams, tributaries, and canals) and modeled upland habitat includes the following land-cover types below 100 foot elevation and within 200 feet of the edge of wetland habitats: annual grassland, pasture, alfalfa, irrigated pasture, unidentified croplands, vernal pool complex, and row crop The entire Study Area is situated above 100 feet in elevation.

Table 4. Potentially Occurring Special-Status Species						
	Status					
Common Name (Scientific Name)	ESA	CESA/ NPPA	Other	Habitat Description	Survey Period	Potential To Occur On-Site
Northwestern pond turtle (*Actinemys marmorata*)	-	-	SSC, PCCP	Requires basking sites and upland habitats up to 0.5 km from water for egg laying. Uses ponds, streams, detention basins, and irrigation ditches.	April-September	Potential-PCCP modeled aquatic habitat is defined by fresh emergent wetlands, seasonal wetland, riverine/riparian, and ponds and nesting habitat (nesting, burrowing habitat) is defined as any land cover type within 150 feet of aquatic habitat, except for urban/suburban, rural residential, agricultural types, barren, and disturbed land cover types. PCCP modeled aquatic and upland nesting habitat is present onsite.
Birds						
Clark's grebe *(Aechmophorus clarkii)*	-	-	BCC	Winters on salt or brackish bays, estuaries, sheltered sea coasts, freshwater lakes, and rivers. Breeds on freshwater to brackish marshes, lakes, reservoirs and ponds, with a preference for large stretches of open water fringed with emergent vegetation.	June-August (breeding)	Absent-there is no suitable nesting or foraging habitat onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status: ESA	Status: CESA/ NPPA	Status: Other	Habitat Description	Survey Period	Potential To Occur On-Site
Rufous hummingbird *(Selasphorus rufus)*	-	-	BCC	Breeds in British Columbia and Alaska (does not breed in California). Winters in coastal Southern California south into Mexico. Common migrant during March-April in Sierra Nevada foothills and June-August in Lower Conifer to Alpine zone of Sierra Nevada. Nesting habitat includes secondary succession communities and openings, mature forests, parks and residential area.	April-July	Absent-this species does not nest in this region.
California black rail (*Laterallus jamaicensis coturniculus*)	-	CT	BCC, CFP, PCCP	Salt marsh, shallow freshwater marsh, wet meadows, and flooded grassy vegetation. In California, primarily found in coastal and Bay-Delta communities, but also in Sierran foothills (Butte, Yuba, Nevada, Placer, El Dorado counties)	March-September (breeding)	Absent-PCCP modeled habitat is defined as fresh emergent wetlands greater than 0.2 acres in the PCCP Plan Area. There is no modeled habitat within the Study Area.
Whimbrel *(Numenius phaeopus)*	-	-	BCC	Nesting occurs in Alaska and northern Canada; winters in coastal Oregon, California, south to Central America; wintering habitat includes tidal mudflats, coral reefs, lagoons, marshes, swamps, estuaries, sandy beaches, and rocky shores.	October-March	Absent-this species does not nest in the region and there is no wintering or foraging habitat onsite.

Table 4. Potentially Occurring Special-Status Species						
	Status					
Common Name (Scientific Name)	ESA	CESA/ NPPA	Other	Habitat Description	Survey Period	Potential To Occur On-Site
Long-billed curlew (*Numenius americanus*)	-	-	BCC	Breeds east of the Cascades in Washington, Oregon, northeastern California (Siskiyou, Modoc, Lassen counties), east-central California (Inyo County), through Great Basin region into Great Plains. Winters in California, Texas, and Louisiana. Wintering habitat includes tidal mudflats and estuaries, wet pastures, sandy beaches, salt marsh, managed wetlands, evaporation ponds, sewage ponds, and grasslands.	September-March (wintering)	Absent-this species does not nest in the region and there is no wintering or foraging habitat onsite.
Marbled godwit (*Limosa fedoa*)	-	-	BCC	Nests in Montana, North and South Dakota, Minnesota, into Canada. Winter range along Pacific Coast from British Columbia south to Central America, with small numbers wintering in interior California. Wintering habitat includes coastal mudflats, meadows, estuaries, sandy beaches, sandflats, and salt ponds.	August-April (Migrant/Wintering in CA)	Absent-this species does not nest in the region and there is no wintering or foraging habitat onsite.
Short-billed Dowitcher *(Limnodromus griseus)*	-	-	BCC	Nests in Canada, southern Alaska; winters in coastal California south to South America; wintering habitat includes coastal mudflats and brackish lagoons	wintering/migrant period: late-August-May	Absent-this species does not nest in the region and there is no wintering or foraging habitat onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Willet (*Tringa semipalmata*)	-	-	BCC	Breeds locally in interior of western North America. In California, breeding range includes the Klamath Basin and Modoc Plateau and portions of Mono and possibly Inyo counties. Breeding habitat includes prairies, Breeds in wetlands and grasslands on semiarid plains; in uplands near brackish or saline wetlands; prefers temporary, seasonal, and alkali wetlands over semipermanent and permanent wetlands.	April-August	Absent-this species does not nest in the region and there is no wintering or foraging habitat onsite.
Great blue heron (*Ardea herodias*)	-	-	CNDDB *	Colonial nester; prefers to nest in vegetation on islands or in swamps but may also be found in upland habitats in trees, bushes, on the ground and on artificial structures. Foraging habitat is widely diverse and includes swamps, coastlines, estuaries, beaches, pastures, cultivated fields, and riparian areas.	February-July	Absent-there are no rookeries (nesting colonies) located within the Project Area.
White-tailed kite (*Elanus leucurus*)	-	-	CFP	Nesting occurs within trees in low elevation grassland, agricultural, wetland, oak woodland, riparian, savannah, and urban habitats.	March-August	Potential-trees found throughout the Project Area represent potential nesting habitat.

Table 4. Potentially Occurring Special-Status Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Golden eagle (*Aquila chrysaetos*)	-	-	BCC, CFP	Nesting habitat includes mountainous canyon land, rimrock terrain of open desert and grasslands, riparian, oak woodland/savannah, and chaparral. Nesting occurs on cliff ledges, river banks, trees, and human-made structures (e.g. windmills, platforms, and transmission towers). Breeding occurs throughout California, except the immediate coast, Central Valley floor, Salton Sea region, and the Colorado River region, where they can be found during Winter.	Nest (February-August); winter CV (October-February)	Absent-there is no nesting or foraging habitat onsite.
Cooper's hawk *(Accipiter cooperii)*	-	-	CDFW WL	Nests in trees in riparian woodlands in deciduous, mixed and evergreen forests, as well as urban landscapes	March-July	Potential-trees found throughout the Project Area represent potential nesting habitat.
Bald eagle (*Haliaeetus leucocephalus*)	De-listed	CE	CFP, BCC	Typically nests in forested areas near large bodies of water in the northern half of California; nest in trees and rarely on cliffs; wintering habitat includes forest and woodland communities near water bodies (e.g. rivers, lakes), wetlands, flooded agricultural fields, open grasslands	February – September (nesting); October-March (wintering)	Absent-there is no nesting or foraging habitat onsite.

Table 4. Potentially Occurring Special-Status Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Swainson's hawk (*Buteo swainsoni*)	-	CT	BCC, PCCP	Nesting occurs in trees in agricultural, riparian, oak woodland, scrub, and urban landscapes. Forages over grassland, agricultural lands, particularly during disking/harvesting, irrigated pastures	March-August	Potential-PCCP modeled nesting habitat includes riverine/riparian, valley oak woodland, and eucalyptus land-cover types in the Valley floor below 200 feet elevation, and foraging habitat is defined by vernal pool complex, annual grassland, pasture, alfalfa, irrigated pasture and row crop land-cover types below 200 feet elevation.
Burrowing owl *(Athene cunicularia)*	-	-	BCC, SSC, PCCP	Nests in burrows or burrow surrogates in open, treeless, areas within grassland, steppe, and desert biomes. Often with other burrowing mammals (e.g. prairie dogs, California ground squirrels). May also use human-made habitat such as agricultural fields, golf courses, cemeteries, roadside, airports, vacant urban lots, and fairgrounds.	February-August	Potential-PCCP modeled overwintering and nesting habitat includes these habitats within the western portion of the PCCP Plan Area below 200 feet in elevation: valley oak woodland, oak woodland savanna, vernal pool complex, annual grassland, alfalfa, pasture, and cropland. PCCP modeled habitat is present onsite.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Lewis' woodpecker (*Melanerpes lewis*)	-	-	BCC	In California, breeds in Siskiyou and Modoc Counties, Warmer Mountains, inner coast ranges from Tehama to San Luis Obispo Counties, San Bernardino Mountains, and Big Pine Mountain (Inyo County); nesting habitat includes open ponderosa pine forest, open riparian woodland, logged/burned forest, and oak woodlands. Does not breed on the west side of Sierran crest (Beedy and Pandalfino 2013).	April-September (breeding); September-March (winter in Central Valley).	Absent-this species does not nest in the region but this species could rarely overwinter in the woodlands onsite.
Nuttall's woodpecker *(Dryobates nuttallii)*	-	-	BCC	Resident from northern California south to Baja California. Nests in tree cavities in oak woodlands and riparian woodlands.	April-July	Potential-trees found throughout the Project Area represent potential nesting habitat.
Loggerhead shrike (*Lanius ludovicianus*)	-	-	BCC, SSC	Found throughout California in open country with short vegetation, pastures, old orchards, grasslands, agricultural areas, open woodlands. Not found in heavily forested habitats.	March-July	Potential-trees and shrubs found adjacent to grassland and pastures within the Project Area represent potential nesting habitat.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
Yellow-billed magpie (*Pica nuttallii*)	-	-	BCC	Endemic to California; found in the Central Valley and coast range south of San Francisco Bay and north of Los Angeles County; nesting habitat includes oak savannah with large in large expanses of open ground; also found in urban parklike settings.	April-June	Potential-trees found throughout the Project Area represent potential nesting habitat.
Oak titmouse (*Baeolophus inornatus*)			BCC	Nests in tree cavities within dry oak or oak-pine woodland and riparian; where oaks are absent, they nest in juniper woodland, open forests (gray, Jeffrey, Coulter, pinyon pines and Joshua tree)	March-July	Potential-trees found throughout the Project Area represent potential nesting habitat.
Wrentit (*Chamaea fasciata*)	-	-	BCC	Coastal sage scrub, northern coastal scrub, chaparral, dense understory of riparian woodlands, riparian scrub, coyote brush and blackberry thickets, and dense thickets in suburban parks and gardens.	March-August	Low Potential-isolated patches of dense scrub in the oak woodland and riparian understories onsite represent marginal nesting habitat.
California thrasher (*Toxostoma redivivum*)	-	-	BCC	Resident and endemic to coastal and Sierra Nevada-Cascade foothill areas of California. Nests are usually well hidden in dense shrubs, including scrub oak, California lilac, and chamise.	February-July	Absent-there is no nesting habitat onsite.
Song sparrow "Modesto" (*Melospiza melodia heermanni*)	-	-	BCC, SSC	Resident in central and southwest California, including Central Valley; nests in marsh, scrub habitat	April-June	Low Potential-isolated patches of dense scrub in the riparian understory onsite represent marginal nesting habitat.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential To Occur On-Site
	ESA	CESA/ NPPA	Other			
San Clemente spotted towhee (*Pipilo maculatus clementae*)	-	-	BCC, SSC	Resident on Santa Catalina and Santa Rosa Islands; extirpated on San Clemente Island, California. Breeds in dense, broadleaf shrubby brush, thickets, and tangles in chaparral, oak woodland, island woodland, and Bishop pine forest.	Year-round resident; breeding season is April-July	Absent-this subspecies is only found on the Channel Islands.
Tricolored blackbird (*Agelaius tricolor*)	-	CT	BCC, SSC, PCCP	Breeds locally west of Cascade-Sierra Nevada and southeastern deserts from Humboldt and Shasta Cos south to San Bernardino, Riverside and San Diego Counties. Central California, Sierra Nevada foothills and Central Valley, Siskiyou, Modoc and Lassen Counties. Nests colonially in freshwater marsh, blackberry bramble, milk thistle, triticale fields, weedy (mustard, mallow) fields, giant cane, safflower, stinging nettles, tamarisk, riparian scrublands and forests, fiddleneck and fava bean fields.	March-August	Potential-PCCP modeled nesting habitat includes the marsh complex land cover type below 300 feet elevation and modeled foraging habitat includes open cover below 300 foot elevation which is mapped as vernal pool complex, annual grassland, pasture, alfalfa, and cropland. There is no modeled nesting habitat, but blackberry brambles are present, which could represent potential nesting habitat onsite. In addition, modeled foraging habitat is present onsite.
Saltmarsh common yellowthroat (*Geothlypis trichas sinuosa*)	-	-	BCC, SSC	Breeds in salt marshes of San Francisco Bay; winters San Francisco south along coast to San Diego County.	March-July	Absent-this subspecies is only found coastal salt marsh habitat.

Table 4. Potentially Occurring Special-Status Species

Common Name (Scientific Name)	Status: ESA	Status: CESA/ NPPA	Status: Other	Habitat Description	Survey Period	Potential To Occur On-Site
Mammals						
Townsend's big-eared bat *(Corynorhinus townsendii)*	-	-	SSC	Distribution is strongly correlated with the availability of caves and cave-like roosting habitat, including abandoned mines. It has also been reported to utilize buildings, bridges, rock crevices and hollow trees as roost sites. (WBWG 2020).	April-September	Low potential- there are no caves/mines located in the Project Area, but larger trees may represent potentially suitable roost habitat onsite.
Western red bat (*Lasiurus blossevillii*)	-	-	SSC	Roosts in foliage of trees or shrubs; Day roosts are commonly in edge habitats adjacent to streams or open fields, in orchards, and sometimes in urban areas. There may be an association with intact riparian habitat (particularly willows, cottonwoods, and sycamores).	April-September	Potential-trees throughout the Project represent potentially suitable roost habitat onsite.

Status Codes:

ESA	Federal Endangered Species Act
CESA	California Endangered Species Act
NPPA	California Native Plant Protection Act
FE	FESA listed, Endangered.
FT	FESA listed, Threatened.
BCC	USFWS Bird of Conservation Concern (USFWS 2002).
CE	CESA or NPPA listed, Endangered.
CT	CESA or NPPA-listed, Threatened.
CR	CESA or NPPA listed, Rare.
CFP	California Fish and Game Code Fully Protected Species (§ 3511-birds, § 4700-mammals, §5 050-reptiles/amphibians).
CDFW WL	CDFW Watch List
CNDDB	California Natural Diversity Database
NMFS	NMFS species of concern
PCCP	PCCP covered species
SSC	CDFW Species of Special Concern
1B	CRPR /Rare or Endangered in California and elsewhere.
2B	Plants rare, threatened, or endangered in California but more common elsewhere.
3	CRPR /Plants About Which More Information is Needed – A Review List
4	CRPR/Plants of Limited Distribution – A Watch List.
0.1	Threat Rank/Seriously threatened in California (over 80 percent of occurrences threatened / high degree and immediacy of threat)
0.2	Threat Rank/Moderately threatened in California (20-80 percent occurrences threatened / moderate degree and immediacy of threat)
0.3	Threat Rank/ Not very threatened in California (less than 20 percent of occurrences threatened / low degree and immediacy of threat or no current threats known)

4.4.1 Plants

Thirty-one special-status plant species were identified as having the potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and site reconnaissance, 12 species were determined to be absent from the Project Area due to the lack of suitable habitat. No further discussion of those species is provided in this assessment. Brief descriptions of the 19 special-status plants with the potential to occur within the Project Area is presented in the following sections.

A determinate-level survey for "late-season" special-status plants was conducted on June 28 and 29, 2020. The target species for this survey included Mexican mosquito fern (*Azolla microphylla*), big-scale balsamroot (*Balsamorhiza macrolepis*), hispid bird's-beak (*Chloropyron molle* ssp. *hispidum*), Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeeae*), stinkbells (*Fritillaria agrestis*), Butte County fritillary (*Fritillaria eastwoodiae*), Boggs Lake hedge-hyssop (*Gratiola heterosepala*), Red bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*), legenere (*Legenere limosa*), Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*), adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*), Sacramento Orcutt grass (*Orcuttia viscida*), Sanford's arrowhead (*Sagittaria sanfordii*), and Brazilian watermeal (*Wolffia brasiliensis*). None of these target species or any other special-status plants were found during these surveys. An "early-season" survey is scheduled to occur during the spring 2021 to target the remaining potentially-occurring special-status plants (e.g. Valley brodiaea [*Brodiaea rosea* ssp. *vallicola*], dwarf downingia [*Downingia pusilla*], Butte County fritillary (*Fritillaria eastwoodiae*), Ahart's dwarf rush [*Juncus leiospermus* var. *ahartii*], dubious pea [*Lathyrus sulphureus* var. *argillaceus*], and pincushion navarretia [*Navarretia myersii* ssp. *myersii*].

Mexican Mosquito Fern

Mexican mosquito fern is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 4.2 species. This species is an herbaceous annual/perennial that occurs in marshes and swamps (e.g., ponds and slow-moving water) (CNPS 2020). Mexican mosquito fern blooms in August and is known to occur at elevations ranging from 98 to 328 feet above MSL (CNPS 2020). The current range for Mexican mosquito fern in California includes Butte, Colusa, Glenn, Inyo, Kern, Lake, Modoc, Nevada, Plumas, San Bernardino, Santa Clara, San Diego, and Tulare counties (CNPS 2020).

There are no documented CNDDB occurrence of Mexican mosquito fern within five miles of the Project Area (CDFW 2020a). Some of the seasonal wetland swales and ephemeral drainages onsite provide suitable habitat for this species. Therefore, Mexican mosquito fern has potential to occur within the Project Area.

Big-scale Balsamroot

Big-scale balsamroot is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 1B.2 species. This species is an herbaceous perennial that occurs in chaparral, cismontane woodlands, valley and foothill grassland, and occasionally on serpentinite soils (CNPS 2020). Big-scale balsamroot blooms from March through June and is known to occur at elevations ranging from 148 to 5,102 feet above MSL (CNPS 2020). Big-scale balsamroot is endemic to California; the current range of this species includes Alameda, Amador, Butte, Colusa, El Dorado, Lake, Mariposa, Napa, Placer, Santa Clara, Shasta, Solano, Sonoma, Tehama, and Tuolumne counties (CNPS 2020).

There is one documented CNDDB occurrence of big-scale balsam root within five miles of the Project Area (CDFW 2020a). The grassland and woodlands onsite provide suitable habitat for this species. Therefore, big-scale balsamroot has potential to occur within the Project Area.

Valley Brodiaea

Valley brodiaea is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 4.2 species. This species is a bulbiferous perennial herb that occurs in old alluvial terraces and silty, sandy, or gravelly soils in vernal pools, swales, and valley and foothill grassland (CNPS 2020). Valley brodiaea blooms from April through May and is known to occur at elevations ranging from 33 to 1,100 feet above MSL (CNPS 2020). Valley brodiaea is endemic to California; the current range of this species includes Butte, Calaveras, Nevada, Placer, Sacramento, San Joaquin, Sutter, and Yuba counties (CNPS 2020).

There are no documented CNDDB occurrences of Valley brodiaea within five miles of the Project Area (CDFW 2020a). The seasonal wetland and seasonal wetland swales onsite provide suitable habitat for this species. Therefore, Valley brodiaea has potential to occur within the Project Area.

Hispid Bird’s-beak

Hispid bird’s-beak is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 1B.1 species. This species is an herbaceous, hemiparasite annual that occurs on alkaline soils in meadows and seeps, playas, and valley and foothill grasslands. Hispid bird’s-beak blooms from June through September and is known to occur at elevations ranging from three feet to 509 feet above MSL (CNPS 2020). Hispid bird’s-beak is endemic to California; the current range of this species includes Alameda, Fresno, Kern, Merced, Placer, and Solano counties (CNPS 2020).

There is one documented CNDDB occurrence of hispid bird’s-beak within five miles of the Project Area (CDFW 2020a). There is no suitable habitat onsite. However, marginal habitat may be present within areas that were inaccessible (i.e. private property). Therefore, hispid bird’s-beak has low potential to occur within the Project Area.

Brandegee’s Clarkia

Brandegee’s clarkia is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 4.2 plant. This species is an herbaceous annual that occurs in chaparral, cismontane woodlands, and lower montane coniferous forest often along roadcuts (CNPS 2020). Brandegee’s clarkia blooms from May through July and is known to occur at elevations ranging from 246 to 3,002 feet above MSL (CNPS 2020). Brandegee’s clarkia is endemic to California, and the current range of this species includes Butte, El Dorado, Nevada, Placer, Sacramento, Sierra, and Yuba counties (CNPS 2020).

There are no documented CNDDB occurrences of Brandegee’s clarkia within five miles of the Project Area (CDFW 2020a). The woodlands onsite provide marginally suitable habitat for this species. Therefore, Brandegee’s clarkia has low potential to occur within the Project Area.

Dwarf Downingia

Dwarf downingia is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 2B.2 species. This species is an herbaceous annual that occurs in vernal pools and mesic areas in valley and foothill grasslands (CNPS 2020). Dwarf downingia also appears to have an affinity for slight disturbance since it has been found in manmade features such as tire ruts, scraped depressions, stock ponds, and roadside ditches (Baldwin et al. 2012, CDFW 2020a). This species blooms from March through May and is known to occur at elevations ranging from 3 to 1,460 feet above MSL (CNPS 2020). The current range of this species in California includes Amador, Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties (CNPS 2020).

There are six documented CNDDB occurrence of dwarf downingia within five miles of the Project Area (CDFW 2020a). The seasonal wetland, seasonal wetlands swales, and ephemeral drainages onsite provide suitable habitat for this species. Therefore, dwarf downingia has potential to occur within the Project Area.

Stinkbells

Stinkbells is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is a perennial bulbiferous herb that occurs in clay, sometimes serpentinite areas in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (CNPS 2020). Stinkbells bloom from March to June and is known to occur at elevations ranging from 33 to 5,102 feet above MSL (CNPS 2020). This species is endemic to California; its current range includes Alameda, Contra Costa, Fresno, Kern, Mendocino, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Stanislaus, Tuolumne, Ventura, and Yuba counties, and is considered to be extirpated from Santa Cruz and San Mateo counties (CNPS 2020).

There are no documented CNDDB occurrences of stinkbells within five miles of the Project Area (CDFW 2020a). The grasslands and woodlands onsite provide marginally suitable habitat for this species. Therefore, stinkbells has low potential to occur within the Project Area.

Butte County Fritillary

Butte County fritillary is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 3.2 species. This species is an herbaceous bulbiferous perennial that occurs in chaparral, cismontane woodland, and lower montane coniferous forest, and is occasionally found on serpentinite soils (CNPS 2020). Butte County fritillary blooms from March to June and is known to occur at elevations ranging from 164 to 4,921 feet above MSL (CNPS 2020). The current range of this species in California includes Butte, El Dorado, Nevada, Placer, Plumas, Shasta, Tehama, and Yuba counties (CNPS 2020).

There are no documented CNDDB occurrences of Butte County fritillary within five miles of the Project Area (CDFW 2020a). The woodlands onsite provide marginally suitable habitat for this species. Therefore, Butte County fritillary has low potential to occur within the Project Area.

Boggs Lake Hedge-hyssop

Boggs Lake hedge-hyssop is not listed pursuant to the federal ESA, is listed as endangered pursuant to the California ESA, and is designated as a CRPR 1B.2 species. This species is an herbaceous annual that occurs in clay in marshes and swamps (lake margins), and vernal pools (CNPS 2020). Boggs Lake hedge-hyssop blooms from April through August and is known to occur at elevations ranging from 33 to 7,792 feet above MSL (CNPS 2020). The current range of this species in California includes Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Sonoma, and Tehama counties (CNPS 2020).

There is one documented CNDDB occurrence of Boggs Lake hedge-hyssop within five miles of the Project Area (CDFW 2020a). The seasonal wetland and seasonal wetland swales onsite provide suitable habitat for this species. Therefore, Boggs Lake hedge-hyssop has potential to occur within the Project Area.

Ahart's Dwarf Rush

Ahart's dwarf rush is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 1B.2 species. This species is an herbaceous annual that occurs in mesic areas in valley and foothill grasslands (CNPS 2020). This species also appears to have an affinity for slight disturbance since it has been found on farmed fields and gopher turnings (USFWS 2005). Ahart's dwarf rush blooms from March through May and is known to occur at elevations ranging from 98 to 751 feet above MSL (CNPS 2020; USFWS 2005). Ahart's dwarf rush is endemic to California; the current range of this species includes Butte, Calaveras, Placer, Sacramento, Tehama, and Yuba counties (CNPS 2020).

There is one documented CNDDB occurrence of Ahart's dwarf rush within five miles of the Project Area (CDFW 2020a). The seasonal wetland and seasonal wetland swales onsite provide suitable habitat for this species. Therefore, Ahart's dwarf rush has potential to occur within the Project Area.

Red Bluff Dwarf Rush

Red Bluff dwarf rush is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 1B.1 species. This species is an herbaceous annual that occurs in vernally mesic areas in chaparral, cismontane woodland, meadows, seeps, valley and foothill grasslands, and vernal pools (CNPS 2020). Red Bluff dwarf rush blooms from March through June and is known to occur at elevations ranging from 115 to 4,101 feet above MSL (CNPS 2020). Red Bluff dwarf rush is endemic to California; the current range of this species includes Butte, Placer, Shasta, and Tehama counties (CNPS 2020).

There are no documented CNDDB occurrences of Red Bluff dwarf rush within five miles of the Project Area (CDFW 2020a). The seasonal wetlands and seasonal wetlands swales onsite provide suitable habitat for this species. Therefore, Red Bluff dwarf rush has potential to occur within the Project Area.

Dubious Pea

Dubious pea is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 3 species. This species is an herbaceous perennial that occurs in cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest (CNPS 2020). Dubious pea blooms from April through May and is known to occur at elevations ranging from 492 to 3,051 feet above MSL (CNPS 2020). Dubious pea is endemic to California; the current range of this species includes Calaveras, El Dorado, Nevada (distribution or identity is uncertain), Placer, Shasta, and Tehama counties (CNPS 2020).

There are no documented CNDDB occurrences of dubious pea within five miles of the Project Area (CDFW 2020a). The woodlands onsite provide marginally suitable habitat for this species. Therefore, dubious pea has low potential to occur within the Project Area.

Legenere

Legenere is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 1B.1 species (CNPS 2020). This species is an herbaceous annual that occurs in a variety of seasonally inundated environments including wetlands, wetland swales, marshes, vernal pools, artificial ponds, and floodplains of intermittent drainages (USFWS 2005). Legenere blooms from April through June and is known to occur at elevations ranging from 3 feet to 2,887 feet above MSL (CNPS 2020). Legenere is endemic to California; the current range of this species includes Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, San Joaquin, Shasta, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties; is believed to be extirpated from Stanislaus County (CNPS 2020).

There are three documented CNDDB occurrence of legenere within five miles of the Project Area (CDFW 2020a). The seasonal wetland seasonal wetlands swales onsite provide suitable habitat for this species. Therefore, legenere has potential to occur within the Project Area.

Humboldt Lily

Humboldt lily is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 4.2 species. This species is a perennial bulbiferous herb that occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest (CNPS 2020). Humboldt lily blooms from May through August and is known to occur at elevations ranging from 295 to 4,199 feet above MSL (CNPS 2020). Humboldt lily is endemic to California; the current range of this species includes Amador, Butte, Calaveras, El Dorado, Fresno, Mariposa, Nevada, Placer, Tehama, Tuolumne, and Yuba counties (CNPS 2020).

There are no documented CNDDB occurrences of Humboldt lily within five miles of the Project Area (CDFW 2020a). The woodlands onsite provide marginally suitable habitat for this species. Therefore, Humboldt lily has low potential to occur within the Project Area.

Pincushion Navarretia

Pincushion navarretia is not listed pursuant to either the federal or California ESAs but is designated as a CNPS 1B.1 species. This species is an herbaceous annual that occurs in vernal pools that are often acidic (CNPS 2020). Pincushion navarretia blooms in April to May and is known to occur at elevations ranging from 66 to 1,083 feet above MSL (CNPS 2020). Pincushion navarretia is endemic to California; the current range of this species includes Amador, Calaveras, Merced, Placer, and Sacramento counties (CNPS 2020).

There is one documented CNDDB occurrence of pincushion navarretia within five miles of the Project Area (CDFW 2020a). The ditches onsite provide suitable habitat for this species. Therefore, pincushion navarretia has potential to occur within the Project Area.

Adobe Navarretia

Adobe navarretia is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 4.2 species. This species is an herbaceous annual that occurs in clay and sometimes serpentinite substrates in mesic areas in valley and foothill grassland and sometimes in vernal pools (CNPS 2020). Adobe navarretia blooms between April and June and is known to occur at elevations ranging from 328 to 3,281 feet above MSL (CNPS 2020). Adobe navarretia is endemic to California; its current range includes Alameda, Butte, Contra Costa, Colusa, Fresno, Kern, Merced, Monterey, Placer, Sutter, and Tulare counties (CNPS 2020).

There are no documented CNDDB occurrences of adobe navarretia within five miles of the Project Area (CDFW 2020a). The seasonal wetland and seasonal wetland swales onsite provide suitable habitat for this species. Therefore, adobe navarretia has potential to occur within the Project Area.

Sacramento Orcutt Grass

Sacramento Orcutt grass is listed as endangered pursuant to both the federal and California ESAs and is designated as a CRPR 1B.1 species. This species is an herbaceous annual that occurs in vernal pools (CNPS 2020). The median area of occupied pools discovered prior to 1988 was 0.69 acre and ranged from 0.25 to 2.03 acres (USFWS 2005). Sacramento Orcutt grass blooms from April through July and is known to occur at elevations ranging from 98 to 328 feet above MSL (CNPS 2020). Sacramento Orcutt grass is endemic to California and to the southeastern Sacramento Valley (Keeler-Wolf et al. 1998, as cited in USFWS 2005), with all known occurrences restricted to Sacramento County. Known occurrences of this species within the general region are limited to a small area east of Mather Field, Phoenix Field Ecological Reserve, Phoenix Park (introduced population), and an area near Rancho Seco Lake (USFWS 2005).

There are no documented CNDDB occurrences of Sacramento Orcutt grass within five miles of the Project Area (CDFW 2020a). There was no suitable habitat observed onsite, and the larger, deeper vernal pools that this species is typically found in are not expected to be found in this portion of Placer County. However, marginally suitable habitat may be present in private properties that were inaccessible. Therefore, Sacramento Orcutt grass has low potential to occur within the Project Area.

Sanford's Arrowhead

Sanford's arrowhead is not listed pursuant to the federal or California ESAs but is designated as a CRPR 1B.2 species. This species is a perennial rhizomatous herb that occurs in shallow, freshwater marshes and swamps (CNPS 2020). Sanford's arrowhead blooms from May through October and is known to occur at elevations ranging from sea level to 2,133 feet above MSL (CNPS 2020). Sanford's arrowhead is endemic to California; the current range of this species includes Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Marin, Napa, Orange, Placer, Sacramento, San Bernardino, San Joaquin, Shasta, Solano, Tehama, Tulare, Ventura, and Yuba counties; it is believed to be extirpated from both Orange and Ventura counties (CNPS 2020).

There are no documented CNDDB occurrences of Sanford's arrowhead within five miles of the Project Area (CDFW 2020a). Some portions of Auburn Ravine, the canal, and ephemeral drainages onsite provide suitable habitat for this species. Therefore, Sanford's arrowhead has potential to occur within the Project Area.

Brazilian Watermeal

Brazilian watermeal is not listed pursuant to either the federal or California ESA but is designated as a CRPR 2B.3 species. This species is an herbaceous perennial that occurs in assorted shallow freshwater marshes and swamps (CNPS 2020). Brazilian watermeal blooms from April through December and is known to occur at elevations ranging from 66 to 328 feet above MSL (CNPS 2020). The current range for Brazilian watermeal in California includes Butte, Glenn, Sutter and Yuba counties (CNPS 2020).

There are no documented CNDDB occurrences of Brazilian watermeal within five miles of the Project Area (CDFW 2020a). Some portions of Auburn Ravine, the canal, and ephemeral drainages onsite provide suitable habitat for this species. Therefore, Brazilian watermeal has potential to occur within the Project Area.

4.4.2 Invertebrates

Four special-status invertebrate species were identified as having potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and site reconnaissance, three of the species, vernal pool fairy, Conservancy fairy shrimp, and vernal pool tadpole shrimp were determined to be absent due to an absence of PCCP modeled species habitat. No further discussion of these species is provided in this assessment. Brief descriptions of the remaining species with the potential to occur within the Project Area are presented in the following sections.

Valley Elderberry Longhorn Beetle

The valley elderberry longhorn beetle (VELB) is listed as threatened pursuant to the federal ESA (USFWS 1980) and a PCCP Covered Species. The VELB is completely dependent on its larval host plant, elderberry (*Sambucus* species), which occurs in riparian and other woodland and scrub communities (USFWS 1999, 2017). Elderberry plants, located within the range of the beetle, with one or more stems measuring 1.0 inch or greater in diameter at ground level are considered to be habitat for the species (USFWS 1999). The adult flight season extends from late March through July (USFWS 2017). During that time the adults feed on foliage and perhaps flowers, mate, and females lay eggs on living elderberry plants (Barr 1991). The first instar larvae bore into live elderberry stems, where they develop for one to two years feeding on the pith. The fifth instar larvae create exit holes in the stems and then plug the holes and remain in the stems through pupation (Talley et al. 2007). The VELB occurs in metapopulations throughout the Central Valley (Collinge et al. 2001 as cited in USFWS 2017). These metapopulations (subpopulations) occur throughout contiguous riparian habitat which shift temporarily and spatially based on changing environmental conditions. This temporal and spatial shifting of the metapopulations results in a patchy and ever-changing distribution of the species. Research indicates that dense elderberry shrub clumps in healthy riparian habitat is the primary habitat for the VELB (USFWS 2017). The beetle's current distribution extends from Shasta County in the north to Fresno County in the south and includes everything from the valley floor up into the lower foothills (USFWS 2017). The vast majority of VELB occurrences have been recorded below 500 feet (152 meters), however, rare occurrences have been recorded up to approximately 3,000 feet (USFWS 1999, 2017).

There is one documented CNDDB occurrences of VELB within five miles of the Project Area (CDFW 2020a). An elderberry survey was conducted for accessible areas within the Project Area during August and September 2020. There is 55 elderberry shrubs located within the Project Area and accessible portions of the surrounding 165-foot buffer (Figure 5. *Elderberry Shrub Locations*). No exit holes (indicative of VELB occurrence) were observed on the stems of the shrubs. Nevertheless, VELB has potential to occur within the Project Area.

There are no documented CNDDB occurrences of vernal pool tadpole shrimp within five miles of the Project Area (CDFW 2020a). The seasonal wetland and seasonal wetland swales mapped within the Project Area represent potentially suitable habitat for vernal pool fairy shrimp.

4.4.3 Fish

Five special-status fish species were identified as having potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and site reconnaissance, two of these species, delta smelt and Central Valley spring-run salmon ESU were determined to be absent from the Project Area due to the lack of suitable habitat and because the Project Area is outside the known range of the species. No further discussion of these species is provided in this assessment. Brief descriptions of the remaining species with the potential to occur within the Project Area are presented in the following sections.

Chinook Salmon (Central Valley Fall-/Late Fall-run ESU)

Four different ESUs of Chinook salmon have been identified in the Central Valley: (1) fall-run, (2) late fall-run, (3) spring-run, and (4) winter-run. While CDFW recognizes four ESUs, NMFS considers fall-run and late fall-run a combined ESU. The fall-/late fall-run ESU, which is the only ESU occurring in Auburn Ravine, is not listed or protected under either the federal ESA or California ESA but is considered a species of special concern by CDFW and a PCCP covered species. Typical habitat in the Central Valley include freshwater rivers and streams that are tributaries to the Sacramento and San Joaquin River systems as well as the rivers themselves.

Adult fall-run Chinook salmon migrate into the San Joaquin and Sacramento river systems from September through January, with peak immigration occurring in October and November (Moyle 2002). Spawning typically occurs from October through December in shallow riffles, and fry typically begin to emerge in late December and January. Fall-run Chinook salmon varies annually in Auburn Ravine, depending on rainfall and hydrology, and often occurs between mid-October and late December (CDFW 2015; Helix 2019). Fall-run Chinook salmon may emigrate as post-emergent fry, juveniles, or as smolts after rearing in their natal streams for up to six months.

Map Features

Study Area - 98.05 ac.

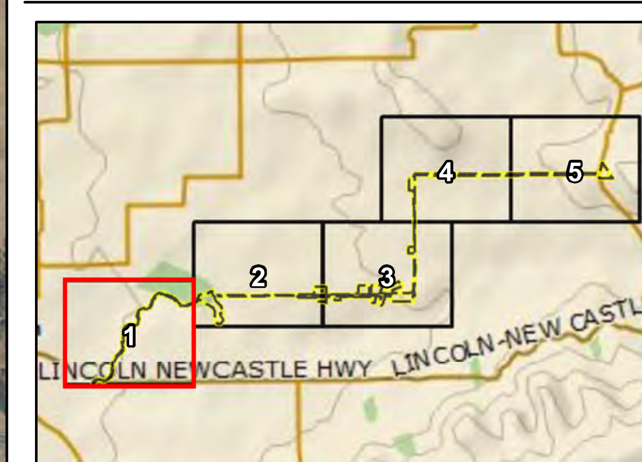
Elderberry shrub locations

Survey Type

Assessment Area Buffer

Survey Area Buffer

Sources: NAIP 2018



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Map Date: 10/29/2020

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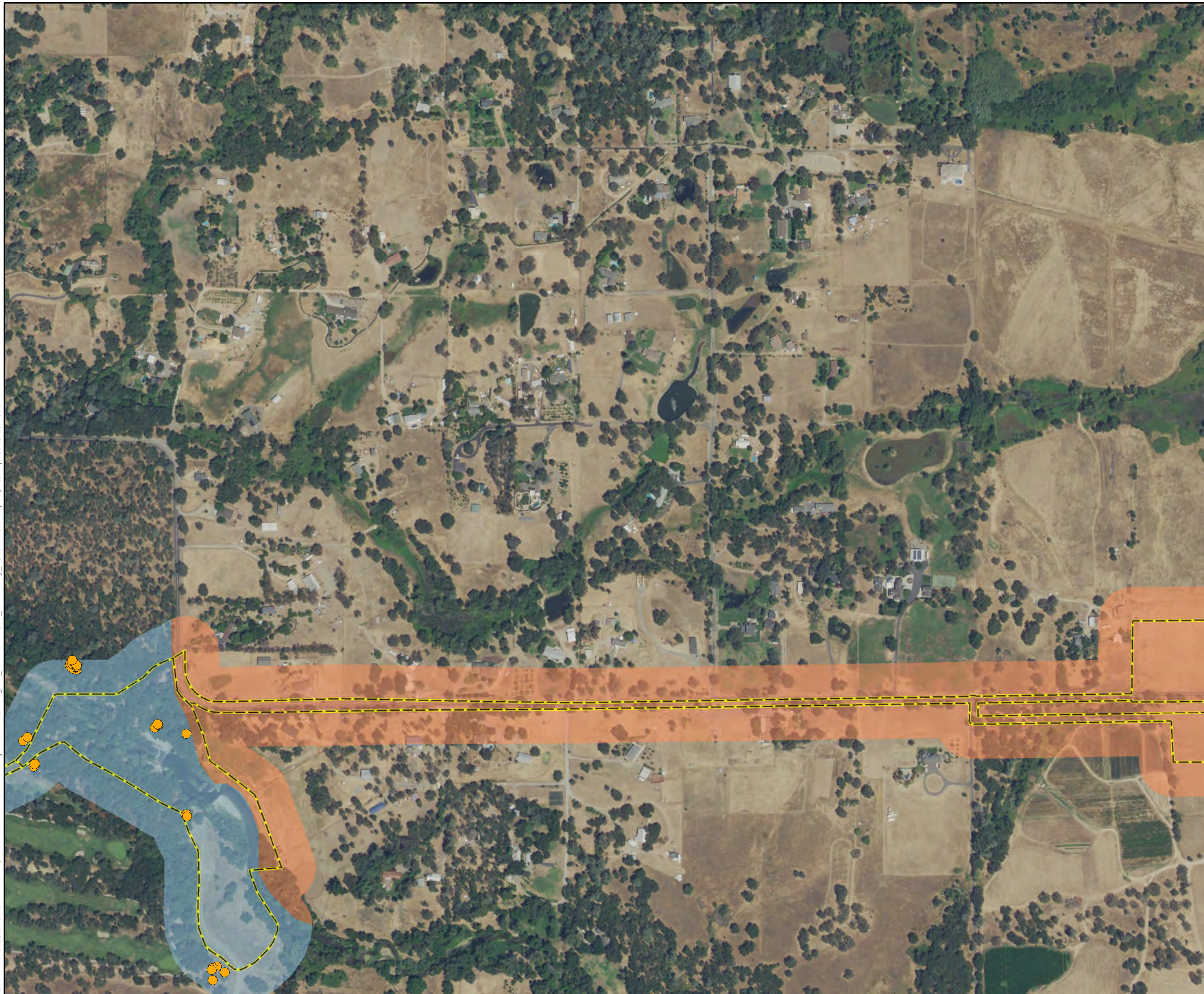
Scale in Feet
0 500

Figure 5. Elderberry Shrub Locations

Sheet 1 of 5

2020-104 NID-Hemphill Diversion Structure Project



Map Features

Study Area - 98.05 ac.

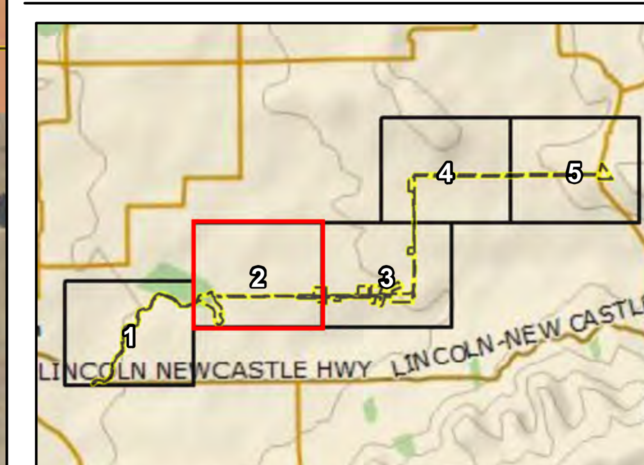
Elderberry shrub locations

Survey Type

Assessment Area Buffer

Survey Area Buffer

Sources: NAIP 2018



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Map Date: 10/29/2020

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Scale in Feet
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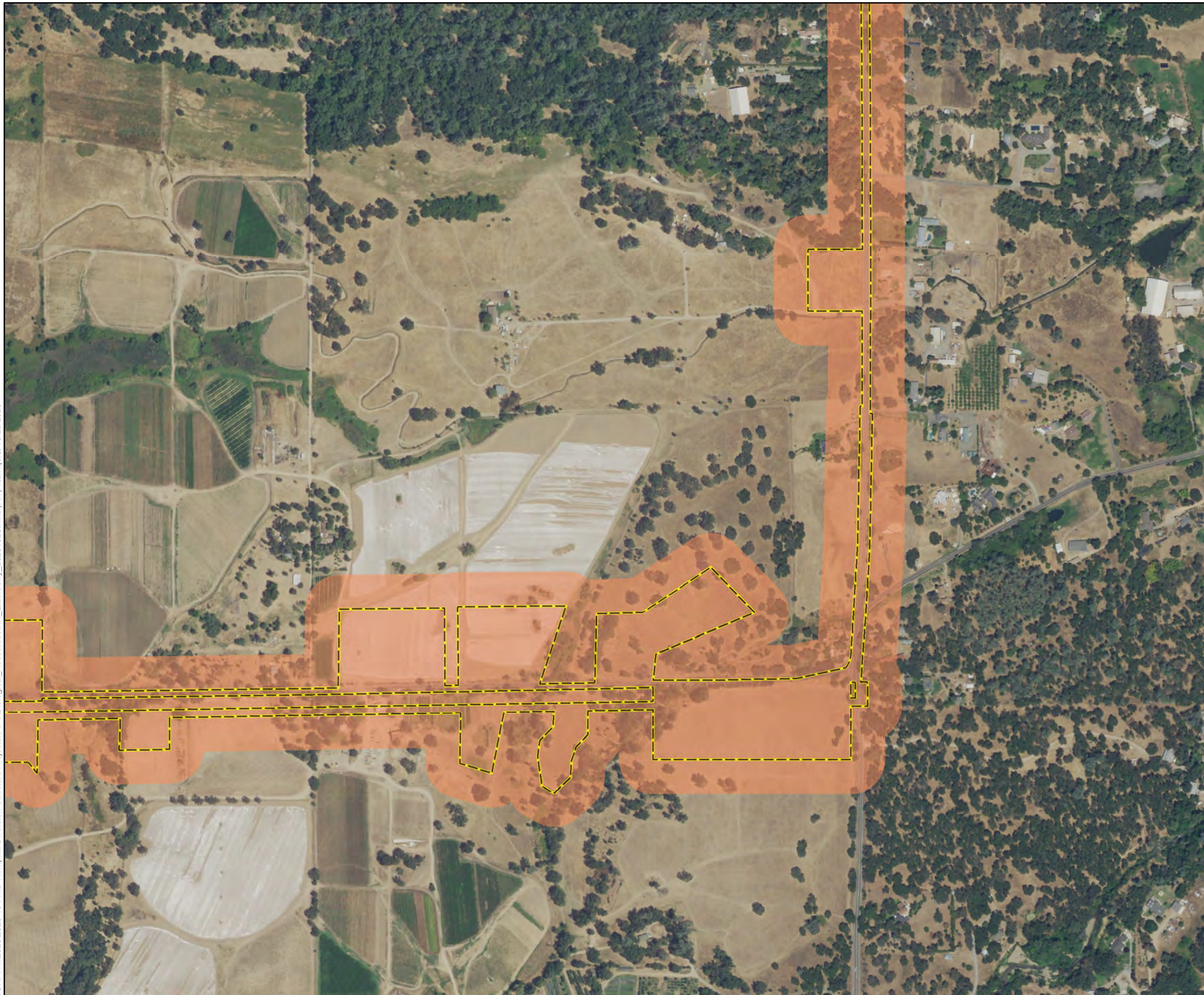
Figure 5. Elderberry Shrub Locations
Sheet 2 of 5

2020-104 NID-Hemphill Diversion Structure Project



Map Features

Study Area - 98.05 ac.

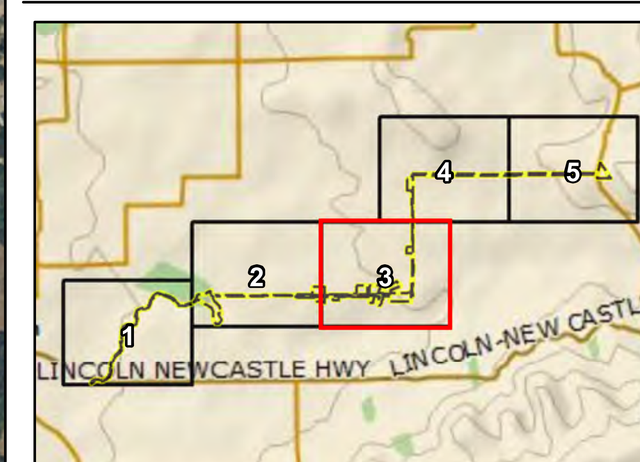
Elderberry shrub locations

Survey Type

Assessment Area Buffer

Survey Area Buffer

Sources: NAIP 2018



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Map Date: 10/29/2020

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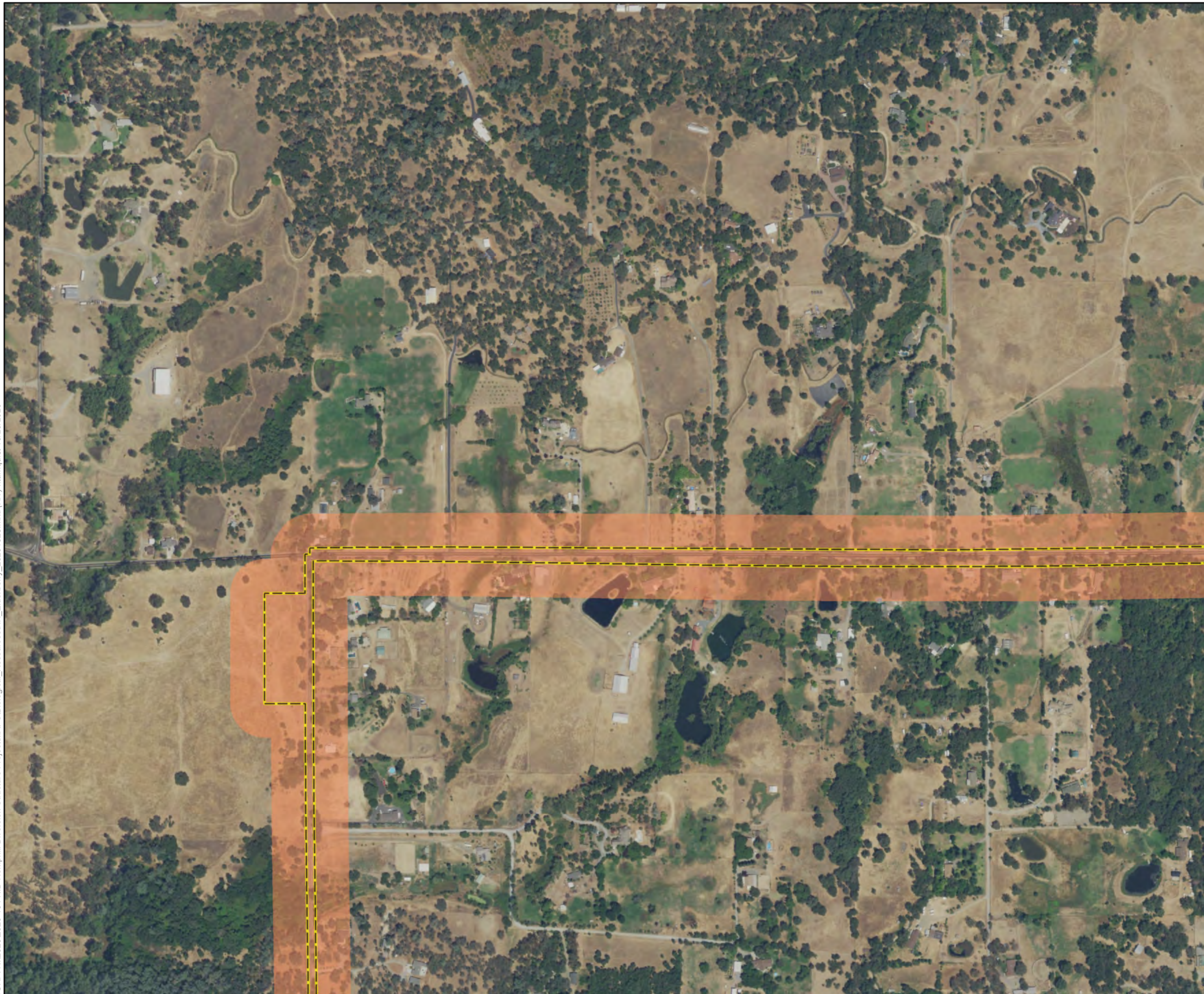
Scale in Feet
0 500

Figure 5. Elderberry Shrub Locations
Sheet 3 of 5
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Study Area - 98.05 ac.

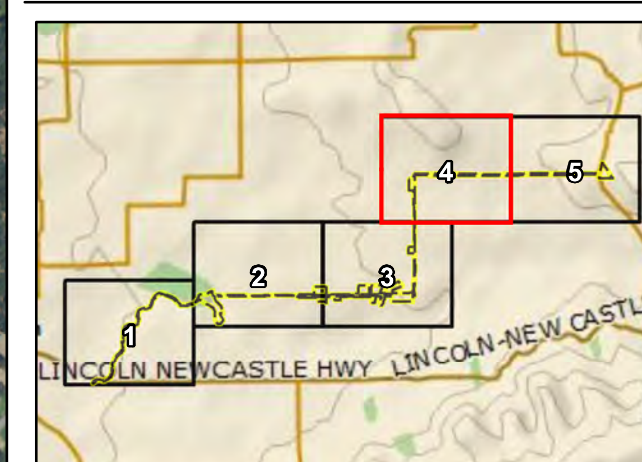
Elderberry shrub locations

Survey Type

Assessment Area Buffer

Survey Area Buffer

Sources: NAIP 2018



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Map Date: 10/29/2020

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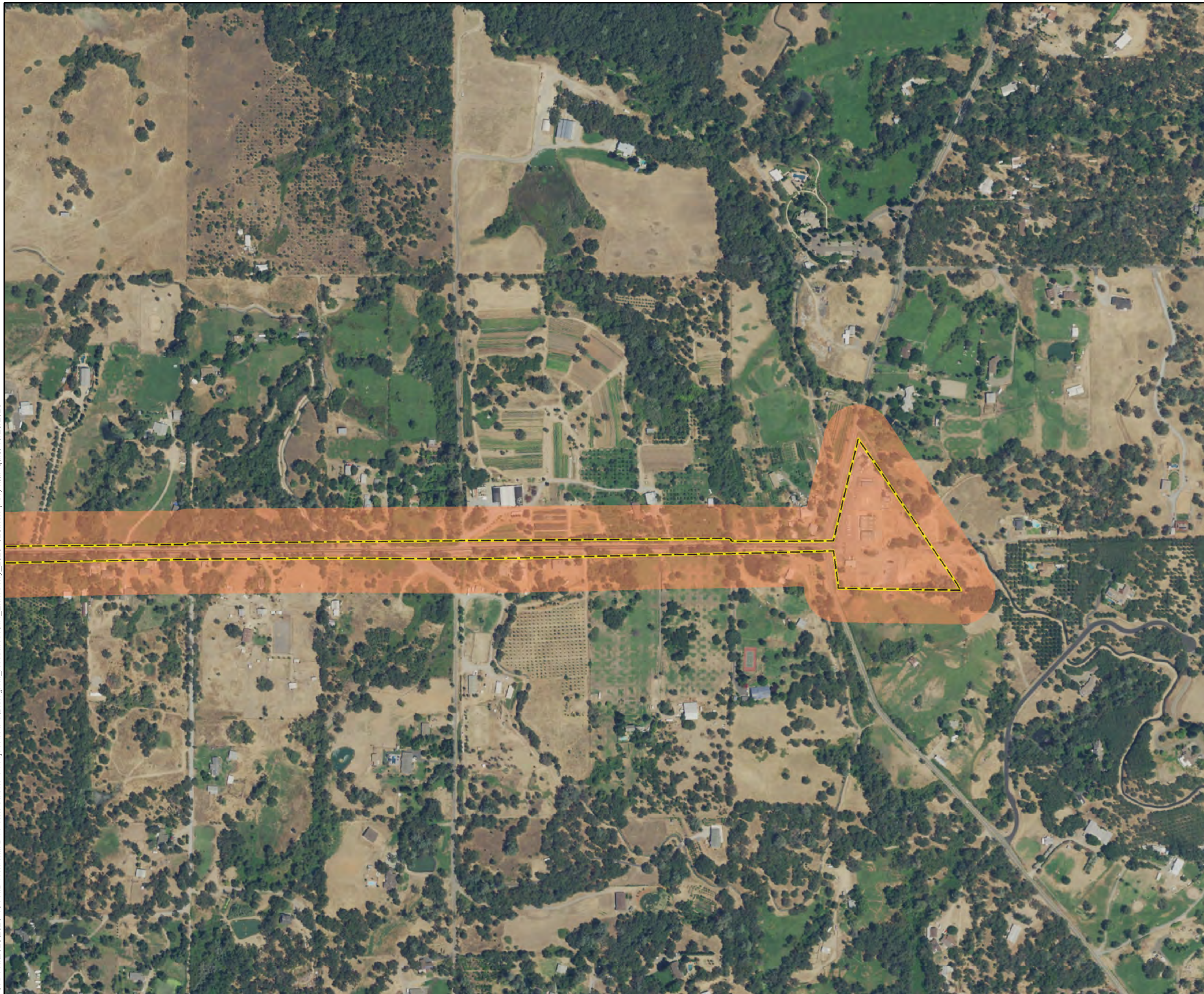
Scale in Feet
0 500

Figure 5. Elderberry Shrub Locations
Sheet 4 of 5
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Study Area - 98.05 ac.

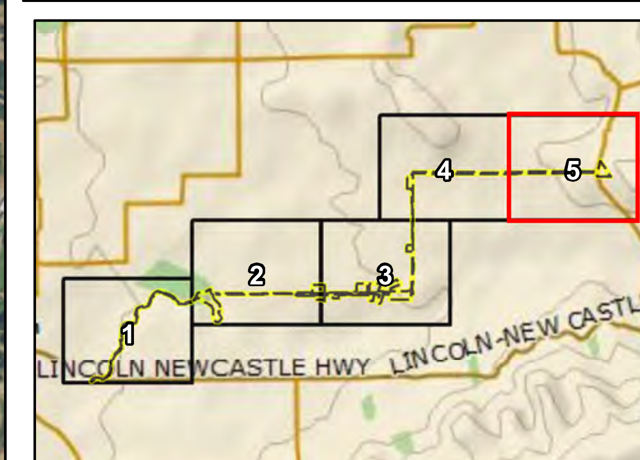
Elderberry shrub locations

Survey Type

Assessment Area Buffer

Survey Area Buffer

Sources: NAIP 2018



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Map Date: 10/29/2020

ECORP Consulting, Inc.
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Scale in Feet
0 500

Figure 5. Elderberry Shrub Locations
Sheet 5 of 5
2020-104 NID-Hemphill Diversion Structure Project

Surveys conducted by Friends of Auburn Ravine and CDFW (2015) have documented spawning by fall-run Chinook salmon downstream and upstream of Hemphill Dam, indicating that the dam is passable under some hydrologic conditions. Suitable spawning habitat for fall-run Chinook salmon is present downstream and upstream of Hemphill Dam. Auburn Ravine provides freshwater EFH for fall-run Chinook salmon upstream and downstream of Hemphill Dam in four primary categories:

- Spawning and incubation;
- Juvenile rearing;
- Juvenile migration corridors; and
- Adult migration corridors.

The specific elements of freshwater EFH (NMFS 2018) present upstream and downstream of the dam include:

- Substrate composition;
- Water quality (e.g., temperature, dissolved oxygen, nutrients);
- Water quantity, depth, and velocity;
- Channel gradient;
- Food availability;
- Cover and habitat complexity (e.g., large woody debris, pools, channel complexity, aquatic vegetation);
- Space;
- Access and passage; and
- Floodplain connectivity.

Surveys conducted by CDFW (2015) during the 2012-2014 survey period documented a total of 70 spawning redds for fall-run Chinook salmon, including a combined total of five redds upstream of Hemphill Dam in 2012 and 2014. Similarly, Helix Environmental Planning, Inc. (Helix 2019) conducted follow-up salmonid spawner surveys in Auburn Ravine in 2017 and 2018 utilizing the same methods used by CDFW (2015). During this two-year study, a combined total of 65 fall-run Chinook salmon redds were documented in the reach downstream of Hemphill Dam and a combined total of five redds were documented upstream of Hemphill Dam. Based on these surveys, fall-run Chinook salmon are considered present in the Study Area and, under suitable flow conditions, are present upstream of Hemphill Dam.

Steelhead (California Central Valley DPS)

The California Central Valley DPS steelhead, the anadromous form of rainbow trout, was listed as threatened under the ESA on March 19, 1998 (63 FR 13347) and is a PCCP covered species. The California

Central Valley DPS steelhead's typical habitats are freshwater rivers and streams that are tributaries to the Sacramento and San Joaquin River systems.

Adult steelhead, typically averaging 600 to 800 millimeters in length (Moyle et al. 1989), generally leave the ocean and begin upstream migration through the Delta to spawning reaches in the upper Sacramento and San Joaquin rivers and tributaries from August through March (McEwan 2001), with peak immigration occurring in January and February (Moyle 2002). Spawning generally occurs from January through April (McEwan and Jackson 1996). Redds are typically dug by female fish in water depths of 10 to 150 centimeters (cm) and where water velocities over redds range from 20 to 155 cm per second (Moyle 2002). Juvenile steelhead rear in their natal streams for one to three years prior to emigrating from the river. Emigration of one- to three-year old, sub-adult fish primarily occurs from January through June (Snider and Titus 1996). Unlike Chinook salmon, steelhead are iteroparous (i.e., able to spawn repeatedly) and may spawn for up to four consecutive years before dying; however, it is rare for steelhead to spawn more than twice and the majority of repeat spawners are females (Busby et al. 1996). Thus, kelts (post-spawning adults) may be present in the in the Project Area shortly after spawning (i.e., January through mid-April).

According to the CNDDB, this DPS is known to occur in the Project Area in Auburn Ravine (CDFW 2020a) and, therefore, is considered present.

Pacific Lamprey

Pacific lamprey (*Lampetra tridentata*) is not listed pursuant to either the federal or California ESAs; however, it is designated by CDFW as an SSC due to declining abundance throughout its range in California (Moyle et al. 2015). The reason for this decline is believed to be a secondary effect of the reduction in abundance of anadromous salmonids, the primary prey of Pacific lamprey.

Lampreys are eel-like, jawless fishes with a cartilaginous skeleton and disc-shaped, sucker-like mouths. Pacific lamprey are predatory and anadromous, although landlocked (i.e., potamodromous) populations exist in some inland water bodies. The adult predatory, ocean-residing stage typically lasts three to four years and these fish rarely stray far from the mouths of their natal streams (Moyle 2002). Adult fish ranging from 30-76 cm total length typically move upstream to spawning streams from March to late June (Moyle 2002). After males and females excavate a redd, the female attaches to the substrate and releases 20,000 to 200,000 eggs that are fertilized by males. The majority of adult fish die following spawning, although a small proportion may survive to spawn the following year at a larger size. The fertilized eggs hatch after approximately 19 days at 15°C (Moyle 2002). The larval ammocoetes remain in the gravel for a short period before emerging and being swept downstream, where they burrow into soft sediments and filter organic material from the substrates. Following a five- to seven-year residence period in freshwater, the ammocoetes undergo metamorphosis to an adult, predatory stage that is tolerant of saltwater and subsequently migrate downstream under high winter flows to the ocean.

Pacific lamprey are known to occur in Auburn Ravine upstream of the city of Lincoln (Goodman and Reid 2018) and Auburn Ravine provides suitable spawning and rearing habitat upstream and downstream of Hemphill Dam. For these reasons, Pacific lamprey are considered present in Auburn Ravine and the species is potentially present during the adult and juvenile migration periods and juvenile rearing period.

4.4.4 Amphibians

Three special-status amphibian species were identified as having the potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and site reconnaissance, two of the species, California red-legged frog and foothill yellow-legged frog were determined to be absent from the Project Area due to the lack of suitable habitat or because the Project Area is outside of the current known range of the species. No further discussion of those species is provided in this assessment. A brief description of the remaining species with the potential to occur within the Project Area, western spadefoot, is presented in the following section.

Western Spadefoot

The western spadefoot is not listed pursuant to either the California or federal ESAs; however, it is designated as a CDFW SSC. Necessary habitat components of the western spadefoot include loose, friable soils in which to burrow in upland habitats and breeding ponds. Breeding sites include temporary rain pools, such as vernal pools and seasonal wetlands, or pools within portions of intermittent drainages (Jennings and Hayes 1994). Spadefoots spend most of their adult life within underground burrows or other suitable refugia, such as rodent burrows. In California, western spadefoot toads are known to occur from the Redding area, Shasta County southward to northwestern Baja California, at elevations below 4,475 feet (Jennings and Hayes 1994).

There are no documented CNDDB occurrences of western spadefoot within five miles of the Project Area (CDFW 2020a). Seasonal wetland swales mapped within the Project Area represent potentially suitable habitat for western spadefoot.

4.4.5 Reptiles

Three special-status reptile species were identified as having potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and site reconnaissance, one of the species, giant garter snake was determined to be absent from the Project Area because the Project Area is outside the known range of the species. No further discussion of this species is provided in this assessment. A brief description of the remaining species, Blainville's horned lizard and northwestern pond turtle, with the potential to occur within the Project Area is presented in the following section.

Blainville's Horned Lizard

Blainville's horned lizard is not listed or protected under either the federal ESA or California ESA but is considered a CDFW SSC. This diurnal species can occur within a variety of habitats including scrubland, annual grassland, valley-foothill woodlands and coniferous forests, though it is most common along lowland desert sandy washes and chaparral (Stebbins 2003). In the Central Valley, the species ranges from southern Tehama County southward. In the Sierra Nevada it occurs from Butte County south to Tulare County, and in the Coast Ranges it occurs from Sonoma County south into Baja California (CDFG 1988). It occurs from sea level to 8,000 feet MSL and an isolated population occurs in Siskiyou County (Stebbins 2003). Habitats converted to vineyards, other agriculture, and housing are considered incompatible with horned lizard predator avoidance strategies (Stebbins and McGinnis 2012).

There are no documented CNDDB occurrences of Blainville's horned lizard within five miles of the Project Area (CDFW 2020a). Annual grassland other open vegetation communities onsite may support potentially suitable habitat for this species. However, much of the Project Area is located along existing roads, near rural residences, and agricultural lands. The potential for horned lizard occurrence is considered low.

Northwestern Pond Turtle

The northwestern pond turtle is not listed pursuant to either the federal or California ESAs; however, it is designated as a CDFW SSC and a PCCP covered species. Northwestern pond turtles occur in a variety of fresh and brackish water habitats including marshes, lakes, ponds, and slow-moving streams (Jennings and Hayes 1994). This species is primarily aquatic; however, they typically leave aquatic habitats in the fall to reproduce and to overwinter (Jennings and Hayes 1994). Deep, still water with abundant emergent woody debris, overhanging vegetation, and rock outcrops is optimal for basking and thermoregulation. Although adults are habitat generalists, hatchlings and juveniles require shallow edge water with relatively dense submergent or short emergent vegetation in which to forage.

Northwestern pond turtles are typically active between March and November. Mating generally occurs during late April and early May and eggs are deposited between late April and early August (Jennings and Hayes 1994). Eggs are deposited within excavated nests in upland areas, with substrates that typically have high clay or silt fractions (Jennings and Hayes 1994). The majority of nesting sites are located within 200 meters (650 feet) of the aquatic sites; however, nests have been documented as far as 400 meters (1,310 feet) from the aquatic habitat.

There are two documented CNDDB occurrences of northwestern pond turtle within five miles of the Project Area (CDFW 2020a). Auburn Ravine, Hemphill Canal, and ponds onsite represent suitable habitat for northwestern pond turtle. Therefore, northwestern pond turtle has potential to occur within the Project Area.

4.4.6 Birds

Twenty-six special-status bird species were identified as having potential to occur within the Project Area based on the literature review (Table 4). Upon further analysis and after the reconnaissance visit, 15 of these species were considered to be absent from the Project Area due to the lack of suitable wintering, foraging, and/or breeding habitat or because the Project Area is outside of the current known range of the species. Brief descriptions of the remaining 11 species with the potential to occur within the Project Area are presented in the following sections.

White-tailed Kite

White-tailed kite is not listed pursuant to either the California or federal ESAs; however, the species is fully protected pursuant to Section 3511 of the California Fish and Game Code. This species is a common resident in the Central Valley and the entire length of the California coast, and all areas up to the Sierra Nevada foothills and southeastern deserts (Dunk 2020). In northern California, white-tailed kite nesting occurs from March through early August, with nesting activity peaking from March through June. Nesting occurs in trees within riparian, oak woodland, savannah, and agricultural communities that are near foraging areas such as low elevation grasslands, agricultural, meadows, farmlands, savannahs, and emergent wetlands (Dunk 2020).

There is one documented CNDDB occurrence of white-tailed kite within five miles of the Project Area (CDFW 2020a). The trees within and in the vicinity of the Project Area provide suitable nesting habitat for this species. Therefore, white-tailed kite has potential to occur within the Project Area.

Cooper's Hawk

The Cooper's hawk is not listed pursuant to either the California or federal ESA.s However, it is a CDFW "watch list" species and is currently tracked in the CNDDB. Typical nesting and foraging habitats include riparian woodland, dense oak woodland, and other woodlands near water. Cooper's hawk nest throughout California from Siskiyou County to San Diego County and includes the Central Valley (Rosenfield et al. 2020). Breeding occurs during March through July, with a peak from May through July.

There are no documented CNDDB occurrences of Cooper's hawk within five miles of the Project Area (CDFW 2020a). The trees within and in the vicinity of the Project Area provide suitable nesting habitat for the species. Cooper's hawk has potential to occur within the Project Area.

Oak Titmouse

Oak titmouse are not listed and protected under either federal or California ESAs but are considered a USFWS BCC. Oak titmouse breeding range includes southwestern Oregon south through California's Coast, Transverse, and Peninsular ranges, western foothills of the Sierra Nevada, into Baja California; they are absent from the humid northwestern coastal region and the San Joaquin Valley (Cicero et al. 2020). They are found in dry oak or oak-pine woodlands but may also use scrub oaks or other brush near woodlands (Cicero et al. 2020). Nesting occurs during March through July.

There are no documented CNDDB occurrences of oak titmouse within five miles of the Project Area (CDFW 2020a). However, the trees onsite provide suitable nesting habitat for this species. Oak titmouse has potential to occur within the Project Area.

Swainson's Hawk

The Swainson's hawk is listed as a threatened species and is protected pursuant to the California ESA and a PCCP covered species. This species nests in North America (Canada, western U.S., and Mexico) and typically winters from South America north to Mexico. However, a small population has been observed wintering in the Sacramento-San Joaquin River Delta (Bechard et al. 2020). In California, the nesting season for Swainson's hawk ranges from mid-March to late August. Swainson's hawks nest within tall trees in a variety of wooded communities including riparian, oak woodland, roadside landscape corridors, urban areas, and agricultural areas, among others. Foraging habitat includes open grassland, savannah, low-cover row crop fields, and livestock pastures. In the Central Valley, Swainson's hawks typically feed on a combination of California vole (*Microtus californicus*), California ground squirrel (*Otospermophilus beecheyi*), ring-necked pheasant (*Phasianus colchicus*), many passerine birds, and grasshoppers (*Melanopulus* species). Swainson's hawks are opportunistic foragers and will readily forage in association with agricultural mowing, harvesting, disking, and irrigating (Estep 1989). The removal of vegetative cover by such farming activities results in more readily available prey items for this species.

There is one documented CNDDB occurrence of Swainson's hawk within five miles of the Project Area (CDFW 2020a). The trees within and in the vicinity of the Project Area provide suitable nesting habitat for this species. Therefore, Swainson's hawk has potential to nest within the Project Area. The potential Swainson's hawk nesting habitat onsite is limited to the areas between Highway 193 and the Turkey Creek Golf Club; Swainson's hawks are typically not found in wooded, rural residential setting such as the areas east of the golf course. There is no potential Swainson's hawk foraging habitat withing the Project Area; they prefer to forage in large tracts of open grasslands and agricultural fields, such as those found to the west and north of Lincoln.

Burrowing Owl

The burrowing owl is not listed pursuant to either the California or federal ESAs; however, it is designated as a BCC by the USFWS, a SSC by the CDFW, and a PCCP covered species. Burrowing owls inhabit dry open rolling hills, grasslands, desert floors, and open bare ground with gullies and arroyos. They can also inhabit developed areas such as golf courses, cemeteries, roadsides within cities, airports, vacant lots in residential areas, school campuses, and fairgrounds (Poulin et al. 2020). This species typically uses burrows created by fossorial mammals, most notably the California ground squirrel but may also use man-made structures such as concrete culverts or pipes; concrete, asphalt, or wood debris piles; or openings beneath concrete or asphalt pavement (CDFG 2012). The breeding season typically occurs between February 1 and August 31 (CDFG 2012).

There is one documented CNDDB occurrence of burrowing owl within five miles of the Project Area (CDFW 2020a). Annual grassland and other open vegetation communities could support potentially suitable habitat for burrowing owl. Therefore, burrowing owl has potential to occur within the Project Area.

Nuttall's Woodpecker

The Nuttall's woodpecker is not listed and protected under either the California or federal ESAs but is considered a USFWS BCC. They are resident from Siskiyou County south to Baja California. Nuttall's woodpeckers nest in tree cavities primarily within oak woodlands, but also can be found in riparian woodlands (Lowther et al. 2020). Breeding occurs during April through July.

There are no documented CNDDB occurrences of Nuttall's woodpecker within five miles of the Project Area (CDFW 2020a). However, there is suitable habitat for this species within the Project Area. Therefore, Nuttall's woodpecker has potential to occur within the Project Area.

Loggerhead Shrike

The loggerhead shrike is not listed pursuant to either the California or federal ESAs; but is considered a BCC by the USFWS and a SSC by the CDFW. Loggerhead shrikes nest throughout California except the northwestern corner, montane forests, and high deserts (Small 1994). Loggerhead shrikes nest in small trees and shrubs in open country with short vegetation such as pastures, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands (Yosef 2020). The nesting season extends from March through July.

There are no documented CNDDB occurrences of loggerhead shrike within five miles of the Project Area (CDFW 2020a). However, there is suitable habitat for this species within the Project Area. Therefore, loggerhead shrike has potential to occur within the Project Area.

Yellow-Billed Magpie

The yellow-billed magpie is not listed pursuant to either the California or federal ESAs but is considered a USFWS BCC. This endemic species is a yearlong resident of the Central Valley and Coast Ranges from San Francisco Bay to Santa Barbara County. Yellow-billed magpies build large, bulky nests in trees in a variety of open woodland habitats, typically near grassland, pastures or cropland. Nest building begins in late-January to mid-February, which may take up to six to eight weeks to complete, with eggs laid during April-May, and fledging during May-June (Koenig and Reynolds 2020). The young leave the nest at about 30 days after hatching (Koenig and Reynolds 2020). Yellow-billed magpies are highly susceptible to West Nile Virus, which may have been the cause of death to thousands of magpies during 2004-2006 (Koenig and Reynolds 2020).

There are no documented CNDDB occurrences of yellow-billed magpie within five miles of the Project Area (CDFW 2020a). However, there is suitable habitat for this species within the Project Area. Therefore, yellow-billed magpie has potential to occur within the Project Area.

Wrentit

The wrentit is not listed in accordance with either the California or federal ESAs but is designated as a BCC by the USFWS. Wrentit are a sedentary resident along the west coast of North America from the Columbia River south to Baja California (Geupel and Ballard 2020). Wrentit are found in coastal sage scrub, northern coastal scrub, and coastal hard and montane chaparral and breed in the dense understory of Valley oak riparian, Douglas-fir and redwood forests, early-successional forests, riparian scrub, coyote bush and blackberry thickets, suburban parks and larger gardens (Geupel and Ballard 2020). Nesting occurs during March through August.

There are no documented CNDDB occurrences of wrentit within five miles of the Project Area (CDFW 2020a). However, there is marginally suitable nesting habitat for this species within the isolated dense thickets onsite. Therefore, wrentit has low potential to occur within the Project Area.

Song Sparrow

The song sparrow is considered one of the most polytypic songbirds in North America (Miller 1956 as cited in Arcese et al. 2020). The subspecies *Melospiza melodia heermanni* includes as synonyms *M. m. mailliardi* (the "Modesto song sparrow") and *M. m. cooperi* (Arcese et al. 2020). The "Modesto song sparrow" is not listed and protected pursuant to either the California or federal ESAs but is considered a CDFW SSC. The subspecies *M. m. heermanni* can be found in central and southwestern California to northwestern Baja California (Arcese et al. 2020). Song sparrows in this group may have slight morphological differences but they are genetically indistinguishable from each other. The "Modesto song sparrow" occurs in the Central Valley from Colusa County south to Stanislaus County, and east of the Suisun Marshes (Grinnell and Miller 1944). Nesting habitat includes riparian thickets and freshwater marsh communities, with nesting occurring from April through June..

There are no documented CNDDB occurrences of song sparrow within five miles of the Project Area (CDFW 2020a). However, there is marginally suitable nesting habitat for this species within the isolated dense thickets onsite. Therefore, song sparrow has low potential to occur within the Project Area.

Tricolored Blackbird

The tricolored blackbird (TRBL) was granted emergency listing for protection under the California ESA in December 2014 but the listing status was not renewed in June 2015. After an extensive status review, the California Fish and Game Commission listed tricolored blackbirds as a threatened species in 2018. In addition, it is currently considered a USFWS BCC, a CDFW SSC, and a PCCP covered species. This colonial nesting species is distributed widely throughout the Central Valley, Coast Range, and into Oregon, Washington, Nevada, and Baja California (Beedy et al. 2020). TRBL nest in colonies that can range from several pairs to several thousand pairs, depending on prey availability, the presence of predators, or level of human disturbance. TRBL nesting habitat includes emergent marsh, riparian woodland/scrub, blackberry thickets, densely vegetated agricultural and idle fields (e.g. wheat, triticale, safflower, fava bean fields, thistle, mustard, cane, and fiddleneck), usually with some nearby standing water or ground saturation (Beedy et al. 2020). They feed mainly on grasshoppers during the breeding season, but may also forage upon a variety of other insects, grains, and seeds in open grasslands, wetlands, feedlots, dairies, and agricultural fields (Beedy et al. 2020). The nesting season is generally from March through August.

There are 13 documented CNDDB occurrences of TRBL within five miles of the Project Area (CDFW 2020a), and blackberry thickets found onsite represent potentially suitable nesting habitat. Therefore, TRBL has potential to occur within the Project Area.

4.4.7 Mammals

Two special-status mammal species, Townsend's big-eared bat and western red bat, were identified as having potential to occur within the Project Area based on the literature review (Table 4). A brief description of these special-status mammal species with potential to occur within the Project Area is presented in the following section.

Townsend's Big-eared Bat

The Townsend's big-eared bat is not listed pursuant to either the California or federal ESAs; however, this species is considered a SSC by CDFW. Townsend's big-eared bat is a fairly large bat with prominent bilateral noes lumps and large "rabbit-like" ears. This species occurs throughout the west and ranges from the southern portion of British Columbia south along the Pacific coast to central Mexico and east into the Great Plains. This species has been reported from a wide variety of habitat types and elevations from sea level to 10,827 feet. Habitats used include coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian communities, active agricultural areas, and coastal habitat types. Its distribution is strongly associated with the availability of caves and cave-like roosting habitat including abandoned mines, buildings, bridges, rock crevices, and hollow trees. This species is readily detectable when roosting due to their habit of roosting pendant-like on open surfaces. Townsend's big-eared bat is a moth specialist with over 90 percent of its diet composed of Lepidopterans. Foraging habitat is generally edge habitats along streams adjacent to and within a variety of wooded habitats. This species often travels long distances when foraging and large home ranges have been documented in California (WBWG 2020).

There is one documented CNDDB occurrence of Townsend's big-eared bat within five miles of the Project Area (CDFW 2020a). There are no mines or caves in the Project Area, but larger trees onsite may provide marginal habitat for this species. Therefore, Townsend's big-eared bat has low potential to occur within the Project Area.

Western Red Bat

The western red bat is not listed pursuant to either the California or federal ESAs; however, this species is considered a SSC by CDFW. The western red bat is easily distinguished from other western bat species by its distinctive red coloration. This species is broadly distributed, its range extending from southern British Columbia in Canada through Argentina and Chile in South America, and including much of the western United States. This solitary species day roosts primarily in the foliage of trees or shrubs in edge habitats bordering streams or open fields, in orchards, and occasionally urban areas. They may be associated with intact riparian habitat, especially with willows, cottonwoods, and sycamores. This species may occasionally utilize caves for roosting as well. They feed on a variety of insects, and generally begin to forage one to two hours after sunset. This species is considered highly migratory, however the timing of migration and the summer ranges of males and females may be different. Winter behavior of this species is poorly understood (WBWG 2020).

There are no documented CNDDB occurrence of western red bat within five miles of the Project Area (CDFW 2020a). However, the trees and shrubs found throughout the Project Area represents potential roosting habitat for this species. Therefore, western red bat has potential to occur within the Project Area.

4.5 Aquatic Resources Delineation

A total of 5.387 acres of aquatic resources was mapped within the Project Area. (Table 5; Figure 6. *Aquatic Resources Delineation*). These include seasonal wetland, seasonal wetland swales, riparian wetland, ditches, ponds, ephemeral drainages, and creek (Auburn Ravine).

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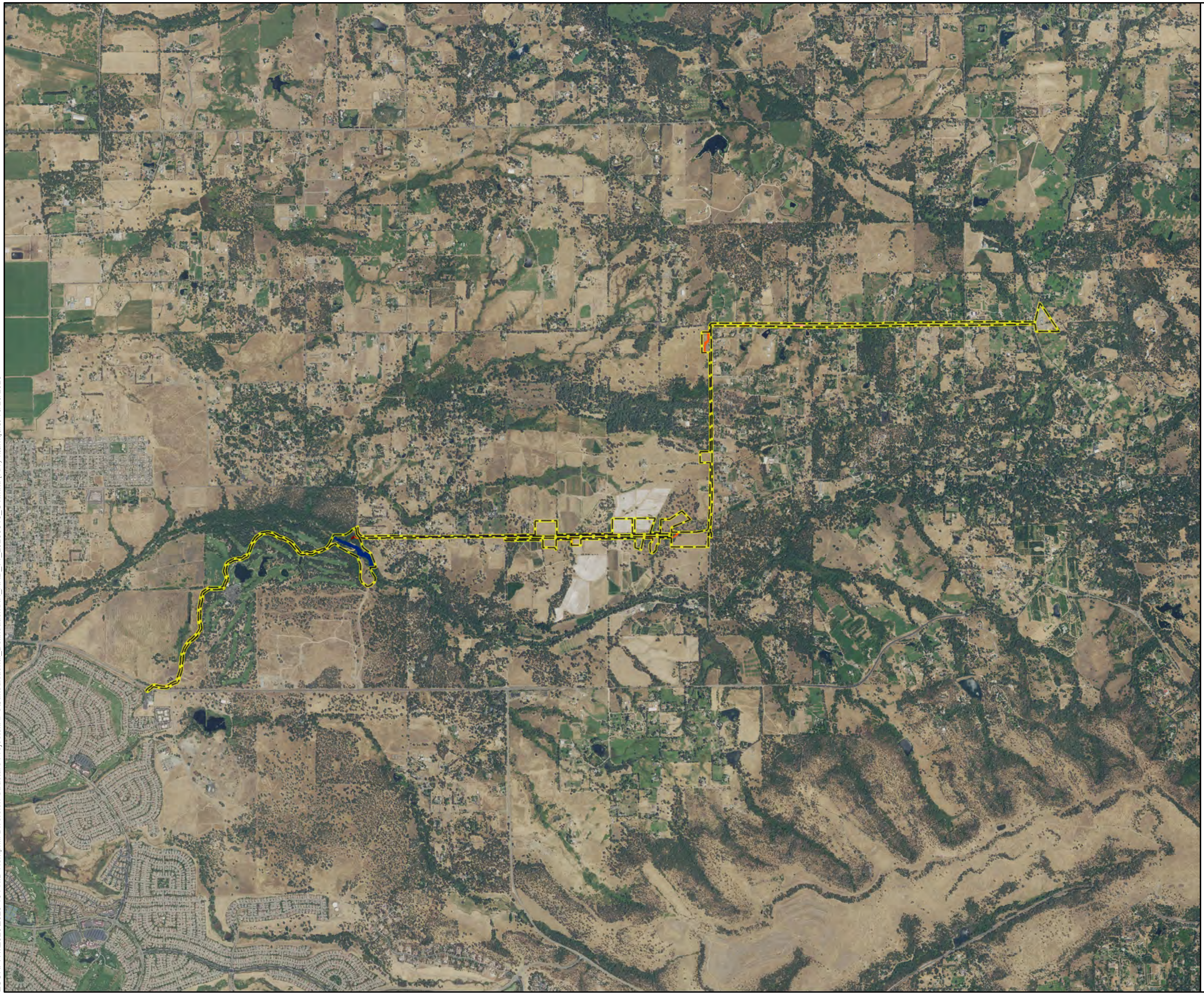


Map Features

Project Area - 98.05 ac.

Aquatic Features - 5.459 Total Acres[1]*

Wetlands

Seasonal Wetland - 0.074 ac.

Seasonal Wetland Swale - 0.826 ac.

Riparian Wetland - 0.310 ac.

Non-Wetland Waters

Ditch - 1.383 ac.

Pond - 0.001 ac.

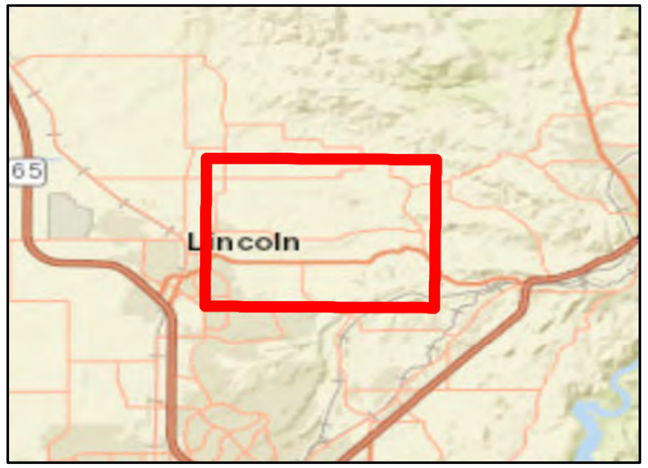
Ephemeral Drainage - 0.016 ac.

Creek - 2.849 ac.

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

[1] Subject to U.S. Army Corps of Engineers verification. This exhibit depicts information and data produced in accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 as well as the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program as amended on February 10, 2016, and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required.

** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



Map Date: 10/20/2020

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

Ditch

Ephemeral Drainage

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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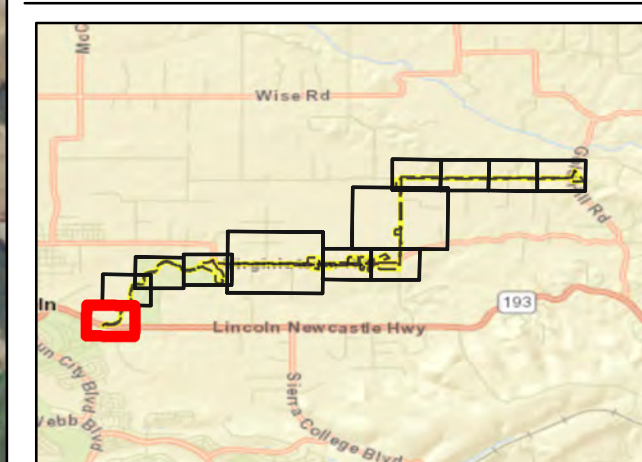

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

N

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

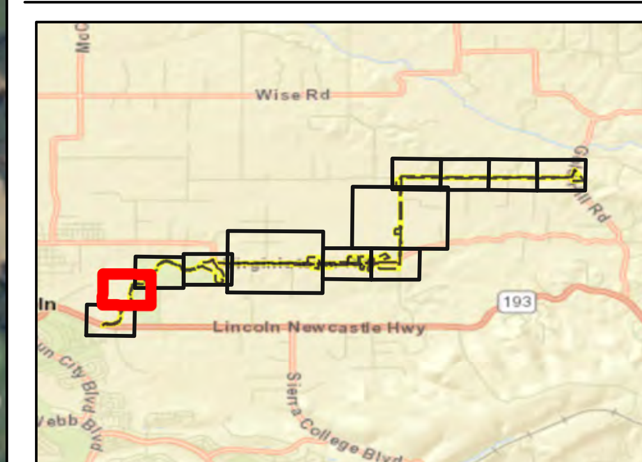
Ditch

Ephemeral Drainage

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

[1] Subject to U.S. Army Corps of Engineers verification. This exhibit depicts information and data produced in accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 as well as the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program as amended on February 10, 2016, and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required.

** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



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Map Date: 10/20/2020

ECORP Consulting, Inc.
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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

Ditch

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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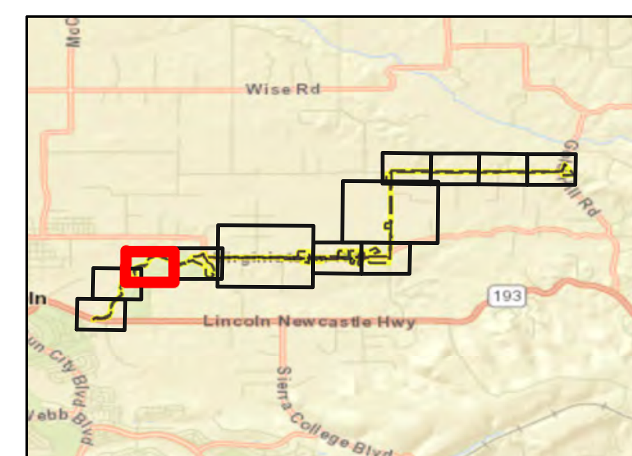

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Intake Structure

Feature Type

Upland

Waters

Aquatic Features[1]*

Creek

Ditch

Seasonal Wetland

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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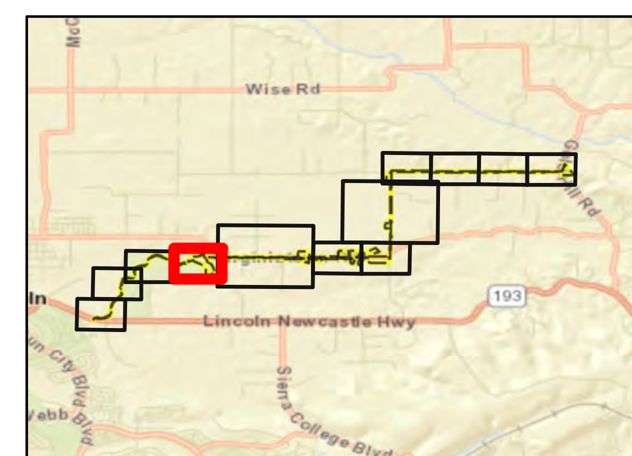

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Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
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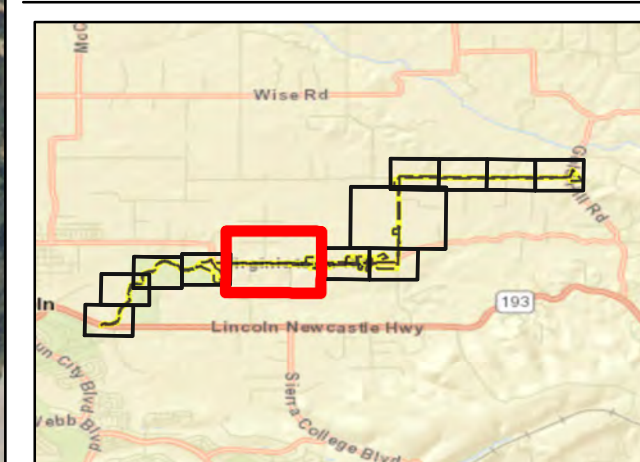

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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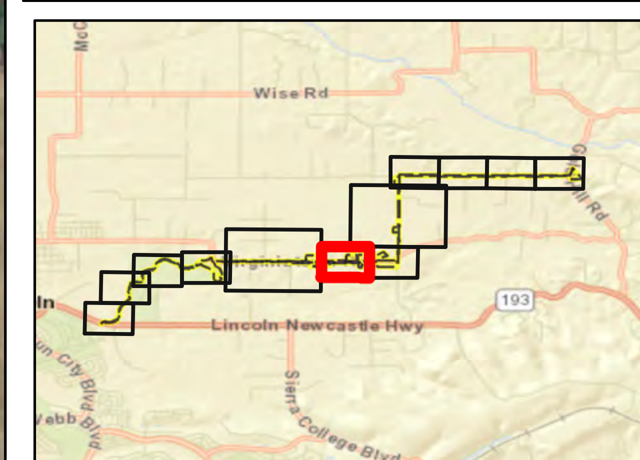

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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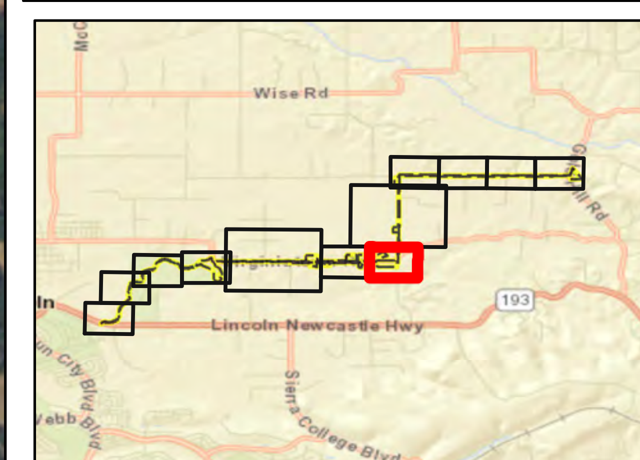

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

Ditch

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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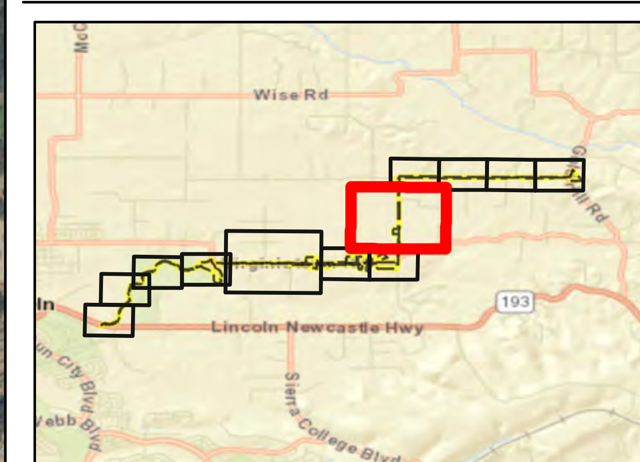

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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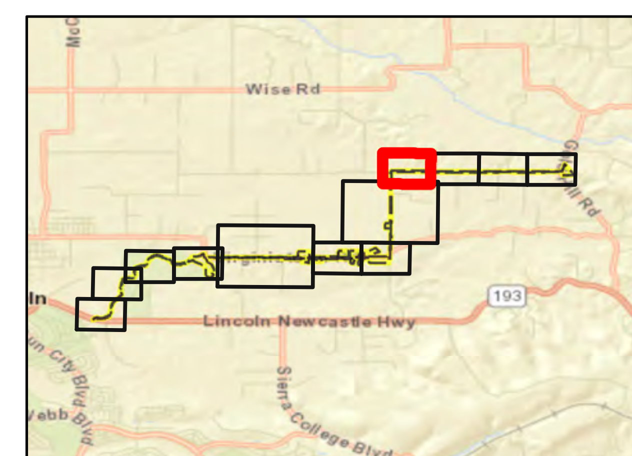

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Riparian Wetland

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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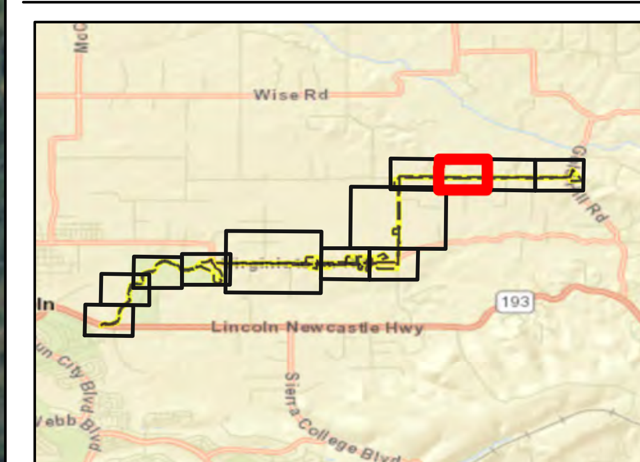

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

Ditch

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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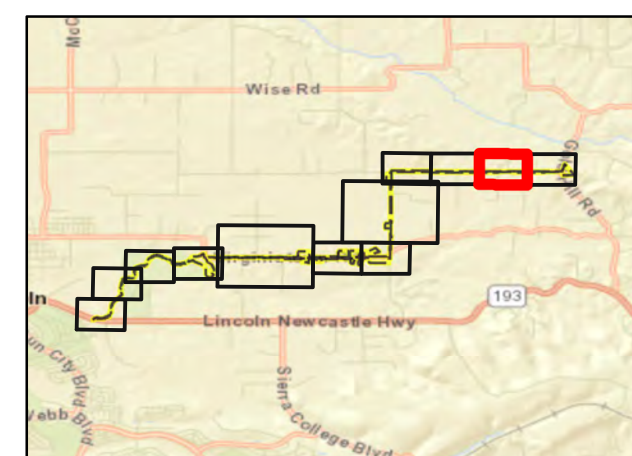

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Area - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Ditch

Pond

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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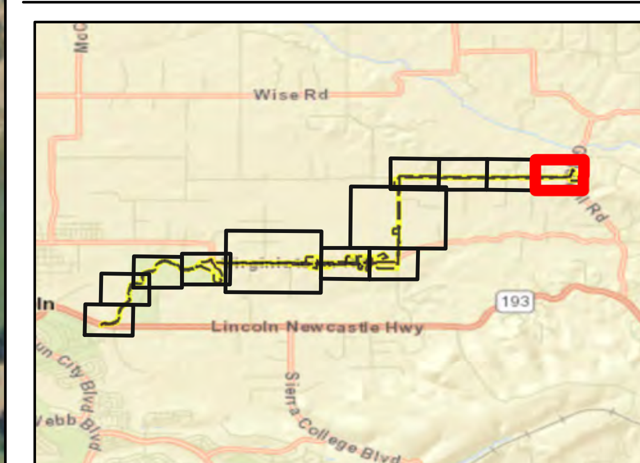

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Map Date: 10/20/2020

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Scale in Feet
0 200 400

Figure 6. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Table 5. Aquatic Resources Delineation	
Type	Acreage
Wetlands:	
Seasonal Wetland	0.074
Seasonal Wetland Swale	0.826
Riparian Wetland	0.310
Non-Wetland Waters:	
Ditch	1.383
Pond	0.001
Ephemeral Drainage	0.016
Creek (Auburn Ravine)	2.849
Total	5.459

4.5.1 Wetlands

Seasonal Wetlands

Seasonal wetlands are ephemerally wet due to accumulation of surface runoff and rainwater within low-lying areas. Inundation periods tend to be relatively short and they are commonly dominated by nonnative annual and sometimes perennial hydrophytic species. One seasonal wetland was mapped within the Project Area. Dominant plants within the seasonal wetland onsite included tall flatsedge (*Cyperus eragrostis*) and common smartweed (*Persicaria hydropiper*).

Seasonal Wetland Swales

Seasonal wetland swales are generally linear wetland features that convey precipitation runoff and support a predominance of hydrophytic vegetation, but do not exhibit an OHWM. These are typically inundated for short periods during and immediately after rain events, but usually maintain soil saturation for longer periods during the wet season. Three seasonal wetland swales occur in the eastern portion of the Study Area to the south of Auburn Ravine. Dominant plant species in the seasonal wetland swales included tall flatsedge, Italian ryegrass, dallis grass (*Paspalum dilatatum*), sticky tarweed, soft rush (*Juncus effusus*), Himalayan blackberry, curly dock (*Rumex crispus*), Johnson grass (*Sorghum halepense*), broad-leaf cattail (*Typha latifolia*), and rough cockle-bur (*Xanthium strumarium*).

Riparian Wetlands

Riparian wetlands have been mapped in a low-lying area along Fruitvale Road. This wetland area appears to be artificially irrigated by runoff from upslope rural residences and adjacent irrigated pastures. Dominant plants found in the riparian wetland include Himalayan blackberry, sandbar willow, black willow, and broad-leaf cattail.

4.5.2 Non-Wetland Waters

Ditch

Much of the western portion of the Project Area follows the NID ditch. This feature is excavated, unlined, and maintained as a water deliver conveyance. The ditch is largely unvegetated except for weedy vegetation on the upper slopes of the ditch walls. The limits of the ditch were delineated based on the water level during the field surveys on August 7 and 26, 2020. There is no apparent OHWM because water levels vary and are dictated by diversions from Auburn Ravine.

Pond

There is a small portion of one pond mapped within the Project Area. This pond is located on private property and was not ground-truthed. The pond hydrology was difficult to assess due to lack of access, but it may be influence by irrigation runoff and possibly by groundwater pumping. A narrow bank of hydrophytic vegetation appeared to be present, consisting of tall flatsedge, dallis grass, and other unidentified grasses. There is an apparent OHWM where the hydrophytic vegetation transitions to upland species.

Ephemeral Drainage

Ephemeral drainages are linear features that exhibit a bed and bank and an OHWM. These features typically convey runoff for short periods of time, during and immediately following rain events, and are not influenced by groundwater sources at any time during the year. Ephemeral drainages within the Project Area are located in grassland and savanna communities and were sparsely vegetated due to erosion and scouring. The OHWM mark of many of the ephemeral drainages onsite were identified at the transition where there was no vegetation (due to scouring) to where upland weedy plants were established.

Creek (Auburn Ravine)

Perennial creeks are linear features that exhibit a bed and bank, OHWM, and flow continuously throughout the year. The perennial creek (Auburn Ravine) mapped within the Project Area was sparsely and sometimes heavily vegetated depending on the depth and velocity of flowing water. Hydrophytic vegetation was present along the banks of Auburn Ravine and in areas of sediment accumulation that provide a substrate suitable for plant establishment and growth. Dominant plant species observed within the OHWM of Auburn Ravine include sandbar willow, red willow (*Salix lasiolepis*), Oregon ash (*Fraxinus latifolia*), Himalayan blackberry, and rice cutgrass. The OHWM of Auburn Ravine was delineated in the field based on the presence of a variety of indicators including water marks, eroded banks, shelving, hydrophytic vegetation, and debris deposits/wrack line.

4.6 Sensitive Natural Communities

Three sensitive natural communities were identified as having the potential to occur within the Project Area based on the literature review: Northern Hardpan Vernal Pool, Alkali Meadow, and Alkali Seep (CDFW 2020b) (Attachment A). While none of these communities were found to occur during the field assessment, one sensitive natural community was identified onsite: the *Quercus lobata* Forest & Woodland Alliance.

4.7 Wildlife Movement/Corridors

Much of the Project Area is located along paved roadways adjacent to cultivated lands and rural residences. These areas are not expected to support signification wildlife movement corridors or potential nursery sites. Auburn Ravine and its associated riparian corridor and the Turkey Creek Golf Club would support local movement of wildlife but would be significantly reduced due to human presence and the close proximity of rural residences. Wildlife species observed within the Project Area during the August 7 and 26, 2020 site visits is included in Attachment D. The Project Area does not fall within an Essential Habitat Connectivity area mapped by the CDFW (CDFW 2020c).

4.8 Trees

A total of 1,611 trees were inventoried that had either their stem or their dripline within the Project. Of these trees, 827 trees were either inaccessible, located outside of the Project limits, or located in unknown property ownership. Therefore, tree tags were not installed on these trees. A map depicting the locations of the inventoried trees is included in Attachment E.

There are 12 species of native tree that were inventoried for the Project. The most common species is interior live oak with 681 individuals. In addition, there are 395 valley oak (*Quercus lobata*), 216 blue oak, 163 northern California black walnut, 44 white alder, 30 Arroyo willow, 28 California buckeye, 21 Fremont's cottonwood, 16 Goodding's black willow, 14 Oregon ash, two American sycamore (*Platanus racemosa*), and one red willow.

5.0 RECOMMENDATIONS

Based on the potential Project impacts to biological resources, the following PCCP measures and conditions (Attachment F), and other recommended measures could be implemented and adhered to prior to Project implementation in order to mitigate impacts to PCCP covered species and species regulated under CEQA.

5.1 Placer County Conservation Program Covered Species Measures and Conditions

The PCCP includes conditions that must be implemented for Covered Activities. These conditions are grouped into the following categories: (1) general, (2) natural community, (3) stream system, (4) rural (5) public project, (6) species, and (7) reserve management conditions. The eight (8) species conditions in the PCCP are required for activities that may affect Covered Species or where potential for take can be avoided or reduced, of which six (6) apply to the Project. The Project shall comply with the following six PCCP Conditions as the mechanism for avoiding, minimizing, and mitigating for the proposed Project impacts to PCCP covered special-status species:

Species Condition 1. Swainson's Hawk:

The Project applicant shall comply with PCCP AMM Species Condition 1 for Swainson's Hawk (PCCP Section 6.3.5.6; Attachment F). Swainson's hawk surveys will be conducted according to PCCP Section 6.3.5.6.1 and if an occupied nest is identified, minimization measures according to PCCP Section 6.3.5.6.2 must be adopted, and PCCP Section 6.3.5.6.3 if construction monitoring is required.

Species Condition 3. Western Burrowing Owl:

The Project applicant shall comply with PCCP AMM Species Condition 3 for Western Burrowing Owl (PCCP Section 6.3.5.8; Attachment F). Burrowing owl surveys will be conducted according to PCCP Section 6.3.5.8.1. If a burrowing owl or evidence of presence at or near a burrow entrance is found to occur within 250 feet of the Project, applicable measures in PCCP Section 6.3.5.8.2 shall be implemented, and PCCP Section 6.3.5.8.3 if construction monitoring is required.

Species Condition 4. Tricolored Blackbird:

The Project applicant shall comply with PCCP AMM Species Condition 4 for Tricolored Blackbird (PCCP Section 6.3.5.9; Attachment F). Tricolored blackbird surveys will be conducted according to PCCP Section 6.3.5.9.1 and applicable measures in PCCP Section 6.3.5.9.2 will be implemented if a tricolored blackbird nesting colony is found and PCCP Section 6.3.5.9.3 implemented if construction monitoring is required.

Species Condition 6. California Red-Legged Frog and Western Pond Turtle:

The Project applicant shall comply with PCCP AMM Species Condition 6 for California red-legged frog and western pond turtle (PCCP Section 6.3.5.11; Attachment F).

Species Condition 7. Central Valley Steelhead and Central Valley Fall-/Late Fall-run chinook Salmon:

The Project applicants shall comply with PCCP AMM Species Condition 7 for Central Valley steelhead and Central Valley fall-/late fall-run chinook salmon (PCCP Section 6.3.5.12; Attachment F).

Species Condition 8. Valley Elderberry Longhorn Beetle:

The Project applicants shall comply with PCCP AMM Species Condition 8 for VELB (PCCP Section 6.3.5.13; Attachment F).

5.2 Special-Status Species Covered Under CEQA

The following recommended measures are provided as the mechanism for potentially avoiding, minimizing, and mitigating for proposed Project impacts to special-status species not covered under the PCCP or if the PCCP programmatic permits are not available.

Special-Status Plants

Focused special-status plant surveys shall be performed. The guidelines, at a minimum, shall require the following:

- All plant species encountered on the Project site shall be identified to the taxonomic level necessary to determine species status.
- The surveys shall be conducted no more than five years prior and no later than the blooming period immediately preceding the approval of a grading or improvement plan or any ground-disturbing activities, including grubbing or clearing. If special-status plants are identified on the Project site, the Project applicants shall be required to implement the following measures to mitigate the potential loss of special-status plant species:

  1. Avoid special-status plant occurrences through Project design to the extent technically feasible and appropriate. Avoidance shall be deemed technically feasible and appropriate if the habitat occupied by special-status plants may be preserved onsite while still obtaining the Project purpose and objectives and if the preserved habitat features could reasonably be expected to continue to function as suitable habitat for special-status plants following Project implementation.
  2. If, after examining all feasible means to avoid impacts to potential special-status plant species habitat through Project site planning and design, adverse effects cannot be avoided, then impacts shall be mitigated in accordance with guidance from the appropriate State or federal agency charged with the protection of the subject species.
  3. Notify CDFW, as required by the California NPPA, if any special-status plants are found on the Project site. Notify the USFWS if any plant species listed under the federal ESA are found.
  4. Develop a mitigation and monitoring plan to address the loss of special-status plant species found during preconstruction surveys, if any. Mitigation measures may include preserving and enhancing existing onsite populations, creation of offsite populations on Project mitigation sites through seed collection or transplantation, and/or preserving occupied habitat offsite in sufficient quantities to offset loss of occupied habitat or individuals.
  5. If transplantation is part of the mitigation plan, the plan shall include a description and map of mitigation sites, details on the methods to be used, including collection, storage, propagation, receptor site preparation, installation, long-term protection and management, monitoring and reporting requirements, remedial action responsibilities should the initial effort fail to meet long-term monitoring requirements, and sources of funding to purchase, manage, and preserve the sites. The following performance standards shall be applied:

     i. The extent of occupied area and the flower density in compensatory reestablished populations shall be equal to or greater than the affected occupied habitat and shall be self-producing. Re-established populations shall be considered self-producing when:

1. plants re-establish annually for a minimum of five years with no human intervention, such as supplemental seeding; and

2. re-established habitats contain an occupied area and flower density comparable to existing occupied habitat areas in similar habitat types.

6. If offsite mitigation includes dedication of conservation easements, purchase of mitigation credits, or other offsite conservation measures, the details of these measures shall be included in the mitigation plan, including information on responsible parties for long-term management, conservation easement holders, long-term management requirements, and other details, as appropriate to target the preservation of long-term viable populations.

Valley Elderberry Longhorn Beetle

If the PCCP programmatic permits are not adopted and not available as a permitting and mitigation strategy, the following measures are recommended to mitigate potential impacts on valley elderberry longhorn beetle:

- As a condition of approval, a qualified biologist shall determine whether future project sites contain valley elderberry longhorn beetle habitat (i.e., elderberry shrubs). If so, a preconstruction survey shall be conducted by a qualified biologist in all riverine/riparian habitat within 165 feet of Project disturbance areas before any construction activity. The surveys shall be conducted according to the protocol outlined in USFWS Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (USFWS 2017c) (Framework).
- If elderberry shrubs are not present, no further mitigation is necessary.
- If elderberry shrubs are located 165 feet or more from project activities, direct or indirect impacts are not expected. Shrubs shall be protected during construction by establishing and maintaining a high visibility fence at least 165 feet from the drip line of each elderberry shrub.
- If elderberry shrubs can be retained within the project footprint, project activities may occur up to 20 feet from the dripline of elderberry shrubs if precautions are implemented to minimize the potential for indirect impacts. An avoidance area shall be established at least 20 feet from the drip line of an elderberry shrub for any activities that may damage the elderberry shrub (e.g., trenching, paving). The project proponent will implement avoidance and minimization measures specified in the USFWS Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (USFWS 2017c).
- As much as feasible, all activities that could occur within 165 feet of an elderberry shrub shall be conducted outside of the flight season of the valley elderberry longhorn beetle (March - July).

- Herbicides shall not be used within the drip line of the shrub. Insecticides shall not be used within 100 feet of an elderberry shrub. All chemicals shall be applied using a backpack sprayer or similar direct application method.
- Mechanical weed removal within the drip-line of the shrub shall be limited to the season when adults are not active (August - February) and shall avoid damaging the elderberry.
- If any elderberry shrubs cannot be avoided according to the USFWS 2017 Framework, the Project proponent shall compensate for the loss of valley elderberry longhorn beetle habitat through participation in the PCCP if it has been adopted and is available for project participation.
- If trimming elderberry shrubs is proposed, trimming shall be conducted between November and February and shall not result in the removal of elderberry branches that are ≥ one inch in diameter. If trimming results in removing branches that are ≥ one inch in diameter, the project proponent shall mitigate for the loss of the valley elderberry beetle habitat through participation in the PCCP, if adopted, or according to the USFWS 2017 Framework if the PCCP has not been adopted.
- The project proponent shall comply with ESA and consult with USFWS and will compensate for the unavoidable loss of elderberry shrubs according to USFWS 2017 Framework. The Framework uses presence or absence of exit holes, and whether the affected elderberry shrubs are in riparian habitat to determine the number of elderberry seedlings or cuttings and associated riparian vegetation that would need to be planted as compensatory mitigation for affected valley elderberry longhorn beetle habitat. Compensatory mitigation may include purchasing credits at a USFWS-approved conservation bank, providing onsite mitigation, or establishing and protecting habitat for valley elderberry longhorn beetle as follows:

    1. For elderberry shrubs in riparian habitat:
        - For each shrub that is trimmed, the Project proponent shall purchase two credits at a USFWS-approved bank.
        - For each shrub that is removed, the entire shrub may be transplanted to a USFWS-approved location in addition to the purchase of two credits.
    2. For elderberry shrubs in non-riparian habitat:
        - The project proponent shall purchase one credit at a USFWS-approved bank for each shrub that will be trimmed if exit holes have been found in any shrub on or within 165 feet of the project area.
        - If no exit holes are present and the shrub is not in riparian habitat, no further action is required.

If the shrub will be completely removed by the activity, the entire shrub shall be transplanted to a USFWS-approved location in addition to a purchase of one credit.

Special-Status Amphibians

A qualified biologist shall determine if the Project site contains suitable habitat for California red-legged frogs, if the PCCP programmatic permits are not adopted, and western spadefoot. The California red-legged frog assessment shall be performed according to the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS 2005). The USFWS will provide guidance, based on the initial assessment, whether field surveys are appropriate, where the field surveys should be conducted, and whether incidental take authorization should be obtained through Section 7 consultation or a Section 10 permit pursuant to the ESA.

If potential western spadefoot habitat is identified, conduct surveys for western spadefoot in areas of potential habitat that would be eliminated by the Project. The surveys shall be conducted at the appropriate time of year to detect western spadefoot, generally the breeding season, according to methods approved by CDFW. If western spadefoot is found in habitat that will be eliminated or made unsuitable for western spadefoot, then a plan will be prepared, in consultation with CDFW, to collect and relocate adult and larval western spadefoot and egg masses to suitable habitat that will be preserved in perpetuity.

Special-Status Reptiles

A qualified biologist shall determine if the Project site contains suitable habitat for Blainville's horned lizard, and if so, conduct surveys for Blainville's horned lizard in areas of potential habitat that would be eliminated by the Project. The surveys shall be conducted at the appropriate time of day to detect Blainville's horned lizard. If Blainville's horned lizard is found in habitat that will be eliminated or made unsuitable for Blainville's horned lizard, then a plan will be prepared, in consultation with CDFW, to potentially collect and relocate individual(s) to suitable habitat that will be preserved in perpetuity.

Swainson's Hawk

If the PCCP programmatic permits are not adopted and not available as a permitting and mitigation strategy, the following measures are recommended to mitigate potential impacts on Swainson's hawk.

A qualified biologist shall determine whether the Project site contains suitable habitat for Swainson's hawk. For projects or ground-disturbing activities (including any required offsite improvements) with potential to affect Swainson's hawk and other raptor nests, or remove Swainson's hawk foraging habitat, the Project proponent shall consult with CDFW with respect to the following measures proposed to mitigate for habitat removal and potential nest disturbance. As part of the consultation, the Project proponent may seek take authorization under Section 2081 of the Fish and Game Code. The following measures will be implemented and are intended to avoid, minimize, and fully mitigate impacts to Swainson's hawk, as well as other raptors:

- For construction activities that would occur within 0.25 mile of a known or likely Swainson's hawk nest site, the Applicant shall attempt to initiate construction activities before nest initiation phase (i.e., before March 1). Depending on the timing, regularity, and intensity of construction activity, construction in the area before nest initiation may discourage a Swainson's hawk pair from using that site and eliminate the need to implement further nest-protection measures, such as buffers and limited construction operating periods around active nests. Other measures that could be used to deter establishment of nests (e.g., reflective striping or decoys) may be used before the breeding season in areas planned for active construction. However, deployment of nest deterrents does not guarantee success. If breeding raptors establish an active nest site, as evidenced by nest building, egg laying, incubation, or other nesting behavior, near the construction area, they shall not be harassed or deterred from continuing with their normal breeding activities.

- For Project activities, including tree removal, that begin between March 1 and September 15, qualified biologists shall conduct preconstruction surveys for Swainson's hawk and other nesting raptors and to identify active nests on and within 0.5 mile of the Project site. The surveys shall be conducted before the beginning of any construction activities between March 1 and September 15, following the Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley (Swainson's Hawk Technical Advisory Committee 2000).
- Impacts to nesting Swainson's hawks and other raptors shall be avoided by establishing appropriate buffers around active nest sites identified during preconstruction raptor surveys. Project activity shall not commence within the buffer areas until a qualified biologist has determined, in coordination with CDFW, that the young have fledged, the nest is no longer active, or reducing the buffer would not likely result in nest abandonment. CDFW guidelines recommend implementation of 0.25-mile-wide buffer for Swainson's hawk and 500 feet for other raptors, but the size of the buffer may be adjusted if a qualified biologist and the Applicant, in consultation with CDFW, determine that such an adjustment would not be likely to adversely affect the nest. Monitoring of the nest by a qualified biologist during and after construction activities shall be required if the activity has potential to adversely affect the nest.
- Trees shall not be removed during the breeding season for nesting raptors unless a survey by a qualified biologist verifies that there is not an active nest in the tree.

Western Burrowing Owl

If the PCCP programmatic permits are not adopted and not available as a permitting and mitigation strategy, the following measures are recommended to mitigate potential impacts on western burrowing owl.

Before ground-disturbing activities, the Applicant shall retain a qualified biologist to determine whether the Project site could affect suitable habitat for burrowing owl. If Project activities have the potential to disturb suitable habitat for burrowing owl, the following measures shall be implemented.

- The Applicant shall retain a qualified biologist to conduct focused breeding and nonbreeding season surveys for burrowing owls in areas of suitable habitat on and within 1,500 feet of the Project site and any required offsite improvements. Surveys shall be conducted before the start of construction activities and in accordance with Appendix D of CDFW's Staff Report on Burrowing Owl Mitigation (CDFG 2012) or the most recent CDFW protocols.

- If no occupied burrows are found, a letter report documenting the survey methods and results shall be submitted to CDFW and no further mitigation will be required.
- If an active burrow is found during the nonbreeding season (September 1 through January 31), the Applicant shall consult with CDFW regarding protection buffers to be established around the occupied burrow and maintained throughout construction. If occupied burrows are present that cannot be avoided or adequately protected with a no-disturbance buffer, a burrowing owl exclusion plan shall be developed, as described in Appendix E of CDFW's 2012 Staff Report. Burrowing owls shall not be excluded from occupied burrows until the Project's burrowing owl exclusion plan is approved by CDFW. The exclusion plan shall include a plan for creation, maintenance, and monitoring of artificial burrows in suitable habitat proximate to the burrows to be destroyed, that provide substitute burrows for displaced owls.
- If an active burrow is found during the breeding season (February 1 through August 31), occupied burrows shall not be disturbed and will be provided with a 150- to 1,500-foot protective buffer unless a qualified biologist verifies through noninvasive means that either: (1) the birds have not begun egg laying, or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival. The size of the buffer shall depend on the time of year and level disturbance as outlined in the CDFW Staff Report (CDFG 2012) or the most recent CDFW protocols. The size of the buffer may be reduced if a broad-scale, long-term, monitoring program acceptable to CDFW is implemented to ensure burrowing owls are not detrimentally affected. Once the fledglings are capable of independent survival, the owls can be evicted, and the burrow can be destroyed per the terms of a CDFW-approved burrowing owl exclusion plan developed in accordance with Appendix E of CDFW's 2012 Staff Report or the most recent CDFW protocols.

Tricolored Blackbird

If the PCCP programmatic permits are not adopted and not available as a permitting and mitigation strategy, the following measures are recommended to mitigate potential impacts on tricolored blackbird.

The Applicant shall retain a qualified biologist to determine whether suitable habitat for tricolored blackbird is present on or within 500 feet of the Project site. If Project activities have the potential to affect tricolored blackbird nesting habitat, the following measures shall be implemented to avoid or minimize loss of active tricolored blackbird nests:

- To minimize the potential for loss of tricolored blackbird nesting colonies and other nesting birds, vegetation removal activities shall commence during the nonbreeding season (September 1-January 31) to the extent feasible. If all suitable nesting habitat is removed during the nonbreeding season, no further mitigation would be required.
- Before removal of any vegetation within potential nesting habitat between February 1 and August 31, a qualified biologist shall conduct preconstruction surveys for nesting tricolored blackbirds (colonies). The surveys shall be conducted no more than 14 days before construction commences. If no active nests or tricolored blackbird colonies are found during focused surveys, no further action under this measure will be required. If active nests are located during the preconstruction

surveys, the biologist shall notify CDFW. If necessary, modifications to the Project design to avoid removal of occupied habitat while still achieving Project objectives shall be evaluated and implemented to the extent feasible. If avoidance is not feasible or conflicts with Project objectives, construction shall be prohibited within a minimum of 100 feet of the nest to avoid disturbance until the nest colony is no longer active. These recommended buffer areas may be reduced or expanded through consultation with CDFW. Monitoring of all occupied nests shall be conducted by a qualified biologist during construction activities to adjust the 100-foot buffer if agitated behavior by the nesting bird is observed.

Special-Status Raptors (White-tailed Kite, Cooper's Hawk) and Other Protected Raptors

For construction and other ground-disturbing activities with potential to affect white-tailed kite, Cooper's hawk, or other raptor nests (e.g., activities proposed to occur in or within 500 feet of suitable habitat), the following measures shall be implemented prevent potential impacts to active raptor nests.

- For Project activities, including tree and other vegetation removal, that begin between February 1 and September 15, qualified biologists shall conduct preconstruction surveys for white-tailed kite and Cooper's hawk and to identify active nests on and within 500 feet of the Project site. The surveys shall be conducted before the beginning of any construction activities between February 1 and September 15.
- Impacts to nesting raptors shall be avoided by establishing appropriate buffers around active nest sites identified during preconstruction raptor surveys. Project activity shall not commence within the buffer areas until a qualified biologist has determined, in coordination with CDFW, that the young have fledged, the nest is no longer active, or reducing the buffer would not likely result in nest abandonment. CDFW guidelines recommend implementation of a 500-foot-wide buffer for these raptor species, but the size of the buffer may be adjusted if a qualified biologist and the Project proponent, in consultation with CDFW, determine that such an adjustment would not be likely to adversely affect the nest. Monitoring of the nest by a qualified biologist during and after construction activities shall be required if the activity has potential to adversely affect the nest.
- Trees shall not be removed during the breeding season for nesting raptors unless a survey by a qualified biologist verifies that there is not an active nest in the tree.

Other Special-Status Birds (Nuttall's Woodpecker, Loggerhead Shrike, Yellow-Billed Magpie, Oak Titmouse, Wrentit, and Song Sparrow) and MBTA-Protected Birds

Before any ground-disturbing Project activities begin, a qualified biologist will identify potential habitat for nesting Nuttall's woodpecker, loggerhead shrike, yellow-billed magpie, oak titmouse, wrentit, and song sparrow, and other bird species protected under the MBTA in areas that could be affected during the breeding season (February 1—August 31) by construction. To the extent feasible, construction-related vegetation removal shall occur outside the nesting season. If vegetation removal or other disturbance related to construction is required during the nesting season, focused surveys for active nests of special-status birds will be conducted before and within 14 days of initiating construction. A qualified biologist will conduct preconstruction surveys to identify active nests that could be affected. The appropriate area to be surveyed and timing of the survey may vary depending on the activity and species that could be affected. If no active nests are found during focused surveys, no further action under this measure will be required. If an active loggerhead shrike, song sparrow, grasshopper sparrow, or other special-status bird nest is located during the preconstruction surveys, the biologist will notify CDFW. If necessary, modifications to the Project design to avoid removal of occupied habitat while still achieving Project objectives will be evaluated and implemented to the extent feasible. If avoidance is not feasible, construction will be prohibited within a minimum of 100 feet of the nest to avoid disturbance until the nest is no longer active. These recommended buffer areas may be reduced or expanded through consultation with CDFW. Monitoring of all occupied nests shall be conducted by a qualified biologist during construction activities to adjust the 100-foot buffer if agitated behavior by the nesting bird is observed.

Special-Status Mammals

Bat roost surveys shall be conducted by a qualified wildlife biologist within 14 days before any tree removal or clearing during each construction season. Locations of vegetation and tree removal or excavation will be examined for potential bat roosts. Specific survey methodologies will be determined in coordination with CDFW, and may include visual surveys of bats (e.g., observation of bats during foraging period), inspection for suitable habitat, bat sign (e.g., guano), or use of ultrasonic detectors (e.g., SonoBat, Anabat). Removal of any significant roost sites located will be avoided to the extent feasible. If it is determined that an active roost site cannot be avoided and will be affected, bats will be excluded from the roost site before the site is removed. The biologist shall first notify and consult with CDFW on appropriate bat exclusion methods and roost removal procedures. Exclusion methods may include use of one-way doors at roost entrances (bats may leave, but not reenter), or sealing roost entrances when the site can be confirmed to contain no bats. Once it is confirmed that all bats have left the roost, crews will be allowed to continue work in the area

5.3 Aquatic Features Recommendations

PCCP

If the PCCP programmatic permits are adopted and available as a permitting and mitigation strategy, the following measures are recommended to mitigate potential impacts on aquatic resources. The Project shall comply with the CARP AMM 7.2 Initial Screening and Consultation, which requires a pre-application meeting with local jurisdiction staff prior to submitting an Initial Project Application (CARP Section 7.2; Attachment G). In addition, the Project applicant shall comply with the CARP authorization process and CARP Conditions of Approval (Sections 7.3-7.5 in the CARP; Attachment G). If Project impacts exceed 3.0 acres in total, an LOP would need to be obtained through the CARP.

The Project shall comply with the following PCCP Stream System Conditions:

Stream System Condition 1. Stream System Avoidance and Minimization

The Project shall comply with PCCP AMM Stream System Condition 1 for avoiding and minimizing impacts to the Stream System (PCCP Section 6.3.3.1; Attachment F).

Stream System Condition 2. Stream System Mitigation: Restoration

The Project shall comply with PCCP AMM Stream System Condition 2 if the Project cannot avoid impacts to the Stream System (PCCP Section 6.3.3.2; Attachment F).

Community Condition 2. Riverine and Riparian Avoidance and Minimization

The Project will be subject to the Best Management Practices listed in Community Condition 2 for avoiding and minimizing impacts to riverine and riparian areas due to its proximity to the Stream System (PCCP Section 6.3.2.2; Attachment F).

Section 404/401 (Non-PCCP)

If the PCCP, including the Western Placer CARP and associated USACE programmatic permits are not adopted, or are not available as a permitting and mitigation strategy, compensation for loss of aquatic resources shall be implemented as follows:

- As a condition of project approval, the County shall require Project proponents to conduct a delineation of Waters of the U.S. according to methods established in the USACE wetlands delineation manual (Environmental Laboratory 1987) and Arid West Supplement (Environmental Laboratory 2008) and to delineate any aquatic resources that may not meet the definition of Waters of the U.S., but would qualify as Waters of the State. The delineation shall map and quantify the acreage of all aquatic resources on the Project site and associated offsite improvement areas and shall be submitted to USACE for jurisdictional determination.
- A permit from the USACE will be required for any activity resulting in fill of wetlands and other Waters of the U.S. Project proponents shall be required to obtain this permit before Project initiation. A wetland mitigation plan that satisfies USACE requirements will be needed as part of the permit application. In addition to the Section 404 permit, a water quality certification from the Central Valley RWQCB pursuant to Section 401 of the CWA will be required.
- Aquatic resources shall be replaced or restored on a “no-net-loss” basis the function of all wetlands and other waters that would be removed as a result of implementing the respective Project. Wetland habitat will be restored or replaced at an acreage and location and by methods agreeable to USACE and the Central Valley RWQCB, depending on agency jurisdiction, and as determined during the Section 401 and Section 404 permitting processes.
- A compensatory MMP shall be submitted to USACE and the Central Valley RWQCB, for review and approval before USACE making a permit decision for the proposed action. The MMP shall be consistent with the Final 2015 Regional Compensatory Mitigation and Monitoring Guidelines for South Pacific Division USACE, or most current guidelines, and shall identify the amount and type of proposed compensatory mitigation to ensure “no net loss” of aquatic resource functions and

services that would be removed, lost, and/or substantially degraded as a result of implementing the Project. The MMP will describe compensation ratios for acres filled, mitigation sites and work plan, maintenance plan and long-term management plan, a monitoring protocol, annual performance standards and final success criteria for created or restored habitats, corrective measures to be applied if performance standards are not met, legal protection for the preservation and mitigation areas (e.g., conservation easement, declaration of restrictions), and funding mechanism information (e.g., endowment).

- Mitigation methods may consist of establishment by a qualified biologist of aquatic resources in upland habitats where they did not exist previously, reestablishment (restoration) of natural historic functions to a former aquatic resource, enhancement of an existing aquatic resource to heighten, intensify, or improve aquatic resource functions, or a combination thereof. The compensatory mitigation may be accomplished through purchase of credits from a USACE-approved mitigation bank, payment into a USACE-approved in-lieu fee fund, or through permittee-responsible onsite or offsite establishment, reestablishment, or enhancement, depending on availability of mitigation credits. To the extent practicable, mitigation shall be carried out within the affected watershed.
- Permittee-responsible mitigation habitat shall be monitored by a qualified biologist for a minimum of five years from completion of mitigation, or human intervention (including recontouring and grading), or until the success criteria identified in the approved MMP have been met, whichever is longer.

5.4 California Department of Fish and Wildlife Lake or Streambed Alteration Agreement

An LSA Notification to CDFW under California Fish and Game Code Section 1602 will be required to request authorization to impact the aquatic features located in the Project Area.

5.5 Land Cover and Sensitive Natural Communities Recommendation

One sensitive natural community was identified onsite: the *Quercus lobata* Forest & Woodland Alliance. The Project shall comply with the PCCP Conservation Strategy, which includes the following AMM Conditions to Avoid and Minimize Effects on Specific Natural Communities (Land Cover Types) (PCCP Sections 6.3.1 (General Conditions) and 6.3.2 (Conditions to Avoid and Minimize Effects of Specific Natural Communities; Attachment F).

If the PCCP programmatic permits are not adopted and not available as a mitigation strategy for impacts to sensitive natural communities, it is anticipated that impacts to sensitive natural communities will be mitigated under the conditions of the Section 404/401 permit, the CDFW 1602 LSA and the Placer County tree permit.

5.6 Placer County Code for Tree Protection

The Project contains 1,611 trees with potential to be impacted by Project activities. If the proposed Project activities occur within the dripline or remove any of these trees, a Tree Permit will be required including tree mitigation and preservation measures in accordance with the Placer County Tree Ordinance. Additionally, once the Project impacts have been refined, ECORP recommends an additional survey within the Riparian Zones for all native trees (regardless of size) to make sure that the trees are captured appropriately

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LIST OF ATTACHMENTS

Attachment A – Special-Status Species Searches

Attachment B – Representative Site Photos

Attachment C – Plant Species Observed within the Project Area

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Attachment G – CARP Section 7

ATTACHMENT A

Special-Status Species Searches

CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

29 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3912113, 3912112, 3912111, 3812183, 3812182, 3812181, 3812173 3812172 and 3812171;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Allium jepsonii	Jepson's onion	Alliaceae	perennial bulbiferous herb	Apr-Aug	1B.2	S2	G2
Allium sanbornii var. sanbornii	Sanborn's onion	Alliaceae	perennial bulbiferous herb	May-Sep	4.2	S3S4	G4T3T4
Azolla microphylla	Mexican mosquito fern	Azollaceae	annual / perennial herb	Aug	4.2	S4	G5
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
Brodiaea rosea ssp. vallicola	valley brodiaea	Themidaceae	perennial bulbiferous herb	Apr-May(Jun)	4.2	S3	G5T3
Calystegia stebbinsii	Stebbins' morning-glory	Convolvulaceae	perennial rhizomatous herb	Apr-Jul	1B.1	S1	G1
Carex xerophila	chaparral sedge	Cyperaceae	perennial herb	Mar-Jun	1B.2	S2	G2
Ceanothus roderickii	Pine Hill ceanothus	Rhamnaceae	perennial evergreen shrub	Apr-Jun	1B.1	S1	G1
Chlorogalum grandiflorum	Red Hills soaproot	Agavaceae	perennial bulbiferous herb	May-Jun	1B.2	S3	G3
Chloropyron molle ssp. hispidum	hispid bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Sep	1B.1	S1	G2T1
	Brandegee's clarkia	Onagraceae	annual herb	May-Jul	4.2	S4	G4G5T4

Clarkia biloba ssp. brandegeeae							
Claytonia parviflora ssp. grandiflora	streambank spring beauty	Montiaceae	annual herb	Feb-May	4.2	S3	G5T3
Crocanthemum suffrutescens	Bisbee Peak rush-rose	Cistaceae	perennial evergreen shrub	Apr-Aug	3.2	S2?	G2?Q
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	2B.2	S2	GU
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	4.2	S3	G3
Fritillaria eastwoodiae	Butte County fritillary	Liliaceae	perennial bulbiferous herb	Mar-Jun	3.2	S3	G3Q
Galium californicum ssp. sierrae	El Dorado bedstraw	Rubiaceae	perennial herb	May-Jun	1B.2	S1	G5T1
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	1B.2	S2	G2
Juncus leiospermus var. ahartii	Ahart's dwarf rush	Juncaceae	annual herb	Mar-May	1B.2	S1	G2T1
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	Juncaceae	annual herb	Mar-Jun	1B.1	S2	G2T2
Lathyrus sulphureus var. argillaceus	dubious pea	Fabaceae	perennial herb	Apr-May	3	S1S2	G5T1T2Q
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2
Lilium humboldtii ssp. humboldtii	Humboldt lily	Liliaceae	perennial bulbiferous herb	May-Jul(Aug)	4.2	S3	G4T3
Navarretia myersii ssp. myersii	pincushion navarretia	Polemoniaceae	annual herb	Apr-May	1B.1	S2	G2T2
Navarretia nigelliformis ssp. nigelliformis	adobe navarretia	Polemoniaceae	annual herb	Apr-Jun	4.2	S3	G4T3
Packera layneae	Layne's ragwort	Asteraceae	perennial herb	Apr-Aug	1B.2	S2	G2
Viburnum ellipticum	oval-leaved viburnum	Adoxaceae	perennial deciduous shrub	May-Jun	2B.3	S3?	G4G5
Wolffia brasiliensis	Brazilian watermeal	Araceae	perennial herb (aquatic)	Apr,Dec	2B.3	S2	G5
Wyethia reticulata	El Dorado County mule ears	Asteraceae	perennial herb	Apr-Aug	1B.2	S2	G2

Suggested Citation

California Native Plant Society, Rare Plant Program. 2020. Inventory of Rare and Endangered Plants of California (online edition, v8-03 0.39). Website http://www.rareplants.cnps.org [accessed 21 September 2020].

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CNPS California Native Plant Society

Inventory of Rare and Endangered Plants

*The database used to provide updates to the Online Inventory is under construction. View updates and changes made since May 2019 here.

Plant List

16 matches found. *Click on scientific name for details*

Search Criteria

Found in Quads 3912114, 3912113, 3912112, 3812184, 3812183, 3812182, 3812174 3812173 and 3812172;

Modify Search Criteria Export to Excel Modify Columns Modify Sort Display Photos

Scientific Name	Common Name	Family	Lifeform	Blooming Period	CA Rare Plant Rank	State Rank	Global Rank
Azolla microphylla	Mexican mosquito fern	Azollaceae	annual / perennial herb	Aug	4.2	S4	G5
Balsamorhiza macrolepis	big-scale balsamroot	Asteraceae	perennial herb	Mar-Jun	1B.2	S2	G2
Brodiaea rosea ssp. vallicola	valley brodiaea	Themidaceae	perennial bulbiferous herb	Apr-May(Jun)	4.2	S3	G5T3
Chloropyron molle ssp. hispidum	hispid bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Sep	1B.1	S1	G2T1
Clarkia biloba ssp. brandegeeae	Brandegee's clarkia	Onagraceae	annual herb	May-Jul	4.2	S4	G4G5T4
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	2B.2	S2	GU
Fritillaria agrestis	stinkbells	Liliaceae	perennial bulbiferous herb	Mar-Jun	4.2	S3	G3
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	1B.2	S2	G2
Juncus leiospermus var. ahartii	Ahart's dwarf rush	Juncaceae	annual herb	Mar-May	1B.2	S1	G2T1
Juncus leiospermus var. leiospermus	Red Bluff dwarf rush	Juncaceae	annual herb	Mar-Jun	1B.1	S2	G2T2
Lathyrus sulphureus var. argillaceus	dubious pea	Fabaceae	perennial herb	Apr-May	3	S1S2	G5T1T2Q
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	1B.1	S2	G2

Lilium humboldtii ssp. humboldtii	Humboldt lily	Liliaceae	perennial bulbiferous herb	May-Jul(Aug)	4.2	S3	G4T3
Navarretia myersii ssp. myersii	pincushion navarretia	Polemoniaceae	annual herb	Apr-May	1B.1	S2	G2T2
Navarretia nigelliformis ssp. nigelliformis	adobe navarretia	Polemoniaceae	annual herb	Apr-Jun	4.2	S3	G4T3
Wolffia brasiliensis	Brazilian watermeal	Araceae	perennial herb (aquatic)	Apr,Dec	2B.3	S2	G5

Suggested Citation

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Selected Elements by Element Code

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Lincoln (3812183) OR Gold Hill (3812182))

Element Code	Species	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
ABNGA04010	***Ardea herodias*** great blue heron	None	None	G5	S4	
ABNKC19070	***Buteo swainsoni*** Swainson's hawk	None	Threatened	G5	S3	
ABNME03041	***Laterallus jamaicensis coturniculus*** California black rail	None	Threatened	G3G4T1	S1	FP
ABNSB10010	***Athene cunicularia*** burrowing owl	None	None	G4	S3	SSC
ABPBXA3010	***Melospiza melodia*** song sparrow ("Modesto" population)	None	None	G5	S3?	SSC
ABPBXB0020	***Agelaius tricolor*** tricolored blackbird	None	Threatened	G2G3	S1S2	SSC
AFCHA0209K	***Oncorhynchus mykiss irideus pop. 11*** steelhead - Central Valley DPS	Threatened	None	G5T2Q	S2	
AMACC08010	***Corynorhinus townsendii*** Townsend's big-eared bat	None	None	G3G4	S2	SSC
ARAAD02030	***Emys marmorata*** western pond turtle	None	None	G3G4	S3	SSC
CTT44110CA	***Northern Hardpan Vernal Pool*** Northern Hardpan Vernal Pool	None	None	G3	S3.1	
ICBRA03030	***Branchinecta lynchi*** vernal pool fairy shrimp	Threatened	None	G3	S3	
ICBRA06010	***Linderiella occidentalis*** California linderiella	None	None	G2G3	S2S3	
PDAST11061	***Balsamorhiza macrolepis*** big-scale balsamroot	None	None	G2	S2	1B.2
PDCAM060C0	***Downingia pusilla*** dwarf downingia	None	None	GU	S2	2B.2
PDONA05053	***Clarkia biloba ssp. brandegeeae*** Brandegee's clarkia	None	None	G4G5T4	S4	4.2
PDPLM0C0X1	***Navarretia myersii ssp. myersii*** pincushion navarretia	None	None	G2T2	S2	1B.1
PDSCR0R060	***Gratiola heterosepala*** Boggs Lake hedge-hyssop	None	Endangered	G2	S2	1B.2
PMJUN011L1	***Juncus leiospermus var. ahartii*** Ahart's dwarf rush	None	None	G2T1	S1	1B.2

Record Count: 18

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Placer County, California

NOT FOR CONSULTATION

Local office

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population, even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

NOT FOR CONSULTATION

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information.
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Reptiles

NAME	STATUS
Giant Garter Snake *Thamnophis gigas* No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4482	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/321	Threatened

Insects

NAME	STATUS

NOT FOR CONSULTATION

Valley Elderberry Longhorn Beetle Desmocerus californicus dimorphus There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/7850	Threatened

Crustaceans

NAME	STATUS
Conservancy Fairy Shrimp Branchinecta conservatio There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/8246	Endangered
Vernal Pool Fairy Shrimp Branchinecta lynchi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/498	Threatened
Vernal Pool Tadpole Shrimp Lepidurus packardi There is **final** critical habitat for this species. Your location is outside the critical habitat. https://ecos.fws.gov/ecp/species/2246	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

THERE ARE NO CRITICAL HABITATS AT THIS LOCATION.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

NOT FOR CONSULTATION

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON (IF A BREEDING SEASON IS INDICATED FOR A BIRD ON YOUR LIST, THE BIRD MAY BREED IN YOUR PROJECT AREA SOMETIME WITHIN THE

NOT FOR CONSULTATION

TIMEFRAME SPECIFIED, WHICH IS A VERY LIBERAL ESTIMATE OF THE DATES INSIDE WHICH THE BIRD BREEDS ACROSS ITS ENTIRE RANGE. "BREEDS ELSEWHERE" INDICATES THAT THE BIRD DOES NOT LIKELY BREED IN YOUR PROJECT AREA.)

Bald Eagle Haliaeetus leucocephalus — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1626

Burrowing Owl Athene cunicularia — Breeds Mar 15 to Aug 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9737

California Thrasher Toxostoma redivivum — Breeds Jan 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Clark's Grebe Aechmophorus clarkii — Breeds Jan 1 to Dec 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Common Yellowthroat Geothlypis trichas sinuosa — Breeds May 20 to Jul 31

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/2084

NOT FOR CONSULTATION

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Long-billed Curlew Numenius americanus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/5511

Marbled Godwit Limosa fedoa — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9481

Nuttall's Woodpecker Picoides nuttallii — Breeds Apr 1 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/9410

Oak Titmouse Baeolophus inornatus — Breeds Mar 15 to Jul 15

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9656

NOT FOR CONSULTATION

Rufous Hummingbird selasphorus rufus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/8002

Short-billed Dowitcher Limnodromus griseus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9480

Song Sparrow Melospiza melodia — Breeds Feb 20 to Sep 5

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Spotted Towhee Pipilo maculatus clementae — Breeds Apr 15 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA
https://ecos.fws.gov/ecp/species/4243

Tricolored Blackbird Agelaius tricolor — Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/3910

Whimbrel Numenius phaeopus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9483

Willet Tringa semipalmata — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Wrentit *Chamaea fasciata* Breeds Mar 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Yellow-billed Magpie *Pica nuttalli* Breeds Apr 1 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9726

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.

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3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

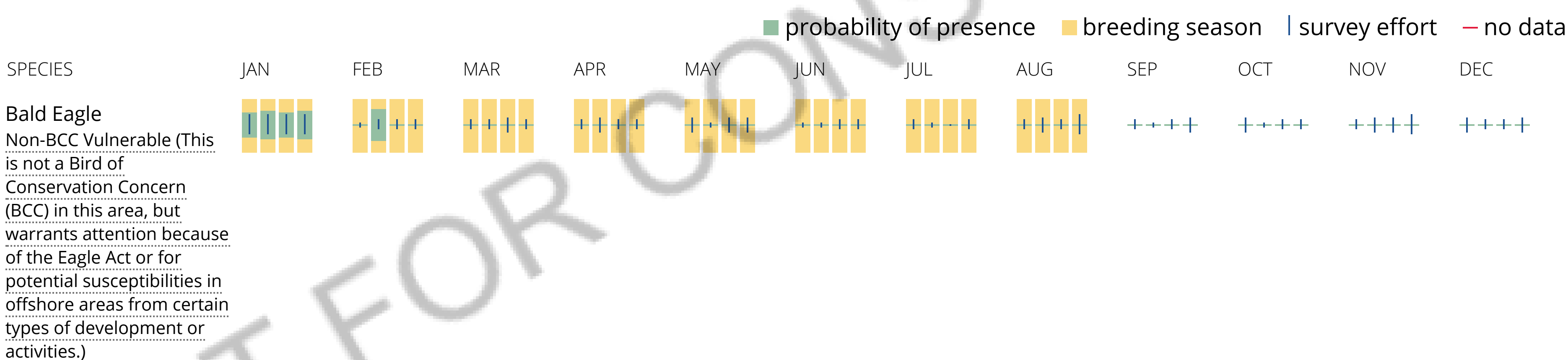
Breeding Season ()
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

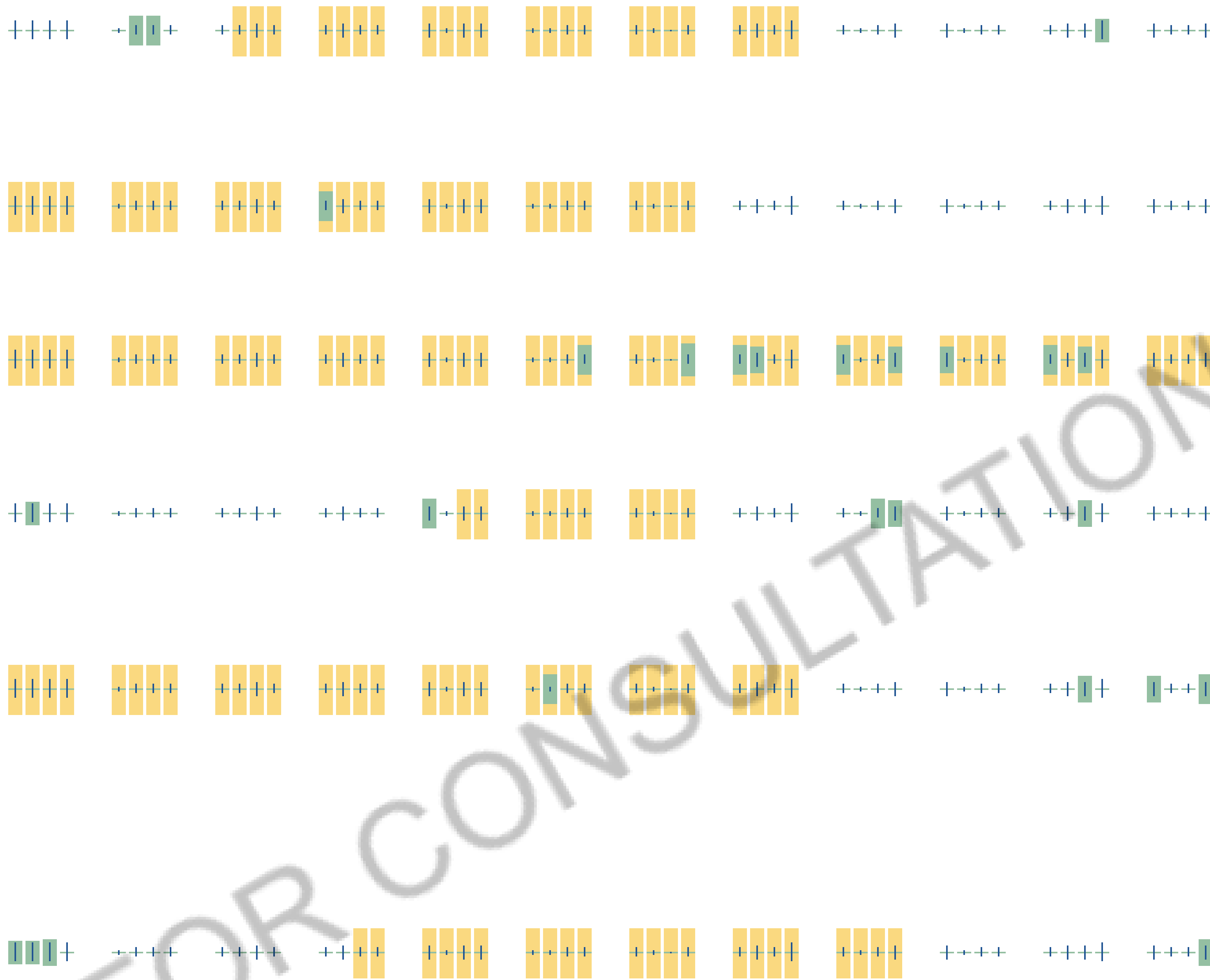
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION



Burrowing Owl
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

California Thrasher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Clark's Grebe
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Common Yellowthroat
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

Golden Eagle
Non-BCC Vulnerable (This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.)

Lewis's Woodpecker
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

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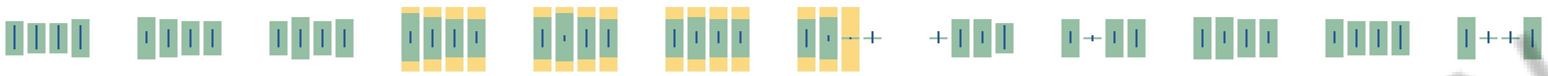
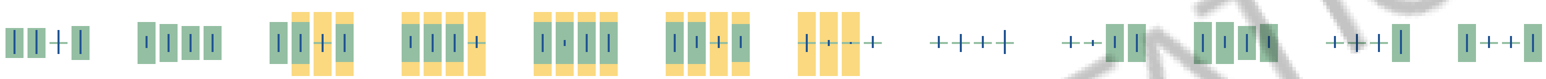
Long-billed Curlew
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Marbled Godwit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Nuttall's Woodpecker
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



Oak Titmouse
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

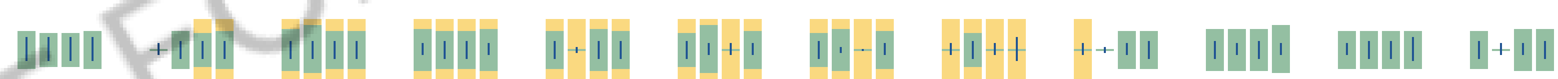


Rufous Hummingbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

SPECIES JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

Short-billed Dowitcher
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Song Sparrow
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)



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Spotted Towhee
BCC - BCR (This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA)

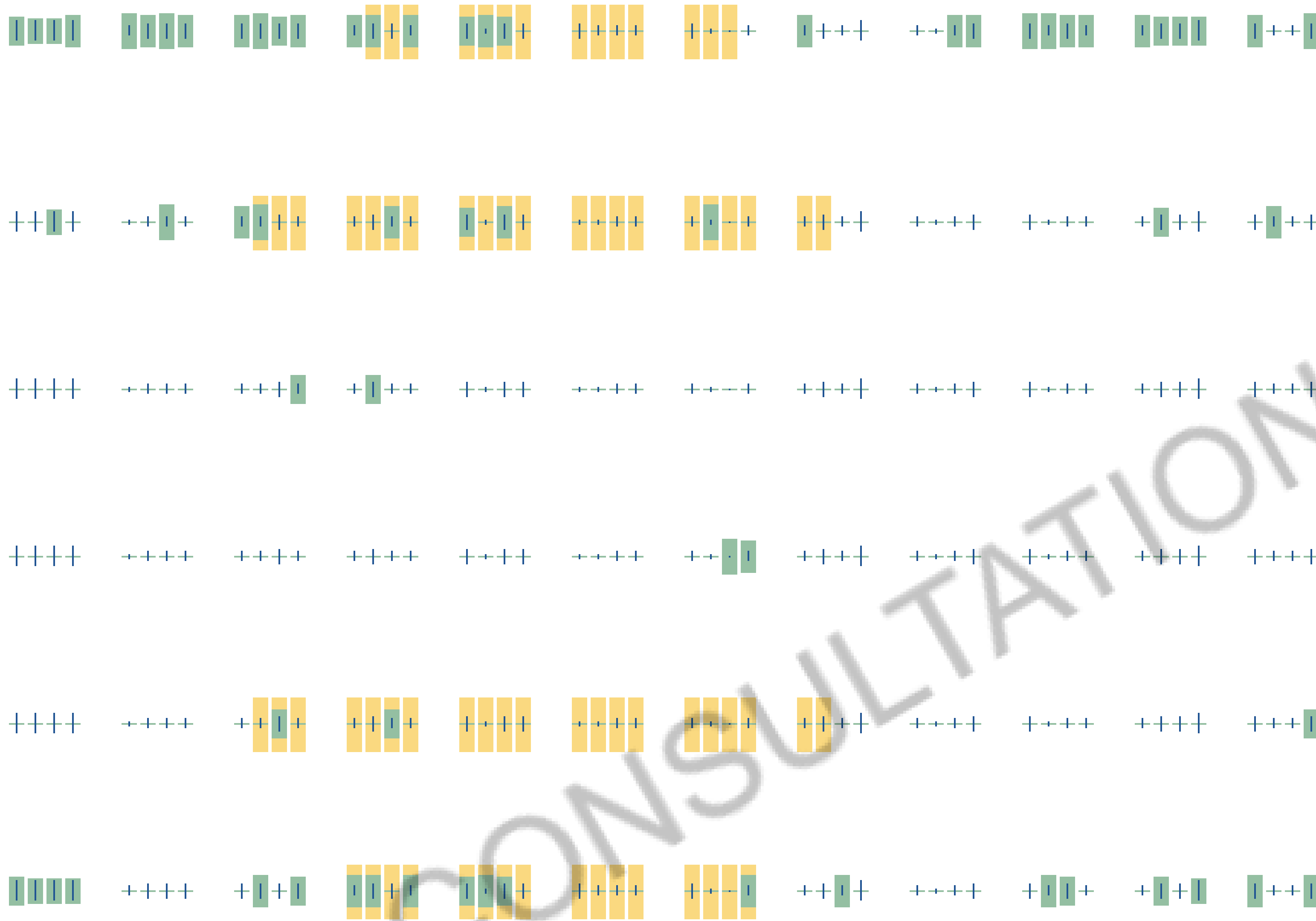
Tricolored Blackbird
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Whimbrel
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Willet
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Wrentit
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)

Yellow-billed Magpie
BCC Rangewide (CON) (This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.)



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

[Nationwide Conservation Measures](#) describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure.

To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures and/or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

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1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ “What does IPaC use to generate the migratory birds potentially occurring in my specified location”. Please be aware this report provides the “probability of presence” of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the “no data” indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and

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helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ “Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds” at the bottom of your migratory bird trust resources page.

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS AT THIS LOCATION.

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

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This location overlaps the following wetlands:

FRESHWATER EMERGENT WETLAND

- PEM1Cx
- PEM1Fx
- PEM1A

FRESHWATER POND

- PUBHh

RIVERINE

- R3UBH
- R2UBH
- R5UBFx
- R2USC
- R5UBF

A full description for each wetland code can be found at the National Wetlands Inventory website

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Quad Name: Lincoln

Quad Number: 38121-H3

ESA Anadromous Fish

CVSR Chinook Salmon ESU (T)

CCV Steelhead DPS (T)

ESA Anadromous Fish Critical Habitat

CCV Steelhead Critical Habitat

Essential Fish Habitat

Chinook Salmon EFH

Quad Name: Gold Hill

Quad Number: 38121-H2

ESA Anadromous Fish

CVSR Chinook Salmon ESU (T)

CCV Steelhead DPS (T)

ESA Anadromous Fish Critical Habitat

CCV Steelhead Critical Habitat

Essential Fish Habitat

Chinook Salmon EFH

Reference:

United States Department of Commerce. National Oceanic and Atmospheric Administration. 2020. NOAA Fisheries, West Coast Region. California Species List Tools. Available online at: https://archive.fisheries.noaa.gov/wcr/maps_data/california_species_list_tools.html. Accessed September 2020.

ATTACHMENT B

Representative Site Photos

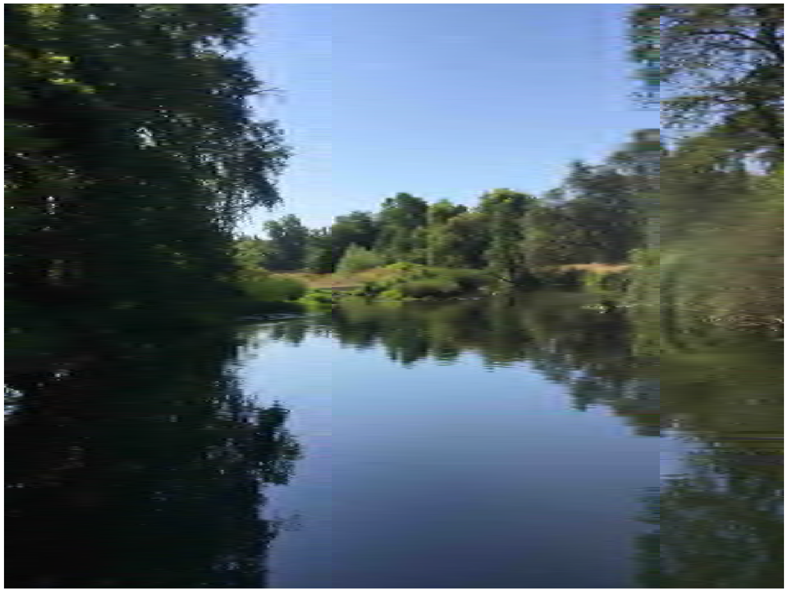


Photo 1. Auburn Ravine Upstream of Hemphill Diversion, facing SE, August 7, 2020

Photo 2. Riverine Riparian Downstream of Hemphill Diversion, facing E, July 28, 2020

Photo 3. Walnut in Riparian, facing E, July 28, 2020

Figure 4. Ditch in Mixed Oak Woodland, facing E, August 7, 2020

Photo 5. Mixed Oak Woodland along Fruitvale Road, facing E, July 28, 2020

Photo 6. Mixed Oak Woodland btw Virginiatown Rd and Auburn Ravine, facing W, September 17, 2020

Photo 7. Annual grassland West of Fowler Road. facing W, July 28, 2020

Figure 8. Seasonal Wetland Swale in Grassland, facing SSW, July 28, 2020

Photo 9. Irrigated Pasture, facing NW, July 28, 2020

Photo 10. Ditch at Turkey Creek Golf Club, facing E, August 26, 2020

Photo 11. Annual Grassland East of Turkey Creek GC, facing S, July 28, 2020

Figure 12. Barren Land Cover, NID Facility, facing SW, July 29, 2020

ATTACHMENT C

Plant Species Observed within the Project Area

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ADOXACEAE	**MUSKROOT FAMILY**
Sambucus nigra subsp. *caerulea*	Blue elderberry
AGAVACEAE	**AGAVE FAMILY**
Agave sp.*	Agave (cultivated)
Chlorogalum pomeridianum	Wavyleaf soap plant
ALISMATACEAE	**WATER-PLANTAIN FAMILY**
Alisma triviale	Northern water plantain
AMARANTHACEAE	**AMARANTH FAMILY**
*Amaranthus albus**	Pigweed amaranth
ANACARDIACEAE	**SUMAC FAMILY**
*Pistacia terebinthus**	Turpentine tree (cultivated)
Toxicodendron diversilobum	Poison oak
APIACEAE	**CARROT FAMILY**
*Conium maculatum**	Poison hemlock
*Daucus carota**	Queen Anne's lace
*Foeniculum vulgare**	Sweet fennel
*Torilis arvensis**	Field hedge parsley
APOCYNACEAE	**DOGBANE FAMILY**
Asclepias fascicularis	Narrow-leaf milkweed
*Nerium oleander**	Oleander
*Vinca major**	Periwinkle
ARACEAE	**ARUM FAMILY**
Lemna minuta	Least duckweed
ARALIACEAE	**IVY FAMILY**
*Hedera helix**	English ivy
ARECACEAE	**PALM FAMILY**
*Washingtonia robusta**	Mexican fan
ARISTOLOCHIACEAE	**PIPEVINE FAMILY**
Aristolochia californica	California pipevine
ASTERACEAE	**SUNFLOWER FAMILY**
Artemisia douglasiana	Mugwort

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ASTERACEAE	**SUNFLOWER FAMILY**
Baccharis pilularis	Coyote bush
*Bidens tripartita**	Tickseed
*Carduus pycnocephalus**	Italian thistle
*Centaurea solstitialis**	Yellow star-thistle
Centromadia fitchii	Fitch's spikeweed
*Chondrilla juncea**	Skeleton weed
*Cichorium intybus**	Chicory
*Cirsium vulgare**	Bull thistle
*Dittrichia graveolens**	Stinkwort
Erigeron canadensis	Canada horseweed
Helenium puberulum	Sneezeweed
Helianthus annuus	Common sunflower
Holocarpha virgata	Narrow tarplant
*Hypochaeris radicata**	Rough cat's-ear
*Lactuca serriola**	Prickly lettuce
*Pseudognaphalium luteoalbum**	Jersey cudweed
*Silybum marianum**	Milk thistle
Xanthium strumarium	Rough cockle-bur
AZOLLACEAE	**MOSQUITO FERN FAMILY**
Azolla filiculoides	Mosquito fern
BERBERIDACEAE	**BARBERRY FAMILY**
Nandina sp.*	Nandina (cultivated)
BETULACEAE	**BIRCH FAMILY**
Alnus rhombifolia	White alder
BIGNONIACEAE	**TRUMPET-CREEPER FAMILY**
*Campsis radicans**	Trumpet vine (cultivated)
*Catalpa bignonioides**	Southern catalpa
BORAGINACEAE	**BORAGE FAMILY**
Amsinckia sp.	Fiddleneck

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
BRASSICACEAE	**MUSTARD FAMILY**
*Brassica nigra**	Black mustard
*Hirschfeldia incana**	Shortpod mustard
*Raphanus sativus**	Purple wild radish
CACTACEAE	**CACTUS FAMILY**
Opuntia sp.*	Prickly pear cactus (cultivated)
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**
Lonicera hispidula	Pink honeysuckle
CARYOPHYLLACEAE	**PINK FAMILY**
Cerastium sp.*	Chickweed
*Spergularia rubra**	Purple sandspurry
CHENOPODIACEAE	**GOOSEFOOT FAMILY**
*Dysphania ambrosioides**	Mexican tea
*Kochia scoparia**	Mexican fireweed
CISTACEAE	**ROCK-ROSE FAMILY**
Cistus sp.*	Rock rose (cultivated)
CONVOLVULACEAE	**MORNING-GLORY FAMILY**
*Convolvulus arvensis**	Field bindweed
CONVOLVULAVEAE	**MORNING GLORY FAMILY**
*Ipomoea purpurea**	Common morning-glory (cultivated)
CYPERACEAE	**SEDGE FAMILY**
Carex barbarae	Santa Barbara sedge
Cyperus eragrostis	Tall flatsedge
Eleocharis macrostachya	Creeping spikerush
Schoenoplectus acutus var. *occidentalis*	Hard-stem bulrush
EQUISETACEAE	**HORSETAIL FAMILY**
Equisetum arvense	Field horsetail
Equisetum hyemale	Rough horsetail
EUPHORBIACEAE	**SPURGE FAMILY**
Croton setiger	Turkey mullein
*Euphorbia crenulata**	Chinese caps

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
EUPHORBIACEAE	**SPURGE FAMILY**
*Euphorbia maculata**	Spotted spurge
FABACEAE	**LEGUME FAMILY**
Acmispon americanus	Spanish clover
*Albizia julibrissin**	Silk tree
*Lotus corniculatus**	Birdsfoot trefoil
Melilotus sp.*	Sweetclover
*Trifolium hirtum**	Rose clover
*Trifolium incarnatum**	Crimson clover
*Trifolium repens**	White clover
Trifolium sp.	Clover
*Vicia sativa**	Spring vetch
FAGACEAE	**OAK FAMILY**
Quercus douglasii	Blue oak
Quercus lobata	Valley oak
Quercus wislizeni	Interior live oak
GENTIANACEAE	**GENTIAN FAMILY**
Zeltnera muehlenbergii	Muehlenberg's centaury
GERANIACEAE	**GERANIUM FAMILY**
Erodium sp.*	Filaree
*Geranium molle**	Dovefoot geranium
HYDROCHARITACEAE	**WATERWEED FAMILY**
Elodea canadensis	Common water weed
HYPERICACEAE	**ST. JOHN'S WORT FAMILY**
*Hypericum perforatum**	Klamath weed
IRIDACEAE	**IRIS FAMILY**
Iris sp.*	Iris (cultivated)
JUGLANDACEAE	**WALNUT FAMILY**
Juglans hindsii	Black walnut
JUNCACEAE	**RUSH FAMILY**
Juncus balticus ssp. *ater*	Baltic rush

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
JUNCACEAE	**RUSH FAMILY**
Juncus effusus	Soft rush
Juncus xiphioides	Iris-leaf rush
LAMIACEAE	**MINT FAMILY**
Lycopus americanus	Bugleweed
*Marrubium vulgare**	Common horehound
*Mentha pulegium**	Pennyroyal
*Salvia rosmarinus**	Rosemary (cultivated)
LYTHRACEAE	**LOOSESTRIFE FAMILY**
*Lagerstroemia indica**	Crape mytle (cultivated)
*Punica granatum**	Pomegranate (cultivated)
MALVACEAE	**MALLOW FAMILY**
Malva sp.*	Mallow
MARTYNIACEAE	**UNICORN-PLANT FAMILY**
*Proboscidea louisianica**	Devil's claw
MOLLUGINACEAE	**CARPET-WEED FAMILY**
*Mollugo verticillata**	Indian chickweed
MORACEAE	**MULBERRY FAMILY**
*Ficus carica**	Common fig
*Morus alba**	White mulberry
MYRSINACEAE	**MYRSINE FAMILY**
*Lysimachia arvensis**	Scarlet pimpernel
MYRTACEAE	**MYRTLE FAMILY**
Callistemon sp.*	Bottlebrush (cultivated)
*Eucalyptus rudis**	Western australian floodedgum
OLEACEAE	**OLIVE FAMILY**
Fraxinus latifolia	Oregon ash
*Ligustrum lucidum**	Glossy privet (cultivated)
ONAGRACEAE	**EVENING PRIMROSE FAMILY**
Epilobium brachycarpum	Panicled willow-herb
Epilobium ciliatum	Hairy willow-herb

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ONAGRACEAE	**EVENING PRIMROSE FAMILY**
Epilobium densiflorum	Dense-flower spike primrose
Ludwigia peploides ssp. *peploides**	Water primrose
Oenothera elata	Hooker's evening-primrose
OXALIDACEAE	**OXALIS FAMILY**
*Oxalis corniculata**	Creeping woodsorrel
PAPAVERACEAE	**POPPY FAMILY**
Eschscholzia californica	California poppy
PHRYMACEAE	**LOPSEED FAMILY**
Erythranthe cardinalis	Scarlet monkeyflower
PHYTOLACCACEAE	**POKEWEED FAMILY**
*Phytolacca americana**	American pokeweed
PINACEAE	**PINE FAMILY**
*Cedrus deodara**	Deodar cedar (cultivated)
Pinus sabiniana	Gray pine
Pinus sp.*	Pine (cultivated)
PLANTAGINACEAE	**PLANTAIN FAMILY**
Callitriche heterophylla	Varied leaved water starwort
*Kickxia elatine**	Sharp-leaved fluellin
*Plantago lanceolata**	English plantain
Veronica americana	American speedwell
PLATANACEAE	**PLANE-TREE FAMILY**
Platanus racemosa	California sycamore
POACEAE	**GRASS FAMILY**
*Aira caryophyllea**	Silvery hairgrass
Avena sp.*	Wild oat
*Briza maxima**	Big quaking grass
*Bromus diandrus**	Ripgut brome
*Bromus hordeaceus**	Soft brome
*Cynodon dactlyon**	Bermuda grass
*Cynosurus echinatus**	Hedgehog dog-tail grass

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
POACEAE	**GRASS FAMILY**
*Digitaria ciliaris**	Hairy crabgrass
*Echinochloa crus-galli**	Barnyard grass
*Festuca glauca**	Blue fescue
*Festuca perennis**	Italian Ryegrass
Hordeum murinum ssp. *glaucum**	Foxtail barley
Leersia oryzoides	Rice cutgrass
Muhlenbergia rigens	Deergrass
*Panicum dichotomiflorum**	Fall panicgrass
*Paspalum dilatatum**	Dallis grass
*Phyllostachys aurea**	Golden bamboo (cultivated)
*Poa annua**	Annual bluegrass
*Polypogon monspeliensis**	Annual rabbit-foot grass
*Setaria pumila**	Yellow bristlegrass
*Sorghum halepense**	Johnson grass
*Triticum aestivum**	Cultivated wheat
POLEMONIACEAE	**PHLOX FAMILY**
Navarretia sp.	Navarretia
POLYGONACEAE	**BUCKWHEAT FAMILY**
*Persicaria hydropiper**	Common smartweed
Polygonum aviculare ssp. *depressum**	Prostrate knotweed
*Rumex crispus**	Curly dock
*Rumex pulcher**	Fiddle dock
PONTEDERIACEAE	**PICKEREL-WEED FAMILY**
*Eichhornia crassipes**	Water hyacinth
PORTULACEAE	**PURSLANE FAMILY**
*Portulaca oleracea**	Common purslane
ROSACEAE	**ROSE FAMILY**
*Malus pumila**	Apple (cultivated)
Photinia sp.*	Photinia (cultivated)
*Prunus cerasifera**	Cherry plum (cultivated)

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ROSACEAE	**ROSE FAMILY**
*Prunus dulcis**	Almond (cultivated)
*Prunus mume**	Plum blossom (cultivated)
*Pyrus calleryana**	Callery pear (cultivated)
Pyrus sp.*	Pear (cultivated)
Rosa sp.	Rose (native)
Rosa sp.*	Rose (cultivated)
*Rubus armeniacus**	Himalayan blackberry
Rubus ursinus	California blackberry
SALICACEAE	**WILLOW FAMILY**
Populus fremontii	Fremont's cottonwood
Salix exigua	Sandbar willow
Salix gooddingii	Goodding's black willow
Salix lasiolepis	Arroyo willow
SAPINDACEAE	**SOAPBERRY FAMILY**
Acer sp.*	Maple (cultivated)
Aesculus californica	California buckeye
SCROPHULARIACEAE	**FIGWORT FAMILY**
*Verbascum blattaria**	Moth mullein
*Verbascum thapsus**	Common mullein
SIMAROUBACEAE	**QUASSIA FAMILY**
*Ailanthus altissima**	Tree-of-heaven
SOLANACEAE	**NIGHTSHADE FAMILY**
Nicotiana attenuata	Coyote tobacco
Solanum americanum	Common nightshade
*Solanum elaeagnifolium**	Silverleaf nightshade
*Solanum rostratum**	Buffalo bur
Solanum xanti	Purple nightshade
TAXODIACEAE	**BALD CYPRESS FAMILY**
Sequoia sempervirens	Coast redwood (cultivated)

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
THEMIDACEAE	**BRODIAEA FAMILY**
Brodiaea sp.	Brodiaea
Dichelostemma capitatum	Blue dicks
Dichelostemma volubile	Twining brodiaea
TYPHACEAE	**CATTAIL FAMILY**
Typha sp.	Cattail
VERBENACEAE	**VERVAIN FAMILY**
Phyla nodiflora	Common lippia
*Verbena bonariensis**	Purpletop vervain
VITACEAE	**GRAPE FAMILY**
Vitis californica	California wild grape
ZYGOPHYLLACEAE	**CALTROP FAMILY**
*Tribulus terrestris**	Puncture vine

An asterisk (*) indicates a non-native species.

ATTACHMENT D

Wildlife Species Observed within the Project Area

Attachment C. Wildlife Observed on August 7 and 26, 2020

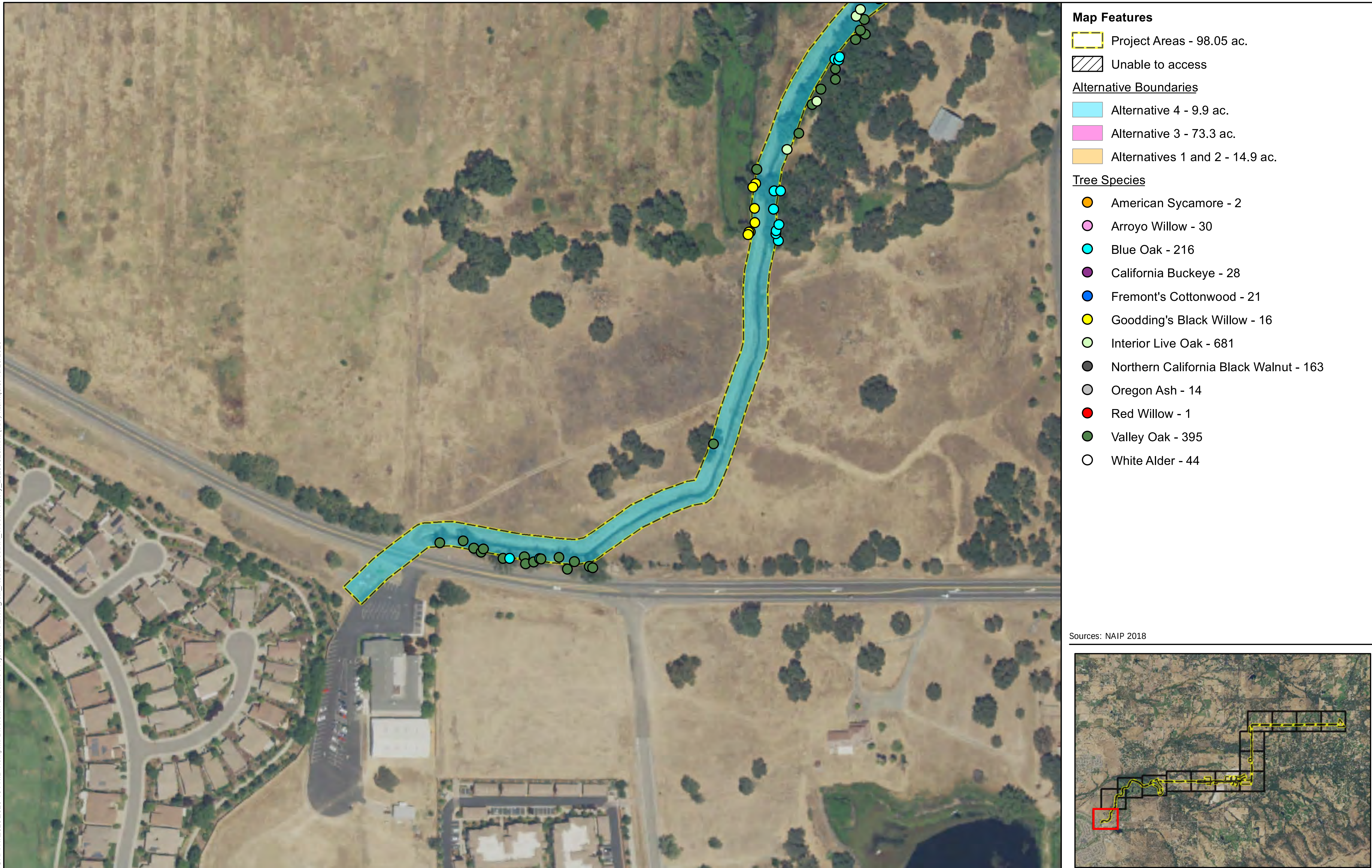
Common Name	Scientific Name
Fish	
Mosquitofish	*Gambusia affinis*
Amphibians	
Bullfrog	*Lithobates catesbeianus*
Reptiles	
Western fence lizard	*Sceloporus occidentalis*
Birds	
Canada Goose	*Branta canadensis*
Wood Duck	*Aix sponsa*
Mallard	*Anas platyrhynchos*
California Quail	*Callipepla californica*
Wild Turkey	*Meleagris gallopavo*
Eurasian Collared-dove	*Streptopelia decaocto*
Mourning Dove	*Zenaida macroura*
Black-chinned Hummingbird	*Archilochus alexandri*
Anna's Hummingbird	*Calypte anna*
Great Blue Heron	*Ardea herodias*
Turkey Vulture	*Cathartes aura*
Red-shouldered Hawk	*Buteo lineatus*
Red-tailed Hawk	*Buteo jamaicensis*
Acorn Woodpecker	*Melanerpes formicivorus*
Nuttall's Woodpecker	*Dryobates nuttallii*
Ash-throated Flycatcher	*Myiarchus cinerascens*
Western Kingbird	*Tyrannus verticalis*
Black Phoebe	*Sayornis nigricans*
California Scrub-Jay	*Aphelocoma californica*
American Crow	*Corvus brachyrhynchos*
Tree Swallow	*Tachycineta bicolor*
Oak Titmouse	*Baeolophus inornatus*
Bushtit	*Psaltriparus minimus*
White-breasted Nuthatch	*Sitta carolinensis*
Bewick's Wren	*Thryomanes bewickii*
Western Bluebird	*Sialia mexicana*
American Robin	*Turdus migratorius*
Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris*
House Sparrow	*Passer domesticus*
House Finch	*Haemorhous mexicanus*
Lesser Goldfinch	*Spinus psaltria*

Attachment C. Wildlife Observed on August 7 and 26, 2020

Common Name	Scientific Name
California Towhee	*Melozone crissalis*
Spotted Towhee	*Pipilo maculatus*
Bullock's Oriole	*Icterus bullockii*
Red-winged Blackbird	*Agelaius phoeniceus*
Lazuli Bunting	*Passerina amoena*
Mammals	
Western gray squirrel	*Sciurus griseus*
Mule Deer	*Odocoileus hemiounus*

ATTACHMENT E

Map Depicting Locations of Inventoried Trees



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Scale in Feet
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Attachment E. Tree Inventory of Hemphill Diversion Structure Removal Project

2020-104 NID-Hemphill Diversion Structure Project

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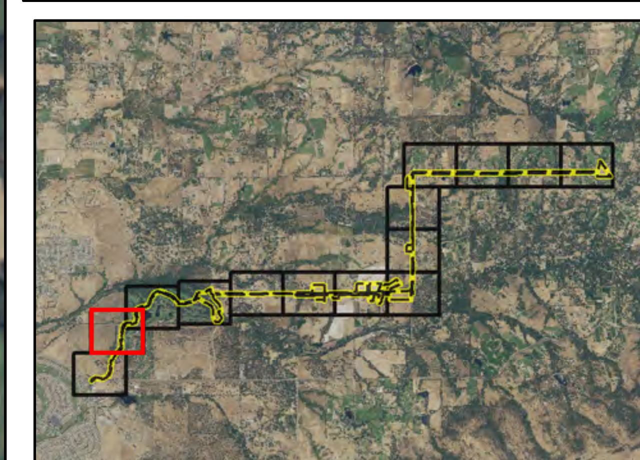

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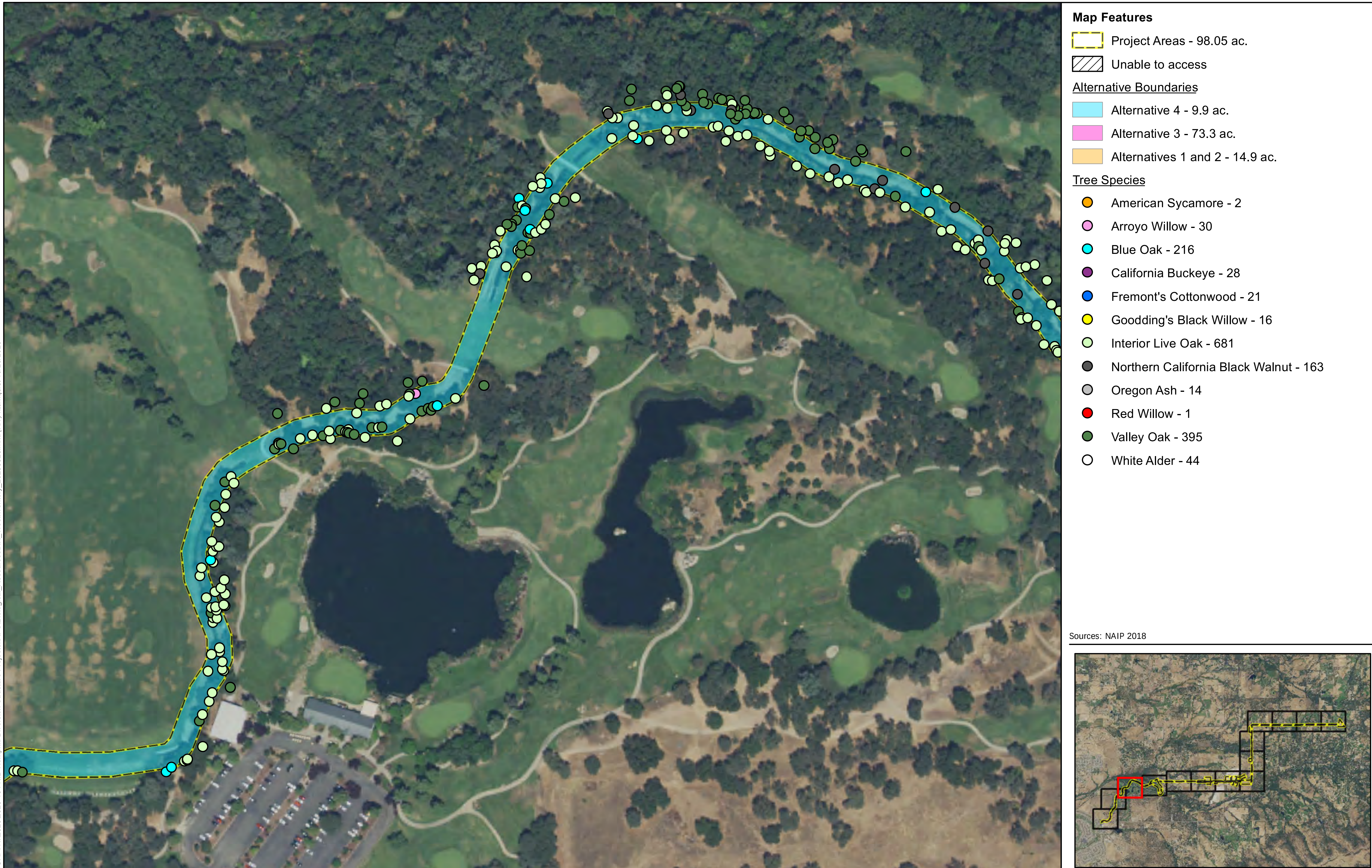

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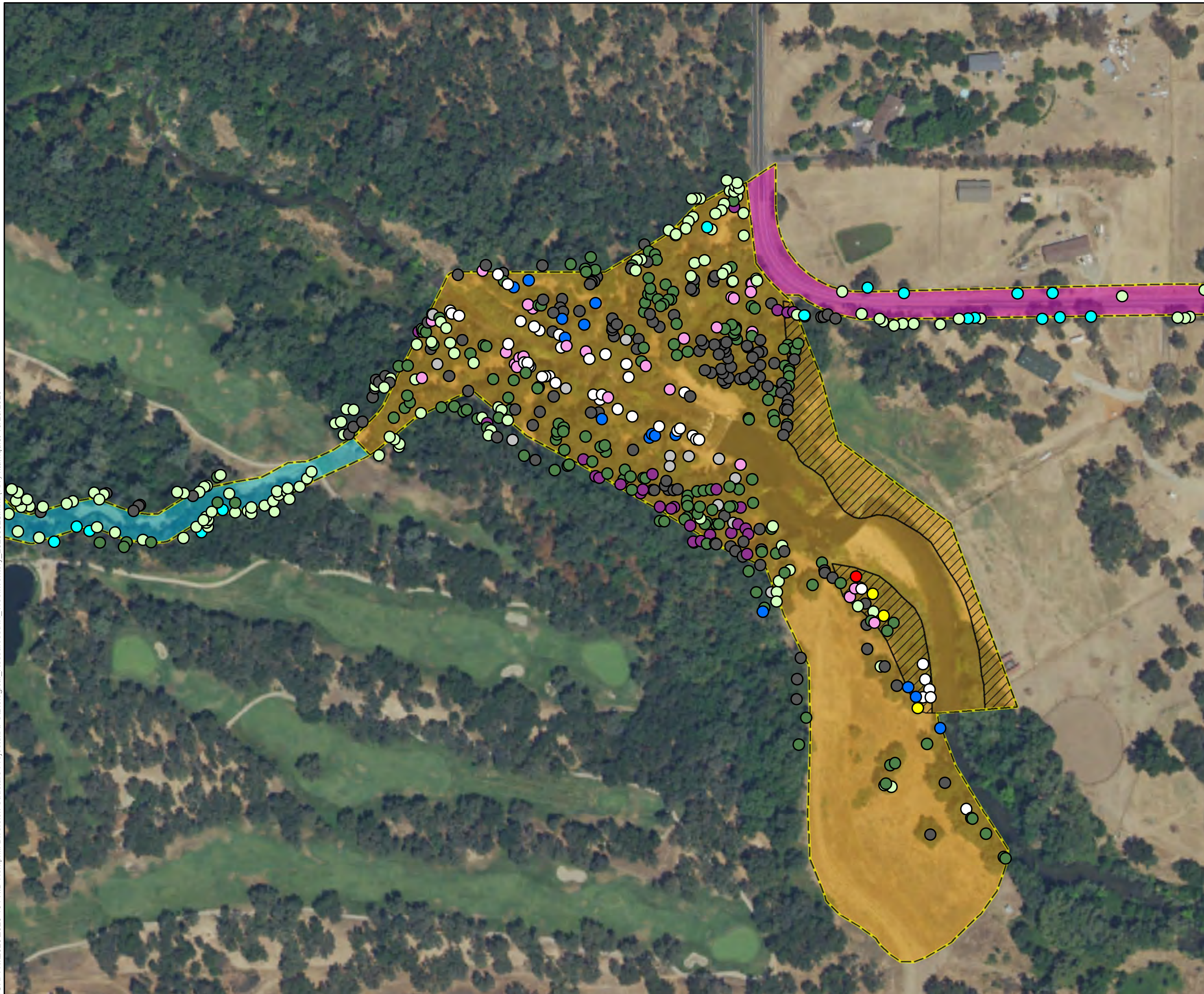

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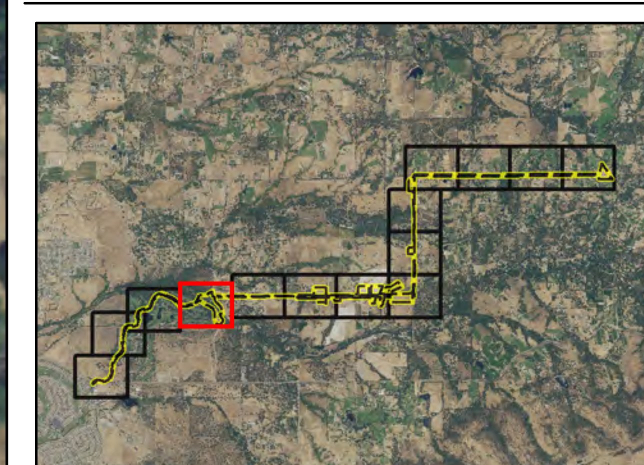

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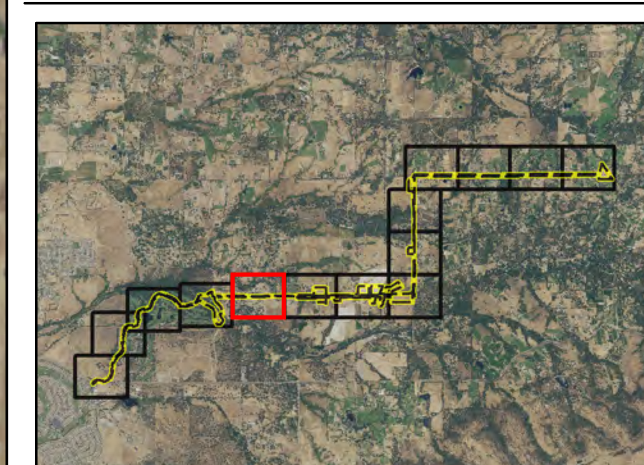

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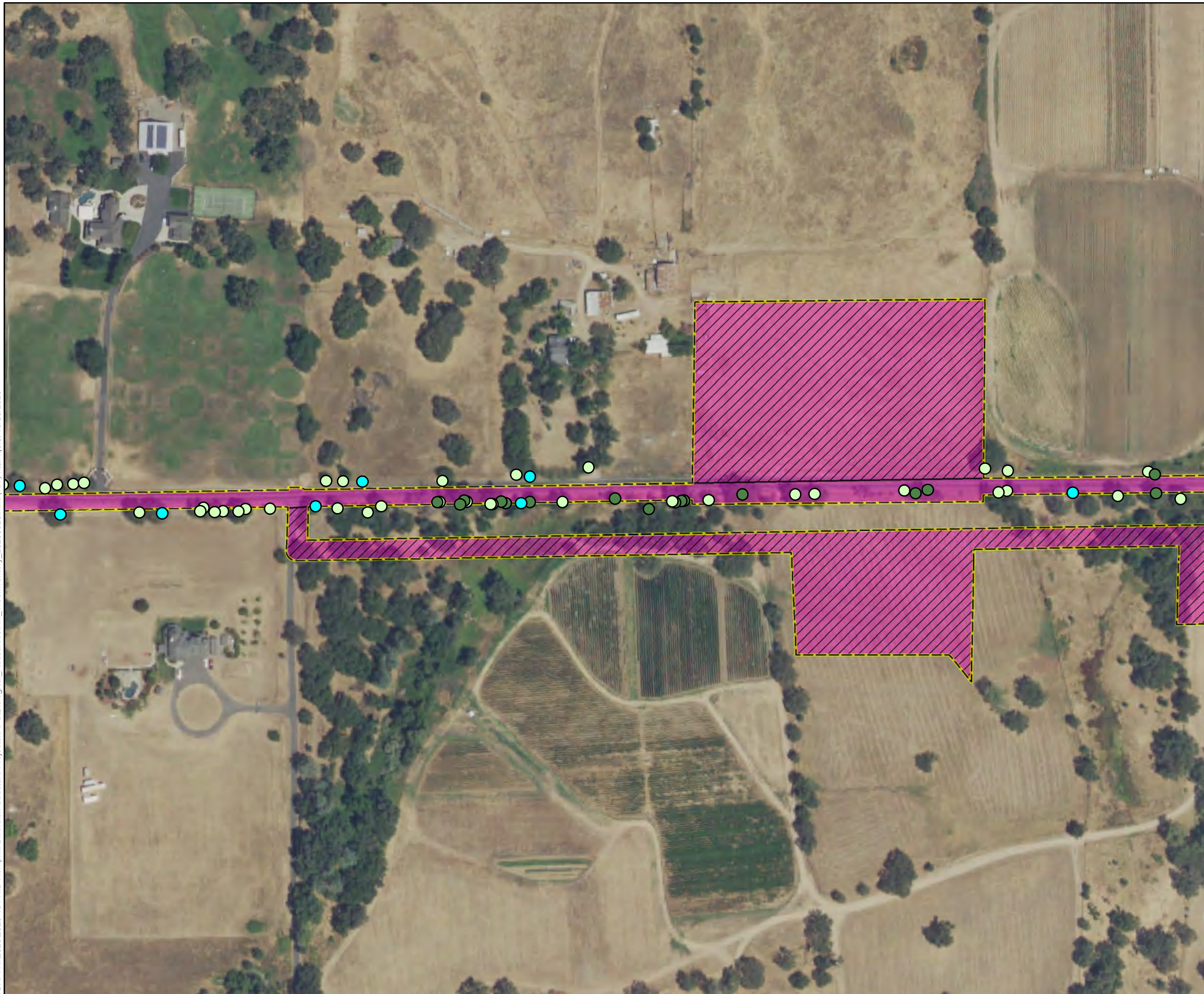

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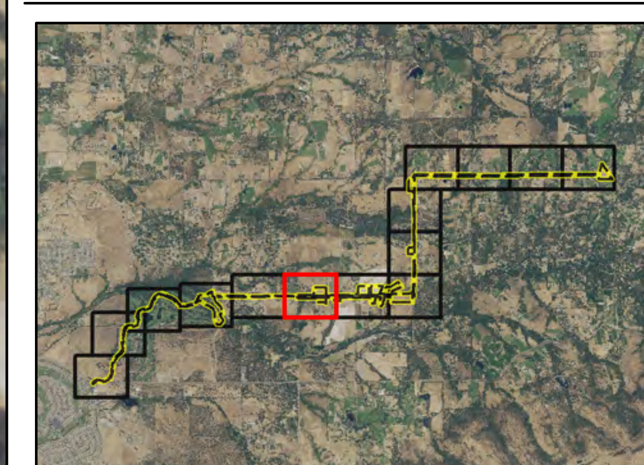

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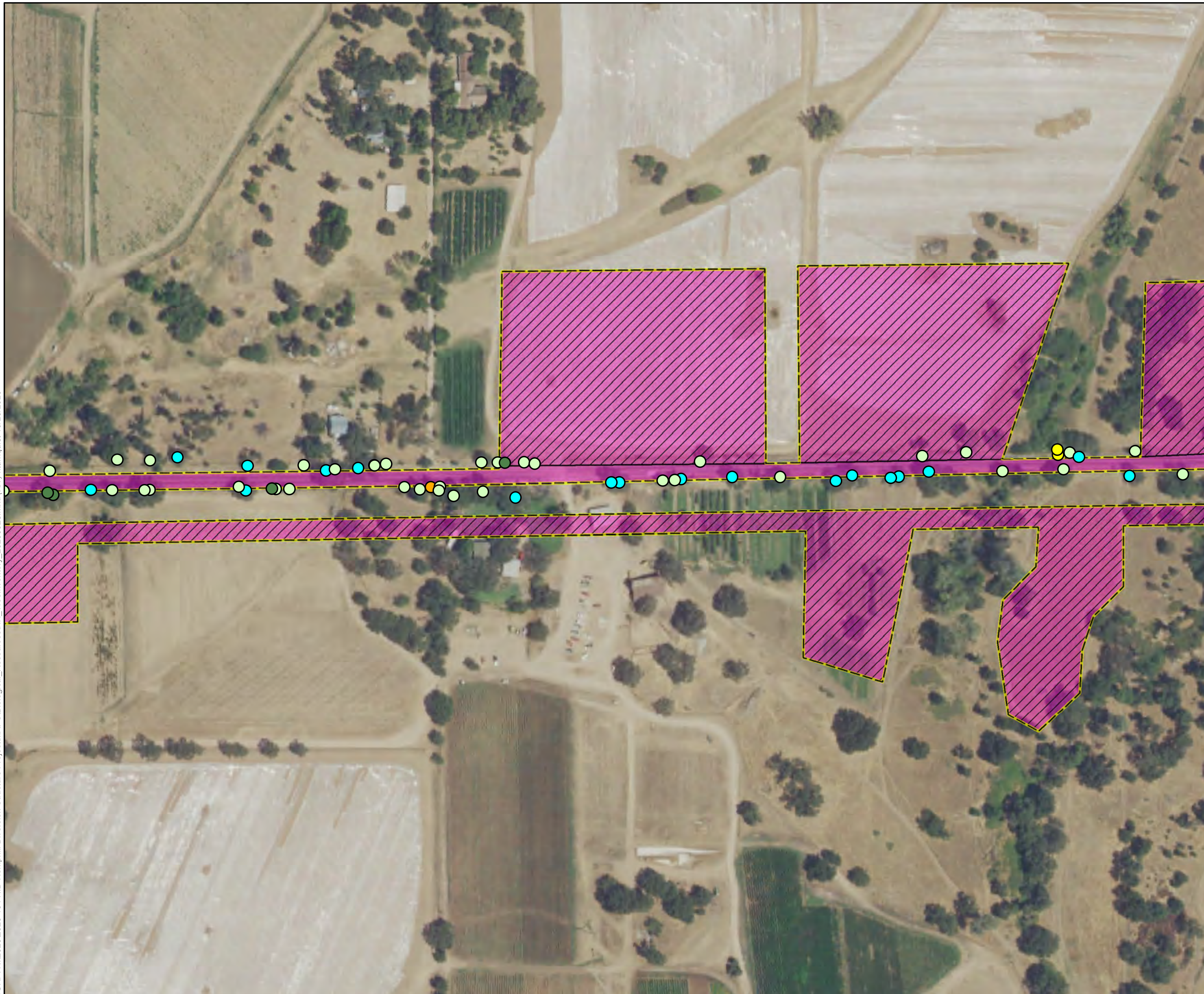

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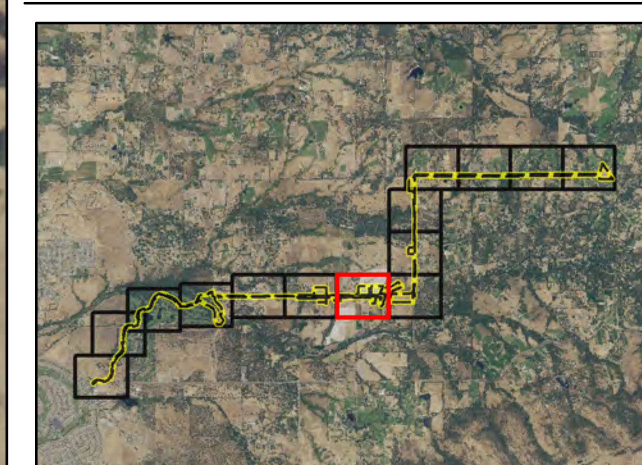

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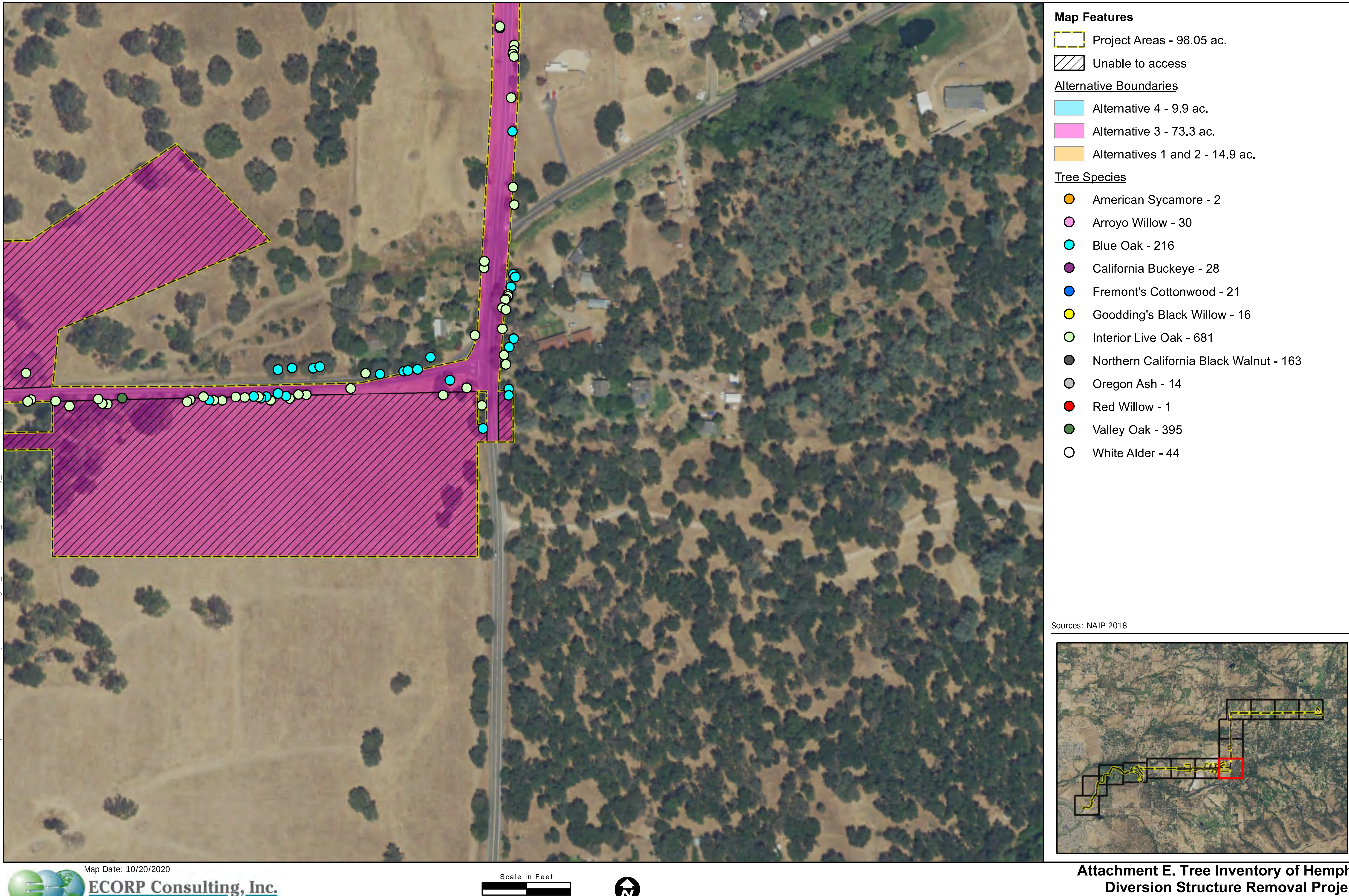

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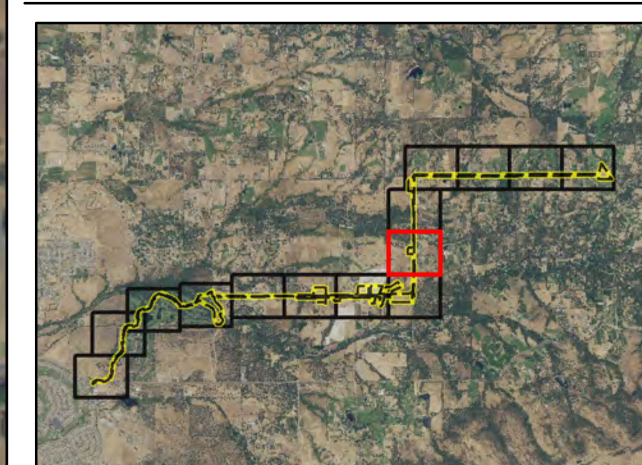

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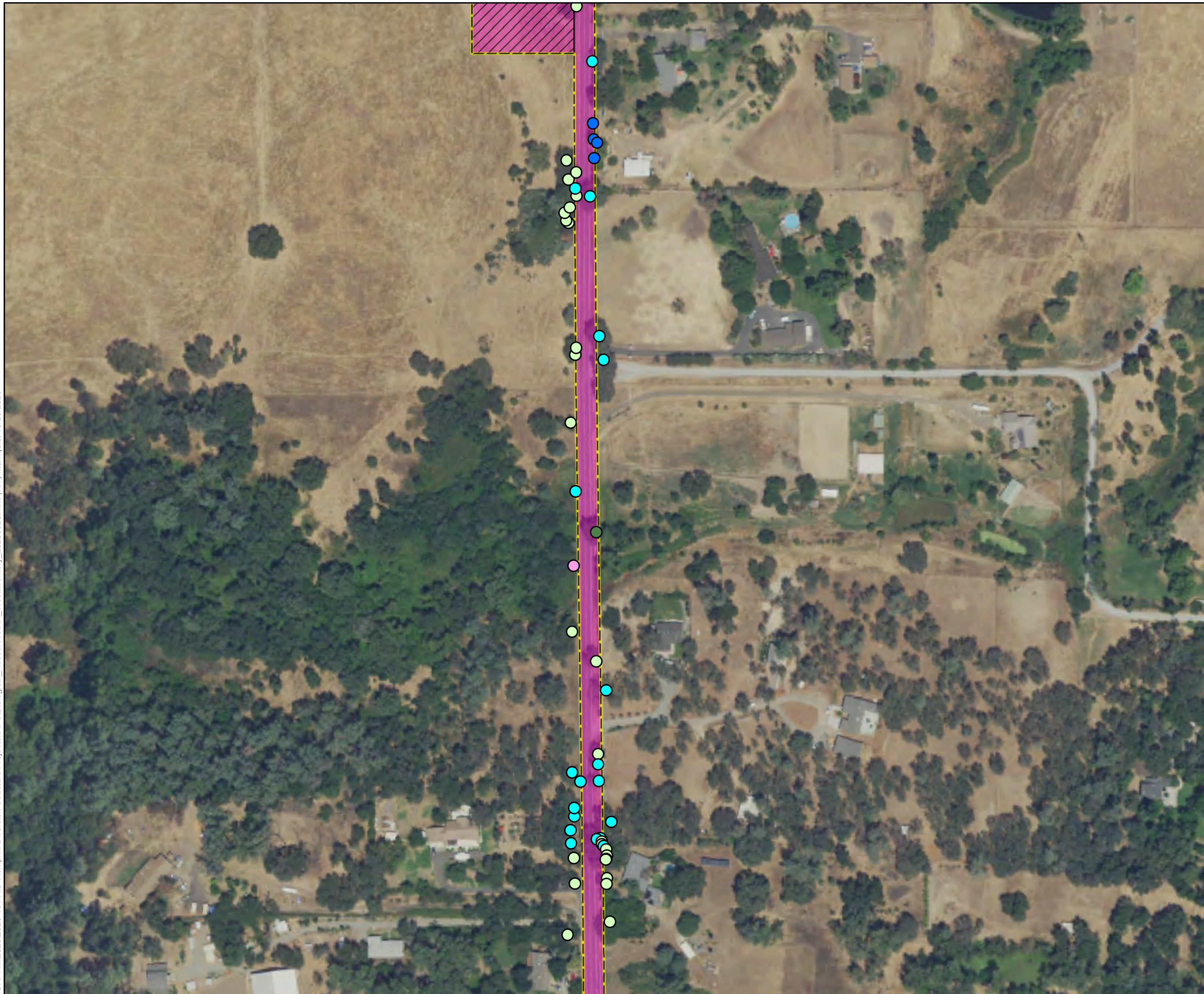

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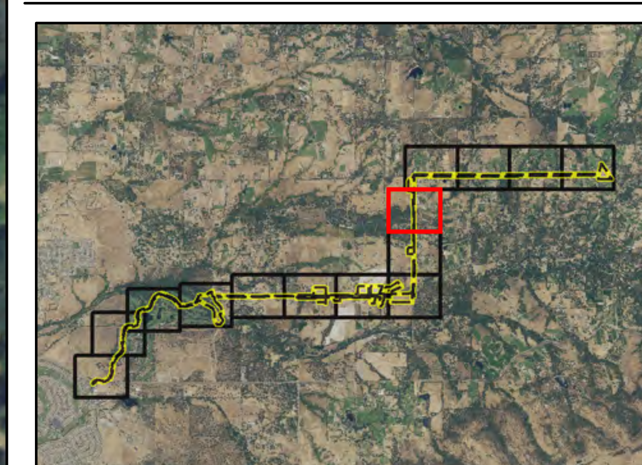

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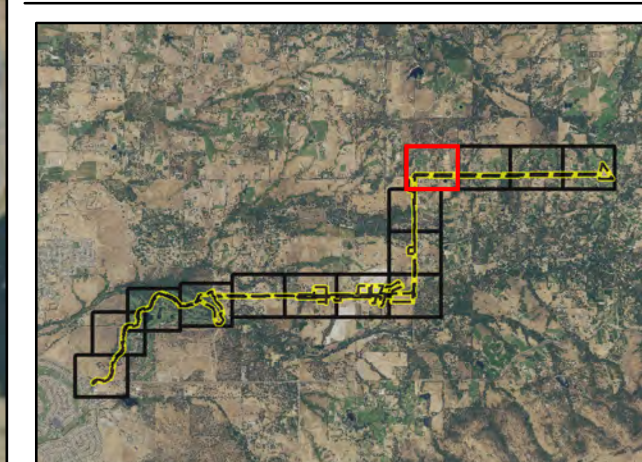

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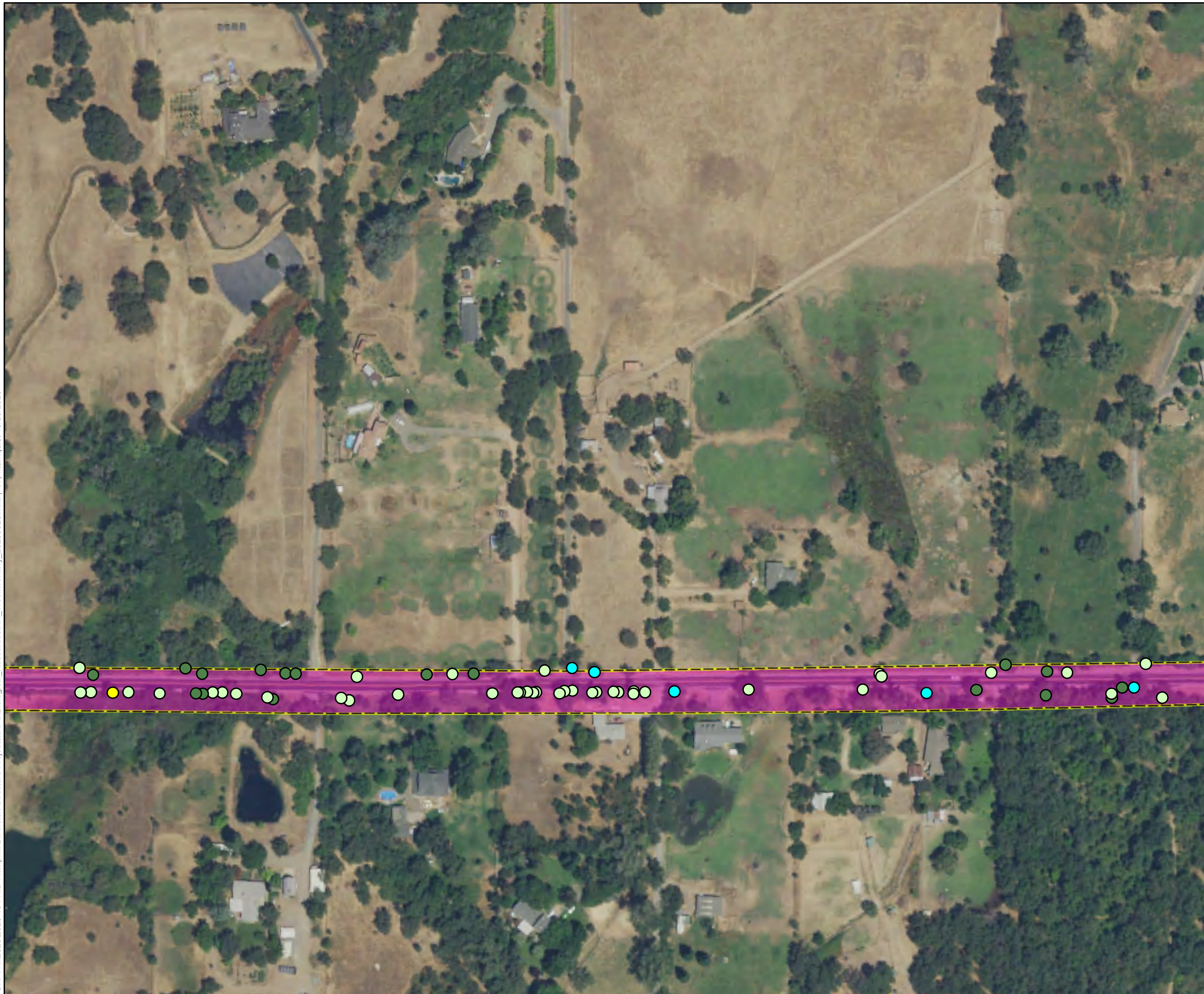

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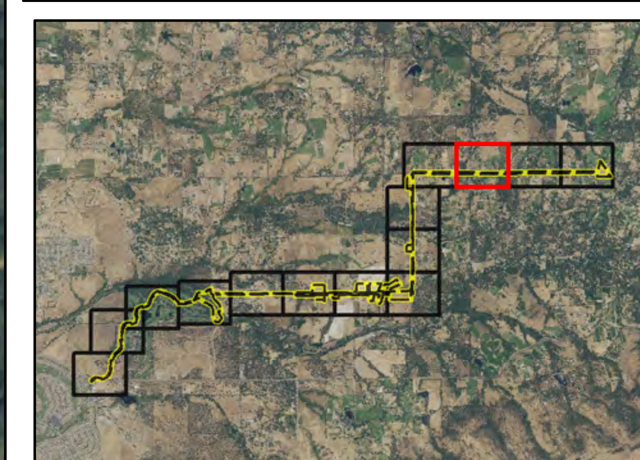

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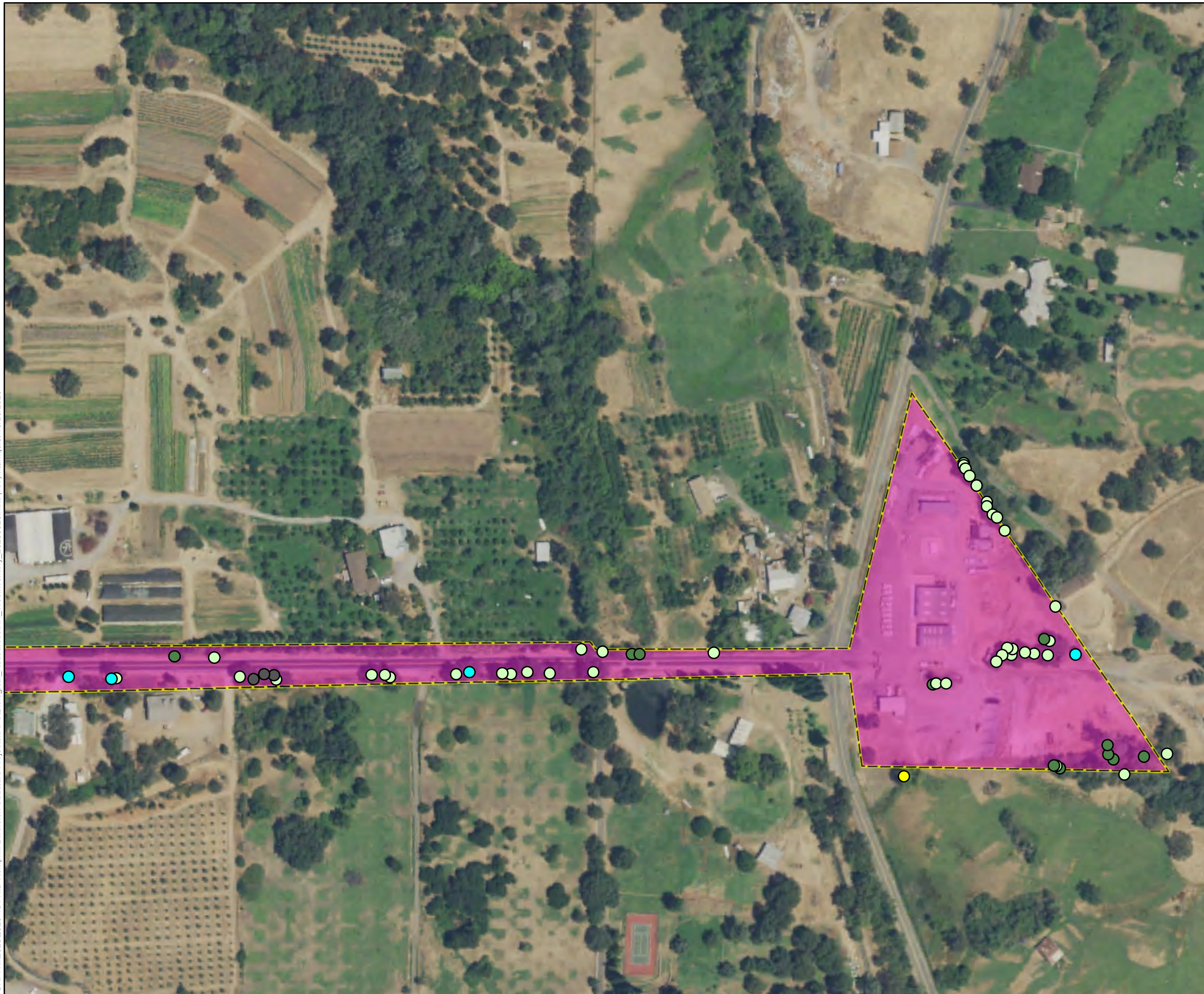

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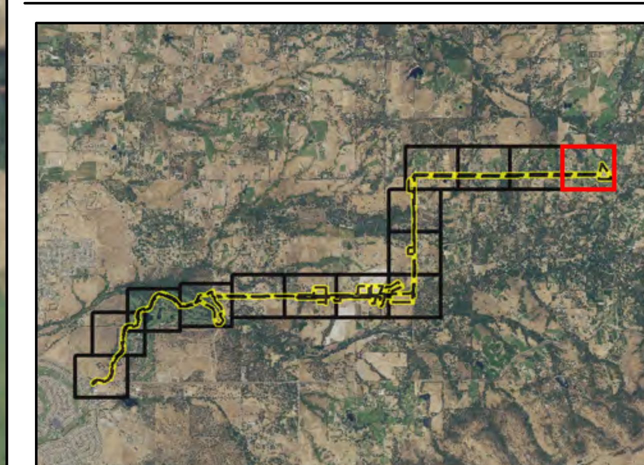

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ATTACHMENT F

PCCP Measures and Conditions

acceptability. See Section 8.4.13, *Land Dedication In Lieu of Land Conversion Fee* and Section 9.4.1.10 *Land Provided in Lieu of Development Fees,* for details regarding land in lieu of fees. Land-in-lieu transactions will require PCA and Wildlife Agency review and approval. Additionally, a Land Dedication Agreement must be executed with the PCA and the lands must be dedicated before Plan fees are due for the proponent's Covered Activity.

The schedule for HCP/NCCP participation package review will be determined by the Permittee, and a final decision on whether the land offered in lieu of fees is acceptable may not be required in order for a Permittee to deem an application complete for entitlement review and processing. However, the PCA must determine an application complete, including making a final decision on acceptability of lands offered in lieu of fees, before coverage under the Plan is extended to the project associated with the land dedication.

6.3 Conditions on Covered Activities

The conditions listed here collectively provide regional and site-specific avoidance, minimization, and mitigation of effects on natural communities and Covered Species. Not all conditions will apply to all activities. The process described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*, makes Permittees responsible for reviewing project design, applying appropriate conditions, and ensuring compliance.

For each condition, this section identifies the biological resource to be protected, explains which Covered Activities would need to comply, and lists specific measures in the following order: avoidance, minimization, and mitigation, where applicable. Subsequent discussion provides detail on how the conditions would be applied. BMPs are identified as guidance for some measures.

The conditions are drawn largely from Wildlife Agency guidance documents, conditions applied to other conservation plans or prior Wildlife Agency permits, and the Permittee's own BMPs, plans, ordinances, or policies. Those sources have been adapted to conditions in the Plan Area and reflect the regional scope of the Plan. As explained in Chapter 5, *Conservation Strategy*, biological objectives will be attained mainly by establishing large interconnected reserves away from future growth. For this reason, application of some conditions depends on the geography of the Plan Area, referring to (1) the PCCP map that designates the PFG distinct from the Reserve Acquisition Area (RAA) and Existing Reserves and Other Protected Areas (EXR) and (2) the Stream System map. The PCCP map and Stream System map are described in Chapter 5, *Conservation Strategy*.

Conditions, including survey protocols and storm water management BMPs, may be revised over the course of the permit term based on results of implementation through the adaptive management process. Allowing such revisions will ensure that out-of-date or unsuccessful management techniques do not persist and that best available science is incorporated into the conditions, as appropriate, for the Plan. Conditions on Covered Activities may be modified through the adaptive management process, based on results of implementation. The Wildlife Agencies will review proposed revisions to conditions on Covered Activities and respond within 30 days. The PCA will revise conditions on Covered Activities only if (1) the revisions are at least equally protective to the Covered Species, (2) there is no increase in economic burden to project applicants, and (3) the revisions are approved by the Wildlife Agencies.

Coverage for take of Covered Species under this HCP/NCCP does not remove or otherwise ameliorate requirements for a project applicant to comply with all other applicable federal, state, and/or local ordinances (e.g., CWA, Porter-Cologne Water Quality Control Act, Fish and Game Code 1600 et seq.).

6.3.1 General Conditions

Chapter 2, *Covered Activities*, describes seven categories of Covered Activities: (1) Valley PFG, (2) Valley rural development, (3) Foothills PFG, (4) Foothills rural development, (5) regional public programs, (6) in-stream programs, and (7) conservation programs. General Conditions apply to all categories of Covered Activities.

6.3.1.1 General Condition 1, Watershed Hydrology and Water Quality

All Covered Activities shall comply with the State of California General Construction Permit—including requirements to develop a project-based Storm Water Pollution Prevention Plan (SWPPP)—and applicable NPDES program requirements as implemented by the County and the City of Lincoln.

The site design requirements, source control measures, and BMPs required by this Condition will cumulatively benefit Covered Species by:

a. Minimizing the potential impacts on Covered Species that are most likely to be affected by changes in hydrology and water quality

b. Reducing stream pollution by removing pollutants from surface runoff before it reaches local streams

c. Minimizing degradation of streams and maintaining or improving the hydrograph to maintain populations of Covered Species and enhance recovery

d. Reducing the potential for scour at storm water outlets to streams by controlling the rate of flow into the streams

6.3.1.1.1 State Water Board Construction General Permit

Project applicants whose projects disturb 1 or more acres of soil or whose project disturbs less than 1 acre but the project is part of a larger common plan of development that in total disturbs 1 or more acres, are required to obtain coverage under the *General Permit for Discharges of Storm Water Associated with Construction Activity* (Construction General Permit Order 2009-0009-DWQ). Construction activity subject to this permit includes clearing, grading and 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.

A component of the Construction General Permit requires the development of a SWPPP by a certified Qualified SWPPP Developer. The General Permit also aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event. However, the runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm Water Management Plan (or other more protective) post-construction requirements in either a Phase I or Phase II municipal separate storm sewer system (MS4) NPDES permit. The County and City are subject to such a permit. That program is described in the following section.

6.3.1.1.2 West Placer Storm Water Quality Design Manual

In 2013 the State Water Board established the Phase II Small MS4 General Permit (Order 2013-0001-DWQ). This now-current permit modified the previous permit (General Permit, Order 2003-0005-DWQ) by establishing storm water management program requirements in the Order and defining the minimum acceptable elements of the municipal storm water management program. Minimum permit requirements were established at the time of permit issuance and are no longer left to be determined later through Regional Water Board review and approval of Storm Water Management Plans.

Small MS4s are those owned or operated by the United States, a state, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to waters of the United States. Small MS4s typically support a population less than 100,000 based on the 1990 Decennial Census. The County, the City, Granite Bay Census Designated Place, the Town of Loomis, and North Auburn Census Designated Place are all identified as Permittees to Order 2013-0001-DWQ.

To comply with Order 2013-0001-DWQ, the County, the City of Roseville, the City, the City of Auburn, and the Town of Loomis jointly developed the *West Placer Storm Water Quality Design Manual* (Design Manual). The goal of the Design Manual is to provide standards that both conform to the mandates of the 2013 MS4 General and achieve the objectives of the PCCP

The Design Manual includes requirements for LID strategies that focus on preserving key elements of a project site's pre-development hydrologic function. LID is a design strategy where storm water runoff is treated as a valuable resource that can recharge groundwater supplies, protect and enhance natural habitat and biodiversity, and add value to new development or redevelopment projects. Rather than discharging storm water runoff as a waste product, projects are designed to include a diverse set of post-construction storm water controls, or BMPs that infiltrate, evapotranspire, or biotreat storm water runoff. By retaining storm water runoff on site, downstream receiving waters are provided with protection from increased pollutant loads and alterations of hydrologic functions otherwise affected by increased impervious surfaces and human activities.

6.3.1.1.3 HCP/NCCP Watershed Hydrology and Water Quality BMPs

The following BMPs are related to water quality objectives contained in the NPDES programs, but are more targeted to avoidance and minimization of effects on Covered Species and go beyond the typical requirements of a SWPPP. These BMPs apply to all Covered Activities:

1. When possible, vehicles and equipment will be parked on pavement, existing roads, and previously disturbed areas. When vehicle parking areas are to be established as a temporary facility, the site will be recovered to pre-project or ecologically improved conditions within 1 year of start of groundbreaking to ensure effects are temporary (see Section 6.3.1.4, *General Condition 4, Temporary Effects*, for the process to demonstrate temporary effects).
2. Trash generated by Covered Activities will be promptly and properly removed from the site.

3. Appropriate erosion control measures (e.g., fiber rolls, filter fences, vegetative buffer strips) will be used on site to reduce siltation and runoff of contaminants into avoided wetlands, ponds, streams, or riparian vegetation.
   a. Erosion control measures will be of material that will not entrap wildlife (i.e., no plastic monofilament). Erosion control blankets will be used as a last resort because of their tendency to biodegrade slowly and trap reptiles and amphibians.
   b. Erosion control measures will be placed between the area of disturbance and any avoided aquatic feature, within an area identified with highly visible markers (e.g., construction and erosion-control fencing, flagging, silt barriers) prior to commencement of construction activities. Such identification will be properly maintained until construction is completed and the soils have been stabilized.
   c. Fiber rolls used for erosion control will be certified by the California Department of Food and Agriculture or any agency that is a successor or receives delegated authority during the permit term as weed free.
   d. Seed mixtures applied for erosion control will not contain California Invasive Plant Council–designated invasive species (http://www.cal-ipc.org/paf/) but will be composed of native species appropriate for the site or sterile non-native species. If sterile non-native species are used for temporary erosion control, native seed mixtures must be used in subsequent treatments to provide long-term erosion control and slow colonization by invasive non-natives.
4. If the runoff from the development will flow within 100 feet of a wetland or pond, vegetated storm water filtration features, such as rain gardens, grass swales, tree box filters, infiltration basins, or similar LID features to capture and treat flows, shall be installed consistent with local programs and ordinances.

6.3.1.2 General Condition 2, Conservation Lands: Development Interface Design Requirements

Covered Activities that occur in or adjacent to the Reserve System, or adjacent to existing reserves, mitigation sites, and conservation banks, will incorporate design requirements to minimize the indirect effects of development on these types of conservation lands in the permit area.

This condition applies when new infrastructure projects, and urban and rural development occur in or adjacent to Plan reserves, mitigation and conservation banks, and any other property protected by an in-perpetuity conservation mechanism for natural lands management. The local jurisdiction (i.e., County or City)will determine which development projects are subject to this condition as well as which components may be required for a particular development. The PCA will provide technical assistance when requested by the local jurisdiction. Design requirements will be incorporated in new development at the reserve-development interface, if appropriate, and at the project applicant's expense. The design requirements set by the local jurisdiction may include, but are not limited to, those listed as design guidelines below.

Although the Plan reserves are required to provide internal buffers, when necessary, to protect reserves from adjacent development and other effects (see Section 5.3.1.3.3, *Buffer Zones*), adjacent development could have effects on reserves that extend beyond reserve buffers. The purpose of this condition is to provide additional measures to minimize effects on Covered Species and natural communities in reserves from neighboring urban and rural development.

6.3.1.2.1 Conservation Lands: Development Interface Design Requirements

Beyond minimizing direct and indirect effects, the design of new development occurring adjacent to conservation lands will consider indirect and long-term effects, such as runoff from developed areas, which can transport harmful substances (e.g., pesticides, fertilizer, automotive fluids, sediment) into conservation lands; changes to hydrological conditions; the establishment of invasive non-native species, which can disperse from landscaped areas; and potential structural and biological damage (e.g., soil compaction, creation of unauthorized trails, disturbance of sensitive species) that can result from unmanaged human access and use. Application of the following design requirements will help minimize the potential for indirect effects of development on conservation lands.

1. Signage will be posted to notify of any usage restrictions and to educate the public on the sensitivity of the area and usage restrictions.
2. Fencing will be installed at the boundary between developed areas and reserves to prevent illegal access by people and pets, unless the conditions on the reserve make trespass unlikely (i.e., surrounded by canals that are difficult to cross). Fences will be suitable to the conditions in the adjacent reserve. The type of fence required will be at the discretion of the County or City, as permitted by County and City codes. Fences will have limited gates and be designed with consideration to not allowing movement of people and their pets. Access will be limited to maintenance and monitoring activities unless a habitat management plan specifies otherwise.
3. Natural or artificial barriers or other access restrictions may be installed around development to protect sensitive land-cover types and Covered Species in the reserves. If used, barriers will be designed so they are appropriate for site conditions and the resources being protected. Some barriers should keep domestic pets outside the reserve, other barriers should keep Covered Species inside the reserve. Before installation of a barrier, consideration shall be given to freedom of movement by Covered Species. If the barrier would prevent movement, or if the barrier would encourage species to use other, less-favorable crossings, alternative solutions shall be considered.
4. Roads constructed adjacent to reserves will be fenced to restrict unauthorized public access. Through the conditional approval process, the Permittee will only approve fencing that is appropriate (e.g., chain link, post and cable, barbwire) to allow movement of wildlife between reserves.
5. Development will be designed to minimize the length of the shared boundary between development and the reserves (i.e., minimize the urban edge, perimeter).
6. Incorporation of high-intensity lighting (e.g., floodlights used for recreational facilities and commercial parking lots) into site improvement standards near reserves will be avoided. Low-glare, no-glare, or shielded lighting will be installed in developed areas adjacent to reserves to minimize artificial lighting of reserve lands at night. The height and intensity of lights shall be kept to a minimum. Resources providing technical support include publications of the Illuminating Engineering Society of North America and its *Lighting Handbook, Reference & Application, Ninth Edition, and Recommended Practices*. The intent of this avoidance and minimization measure is to design a lighting system, where determined necessary, that maintains public safety and security in the project area while curtailing the degradation of the

nighttime visual environment on the reserve property by limiting nighttime light radiation and/or light spill.

7. Public facilities, such as ballparks and fields that require high-intensity night lighting (i.e., floodlights), will be sited at least 0.5 mile from the reserve boundary to minimize light pollution. Facilities may be sited closer to the Reserve System if the PCA determines the lighting system will not be intrusive to wildlife within the Reserve System (e.g., hills block the lighting).
8. For any landscaping adjacent to reserve properties, non-invasive plants will be required, and the use of native plants will be highly encouraged, consistent with County landscape design guidelines (Placer County 2013) or similar standards for the City of Lincoln.

Any of the above design requirements, or similar requirements developed over time, that are incorporated into projects will be located within the development footprint. These project features will be maintained by the property owners. Conditions of approval on projects are monitored by County or City staff during the construction and development phase and are enforced over time through the efforts of professional land development staff familiar with the project or a code enforcement division. If projects are found to be out of compliance, standard remedial actions would be applied and may include: code enforcement, use of securities, revocation or modification of entitlement. Violations will be reported to the PCA, Wildlife Agencies, and applicable local jurisdiction for potential enforcement.

The above avoidance and minimization measures are intended to serve as guidelines that establish, at a minimum, how effects at the development interface with the Reserve System and other conservation lands can be avoided and minimized. Site conditions may introduce additional opportunities that will need to be considered on a case-by-case basis (e.g., topographic conditions, location of passive recreational facilities, native landscaping buffers).

Non-participating local jurisdictions are encouraged to consult with the PCA during the development review process for large projects planned at the boundary of existing reserves.

6.3.1.3 General Condition 3, Land Conversion

Covered Activities that would result in permanent conversion of natural land cover must pay fees or otherwise contribute to establishing the Reserve System and are subject to the maximum extent of take proposed under the Plan.

Land conversion refers broadly to an activity or process that results in the permanent conversion of a natural or semi-natural land cover to an urban, suburban, rural residential, or other artificial, built-up, or otherwise non-natural condition. It is not meant to apply when one natural or semi-natural land-cover type is converted to another natural or semi-natural land-cover type. It is also not meant to apply to changes in agricultural crop types, which is not a Covered Activity addressed by the Plan. Application of this condition is a key provision of the Plan. Land conversion allowable under the permits will be subject to an overall maximum extent of take. The proposed extent of take sets a maximum acreage of cumulative land conversion from all Covered Activities. Proposed maximums are set for several communities and are listed in Table 4-1 for permanent effects. Proposed maximums are also set for geographical Plan subareas, with some provision for flexibility in shifting allowable take between subareas.

The conservation strategy outlined in Chapter 5, *Conservation Strategy*, serves at a regional scale as conservation in perpetuity for Covered Species and mitigation for the effects of Covered Activities.

Fees collected for land conversion will fund land acquisition, restoration, and long-term management and monitoring of similar or higher quality land than those lands affected by Covered Activities.[6]

Covered Activities will be assessed fees based on the parameters described in Chapter 9, *Costs and Funding,* and summarized in Table 9-6. In the Valley the fees will be applied when projects affect natural, semi-natural, and other agricultural communities. These communities include the following land-cover types:

a. Grassland

b. Vernal Pool Complex

c. Aquatic/Wetland Complex

d. Riverine/Riparian Complex

e. Oak Woodland

f. Valley Oak Woodland

g. Rice Agriculture

h. Field Agriculture

i. Orchard and Vineyard Agriculture

j. Rural Residential

In the Valley, the land conversion fee will not apply to ground disturbance in urban (non-natural) communities except if a special habitat fee applies. Special habitat fees for restoration and enhancement will apply to any ground disturbance to a constituent habitat regardless of community type (see Chapter 3, *Physical and Biological Setting*, Table 3-6 for a list of constituent habitats). In urban (non-natural) communities, the land conversion fee would apply to the same area of ground disturbance as the special habitat fee.

In the Foothills, an open space fee will be assessed on ground disturbance of urban (non-natural) communities to reflect the open space and fuels management benefits of the Plan to all Foothills development. As with the Valley, special habitat fees will apply to ground disturbance in any community where a constituent habitat is present.

Chapter 9, *Costs and Funding,* describes how fees will be applied based on the parcel or the development area, depending on the type of covered activity and if the project applicant is a Permittee or not. For projects where fees are based on the entire parcel, the project applicant can demonstrate portions of the parcel will be fully avoided, as described in the following section (Section 6.3.1.3.1, *Permanent Effect Avoidance in the PFG*) and in other conditions on Covered Activities described in this chapter. Fees will not be levied on lands that are completely avoided per the terms of this chapter. The fee calculation is described in further detail in Chapter 9, *Costs and Funding*.

[6] The HCP/NCCP also provides additional conservation beyond mitigation. The fees, however, apply to the mitigation component of the conservation strategy.

6.3.1.3.1 Permanent Effect Avoidance in the PFG

The past trend toward large projects is expected to continue in the Valley and to a lesser extent, in the Foothills in the portion of the Plan Area designated as PFG (Components A1 and A3). These projects typically involve large tracts of undeveloped land converted to fairly dense urban or suburban uses. Open space areas may be left within the project site, but these serve mainly aesthetic, flood control, or recreational purposes rather than biological conservation. Such small, avoided areas are subject to indirect effects so that any original habitat values are difficult to manage and protect. For this reason any open space proposed as part of a Covered Activity will be considered part of the project effects and, therefore, assumed to be permanently affected and not exempted from the Plan fees, unless the open space meets avoidance criteria described below. See Chapter 9, Section 9.4.1.8, *Timing of Development Fee Payment* for application of fees to multi-phase projects.

To qualify as "avoided," land within the PFG must meet all the applicable natural community and Covered Species habitat requirements in Section 6.3.2, *Conditions to Avoid and Minimize Effects on Specific Natural Communities,* and Section 6.3.5, *Conditions to Minimize Effects on Covered Species.* Avoided lands must also meet at least one of the following criteria:

1. It is a minimum of 200 contiguous acres.
2. It is located adjacent to the RAA or adjacent to an existing reserve that together totals at least 200 acres (either a HCP/NCCP reserve or a non-HCP/NCCP reserve protected in perpetuity).
3. It is located in or abuts the Stream System boundary.
4. It contributes to meeting the goals and objectives of the Plan as described in Chapter 5, *Conservation Strategy*, and as determined by the PCA (i.e., the PCA may want to acquire the avoided area for the Reserve System).
5. It is set aside to avoid occurrences of certain Covered Species or sensitive land-cover types per the conditions in this chapter.
6. It is required to be avoided by the PCA .

The avoidance determination, including an evaluation of direct and indirect effects, will be made by the Permittee with jurisdiction over the project in consultation with the PCA and will take into account such factors as the avoidance area's relationship to existing or potential reserves, edge:area ratio, and Stream System boundary. The Permittee may consult with the PCA for guidance in determining the extent of the reduction of effects.

Any part of a project site that is deemed to have avoided take is not subject to the application of fees, and establishment of a conservation easement is not required. Avoidance does not necessarily mean that the excluded land is suitable to be credited as land to be incorporated into the Reserve System in lieu of fees (see below for additional discussion on land in lieu of fees). If the avoided land is to be included as part of the Reserve System, the Wildlife Agencies must review and approve such inclusion.

6.3.1.3.2 Permanent Effect Avoidance for Low Density Rural Development

Low density rural development comprises 1) new rural residential use, 2) appurtenant or accessory activities or structures for existing rural residential uses, and 3) activities or structures for rural non-residential land uses. The following considerations will apply to low density rural development that is anticipated to include most non-public Covered Activities in the Conservation and Rural Development portion of the Plan Area (components A2 and A4 comprising the RAA and EXR) and in the Foothills portion of the PFG, plus some limited non-public Covered Activities in the Valley portion of the PFG.

Because low density rural development may leave a large portion of a parcel undisturbed and where these Covered Activities occur on existing parcels already subject to fragmentation and indirect effects, fees for new rural residential development are graduated based on whether subdivision of an existing parcels occurs and the number of resulting parcels (see Chapter 9, *Costs and Funding*). The PCA will track the estimated actual impact of rural residential development and the graduated fee may be adjusted if impacts in the aggregate differ from the assumptions used to set the fee. For structures or activities that are appurtenant or accessory to rural residential uses, and activities or structures that support rural nonresidential land uses, land conversion fees will apply to the disturbed area footprint.

6.3.1.3.3 Land Provided In Lieu of Fees

Project applicants wishing to receive full or partial credit toward their fee obligations may offer land in lieu of fees. Details regarding land in lieu of fees are provided in Section 9.4.1.10, *Land Provided in Lieu of Development Fees*.

6.3.1.4 General Condition 4, Temporary Effects

Covered Activities that result in temporary effects on natural land cover must pay fees and are subject to the maximum extent of take proposed under the Plan.

In addition to verifying the land cover on the project site as described in Section 6.2.4.3, *Item 3: Community and Constituent Habitat Types on Site and Baseline Land-cover Map Consistency*, project applicants of Covered Activities that have temporary effects are required to provide documentation related to the nature of the effects. To qualify for the temporary effect fee, applicants must document pre-project conditions and propose performance standards for the affected natural community as part of their participation package. The purpose of these performance standards is to demonstrate to the local jurisdiction that temporary impact sites will be returned to pre-project conditions within 1 year of starting ground disturbance at that location. Performance standards will vary based on natural community type affected, but should include metrics such as percent vegetative cover, vegetation height, restored topography, or restored hydrology. One year after project groundbreaking, the applicant will provide the Permittee with jurisdiction over the project with a written assessment of how the performance standards were met. Based on this information, the Permittee will determine whether the project impacts were actually temporary. If it is determined the effects remain 1 year after groundbreaking activities have commenced, the effects will be considered permanent and fees will be reassessed based on those effects, as described in General Condition 3, *Land Conversion*.

Temporary effects allowable under the permits will be subject to overall maximum effects. If a plot of land is subjected to temporary disturbance more than once, that temporary effect is only counted once in the cumulative tally of maximum effects. Proposed temporary effect limits are set for several communities and are listed in Table 4-3 . Proposed maximum temporary effects under the permits are established for geographical Plan subareas, with some provision for flexibility between subareas.

Within 2 years of permit issuance, the PCA will provide guidelines to all applicants on recommended performance standards for each affected natural community that, if met, would meet the intent of the temporary impacts. At any time, Permittees may confer with the PCA in the review and approval of the performance standards.

6.3.1.5 General Condition 5, Conduct Worker Training

If project-specific conditions for avoidance or minimization apply during construction, all project construction personnel will participate in a worker environmental training program that will educate workers regarding the Covered Species and their habitats, the need to avoid impacts, state and federal protection, and the legal implications of violating environmental laws and regulations.

This condition applies to projects where compliance with the Conditions described in this Chapter would result in one or more avoidance and minimization requirements applied during construction (e.g., maintenance of an avoidance buffer, placement of exclusion fencing). At a minimum, this training may be accomplished through "tailgate" presentations at the project site and the distribution of informational brochures, with descriptions of sensitive biological resources and regulatory protections, to construction personnel prior to initiation of construction work.

6.3.2 Conditions to Avoid and Minimize Effects on Specific Natural Communities

The General Conditions set forth above address conservation issues at a landscape-scale level, which incorporates the major natural communities in the Plan Area. Because of their biological sensitivity and/or regulatory status, several natural communities have specific conditions. Additional avoidance and minimization requirements apply to the following natural communities within the Plan Area:

- Vernal Pool Complex
- Aquatic/Wetland Complex
- Riverine/Riparian Complex (this is in addition to Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*)
- Valley Oak Woodland

The specific conditions define what constitutes avoidance and set mitigation requirements in addition to the general landscape conservation strategy defined above. Mitigation for take of these natural communities involves off-site restoration at an area ratio of 1.5:1. Restoration will be overseen by the PCA. Restoration will be funded through fees paid in addition to land conversion fees. Restoration undertaken on site by the project applicant may serve in lieu of some or all of the special habitat fee if it meets all the applicable requirements described in Section 5.3.1, *Conservation Measure 1, Establish the Reserve System*; Section 5.3.3, *Conservation Measure 3, Restore and Create Natural Communities and Covered Species Habitat*; and Chapter 8, *Plan Implementation*, regarding use of land in lieu of fees and restoration in lieu of special habitat fees. Valley Oak Woodland restoration will be funded by the land conversion fee.

6.3.2.1 Community Condition 1, Wetland Avoidance and Minimization (Vernal Pool and Aquatic/Wetland Complex)

This condition describes how avoidance is determined for constituent habitat within the vernal pool complex and aquatic/wetland complex communities. It also describes how effects on aquatic/wetland complex constituent habitat that cannot be avoided are minimized and, in cases where permanent effects on vernal pool constituent habitat may occur, the process for allowing the PCA to salvage vernal pool inocula.

Vernal pool constituent habitat includes vernal pool wetlands, seasonal wetland in vernal pool complex, and seasonal swales. Aquatic/wetland constituent habitat (also called *other wetlands* in this condition) encompasses fresh emergent marsh, non-vernal pool seasonal wetland, and lacustrine and includes all Waters of Placer County where avoidance buffers are not otherwise applied (Section 6.3.2.1.1, *Community Condition 1.1, Avoidance for Vernal Pool Complex Constituent Habitat*, and Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*). This category includes flowing springs and long-duration seeps not located inside the Stream System. See Chapter 3, *Physical and Biological Setting*, for a description of each constituent habitat type.

Projects that affect vernal pool constituent habitats and other wetlands must also adhere to applicable Species Conditions to minimize effects on certain Covered Species that may occur in these habitat types.

6.3.2.1.1 Community Condition 1.1, Avoidance of Vernal Pool Complex Constituent Habitat

Covered Activities are required to mitigate for impacts, generally through payment of fees if project activities encroach on a vernal pool constituent habitat wetland or its immediate watershed.

As described Section 6.3.1.3, *General Condition 3, Land Conversion*, and Section 6.3.1.4, *General Condition 4, Temporary Effects*, projects resulting in direct permanent or temporary effects on certain communities and/or constituent habitats are required to mitigate for the impacts, generally through payment of fees. This condition describes how impacts on vernal pool constituent habitat is evaluated for the HCP/NCCP participation package.

Impact evaluation will consider whether ground disturbance from a Covered Activity encroaches on (1) the Delineated Wetland or (2) the Immediate Watershed of a vernal pool constituent habitat feature.

Delineated Wetland. Where ground disturbance alters any portion of a vernal pool constituent habitat, the entire wetland area is considered to be subject to permanent direct effect. The wetland perimeter will be based on a wetland delineation for on-site aquatic features (see Section 6.1.1, *Definitions*). If an affected wetland crosses a property boundary where ground access required for wetland delineation is not available, the wetland perimeter of the portion of the wetland which falls outside of the project site will be based on aerial photography, LIDAR, or other approved techniques. The full area of a wetland subject to permanent direct effect will be subject to Special Habitat, Vernal Pool Constituent Habitat, Direct Effect Fee 7a set forth in Chapter 9, *Costs and Funding*, and will count against the proposed maximum extent of take described in Chapter 4*, Effects of Covered Activities*, Table 4-1.

Immediate Watershed. Where ground disturbance encroaches on the Immediate Watershed (see Section 6.1.1, *Definitions*) of vernal pool constituent habitat, that wetland area will be considered to be subject to indirect effect. Any vernal pool constituent habitat that falls within 250 feet from the edge of the project footprint must be evaluated for potential effect. The plan distinguishes whether the indirectly affected wetland is on or off the project site:

- The full area of a wetland on the project parcel with an Immediate Watershed overlapping any portion of the project footprint will be subject to Special Habitat, Vernal Pool Constituent Habitat, and Immediate Watershed Impact Fee 7b (see Chapter 9, *Costs and Funding*) and will be tracked by the PCA.
- The full area of a wetland not on the project parcel with an Immediate Watershed overlapping any portion of the project footprint will not be subject to fees, but the area will be tracked as an offsite indirect effect (i.e., 10% of the direct effects) as described in Section 4.3.3, *Methods to Estimate Indirect Effects in the Valley.* Fees will only be paid for impacts that occur on the project parcel. The project parcel boundary used to evaluate effects calculate fees will be based on the parcel boundaries at the time of Plan adoption.

Vernal pool constituent habitat determined to be subject to indirect effects on the Immediate Watershed will be subject to assessment for direct effects on the Delineated Wetland at any time in the future they are subject to disturbance by Covered Activities. Prior payment of indirect effect Immediate Watershed fees will not affect the status of the wetlands subject to direct effect fees.

Immediate Watershed Avoidance Measures

- Immediate Watersheds that will be avoided will be temporarily staked in the field by a qualified professional to ensure construction equipment and personnel completely avoid these features.

6.3.2.1.2 Community Condition 1.2, Avoidance of Aquatic/Wetland Complex Constituent Habitat

Covered Activities are required to mitigate for impacts, generally through payment of fees if project activities encroach on a non-vernal pool wetland (other wetlands) or its buffer.

This condition describes how impacts on constituent habitat within the aquatic/wetland complex (i.e., “other wetlands”) are avoided. Avoidance requirements for other wetlands will be evaluated on a case-by-case basis and will be determined by a qualified biologist hired by the PCA. If the project applicant desires to apply measures to avoid impacts on a resource and, as a result eliminates fee obligations, a buffer will be used to insure that the avoided resource retains pre-project functions and services.

The qualified biologist will determine whether the establishment of an avoidance buffer is appropriate. If applied, the buffer width will vary by project based on the sensitivity and vulnerability of the avoided resources.

The PCA biologist will consider the following when determining the buffer.

- Adjacent land use and nature of potential on-going disturbance to the avoided feature
- Adjacency to existing Reserve System lands or the RAA
- Existing and potential future hydrologic connections (e.g., new storm drain outfalls), which may have a significant effect on the quality, type and function of the feature

- Vertical/topographical separation, particularly in the Foothills
- Species avoidance buffers (per Section 6.3.5, *Conditions to Minimize Effects on Covered Species*)

In cases of disagreement with the qualified biologist's determination regarding the sensitivity and vulnerability of avoided resources or the buffer width, the Wildlife Agencies will be consulted to support resolution of such controversy.

Covered Activities that fully avoid the other wetland and its associated buffer will be deemed to have avoided these resources so long as the project applicant can also demonstrate the water source, including quantity of inflow, has not changed compared with pre-project conditions. This may require that a qualified professional prepare a hydrologic study of the wetland and anticipated effect, or lack thereof, on the wetland as a result of project implementation. The avoidance determination process applies to all other wetlands and buffers that may be affected by a project, even if a portion of the other wetland and buffer is on a different parcel than that on which the project is occurring. As such, the project applicant must evaluate all on-site and nearby aquatic features. If access to determine the extent of aquatic features—and therefore the extent of the buffer and potential for impact—is not allowed, a qualified professional will determine the extent of adjacent aquatic features using available resources, including current aerial photos and baseline data information provided by the PCA, and will apply best efforts to assess the extent of the adjacent aquatic feature visually from areas of allowable site access.

Impacts on other wetlands will be evaluated on a case-by-case basis by the PCA's qualified biologist in instances where the project does not fully avoid the other wetland and buffer. Project impacts on an entire wetland may be assessed under the PCCP if only a portion of the Water of Placer County is affected (permanently or temporarily). The PCA will be make a final determination regarding avoidance or level of impact. At a minimum, project applicants must comply with Community Condition 1.3, *Wetland Impact Minimization Measures*.

The required buffer will not be used to determine the area of indirect effect for other wetlands. The determination that an indirect effect may or will occur will be project-based, and depend on the specific circumstances present at the project site. Indirect effects on buffers or other wetlands will not be deducted as part of the proposed maximum extent of take.

Fees will only be paid for impacts that occur on the project parcel. The project parcel boundary used to evaluate effects will be based on the parcel boundaries at the time of Plan adoption.

Other Wetland Avoidance Measures

- Other wetlands and their associated buffers that will be avoided will be temporarily staked in the field by a qualified professional to ensure construction equipment and personnel completely avoid these features.

6.3.2.1.3 Community Condition 1.3, *Aquatic/Wetland Complex* Impact Minimization Measures

Covered Activities that minimize effects on the Aquatic/Wetland Complex constituent habitat may qualify to count those effects as temporary rather than permanent. If activities associated with Covered Activities are proposed to occur within other wetlands and their associated buffers, the activities must comply with Wetland Impact Minimization Criteria *(below) to have project effects count as temporary instead of permanent.*

Wetland Impact Minimization Criteria

Other wetlands and their buffers will be considered temporarily affected if all of the following criteria are met and if the project also complies with General Condition 1, *Watershed Hydrology and Water Quality*. If a project in other wetlands or their buffers does not comply with the following criteria, the effect will be assessed as permanent across the entire delineated area:

1. Personnel conducting ground-disturbing activities in or around other wetlands must be trained by a qualified biologist in these minimization measures and the permit obligations of project applicants working under the Plan.
2. Construction and maintenance vehicles or equipment cannot be refueled within the wetland or its buffer unless a bermed and lined refueling area is constructed and hazardous material absorbent pads are available in the event of a spill.
3. No equipment will be present in the wetted portion of the aquatic feature. Equipment may only enter the area when the aquatic feature is dry and there is no forecasted rain within 72 hours. Vehicles will be checked for leaks prior to entering or traveling around the aquatic feature.
4. All organic matter must be removed from nets, traps, boots, vehicle tires, and all other surfaces that have come into contact with aquatic features, or potentially contaminated sediments. Items shall be rinsed with clean water before leaving each study site (U.S. Fish and Wildlife Service 2005).
5. Measures to minimize the spread of disease and non-native species shall be implemented based on current Wildlife Agency protocols (e.g., *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog*, Appendix B, *Recommended Equipment Decontamination Procedures* [U.S. Fish and Wildlife Service 2005]) and other best available science.
6. Used cleaning materials (e.g., liquids) must be disposed of safely and, if necessary, taken off site for proper disposal. Used disposable gloves shall be retained for safe disposal in sealed bags (U.S. Fish and Wildlife Service 2005).
7. Native vegetation (shrubs and small trees) must be planted between other wetlands and the development such that the line of sight between other wetlandsand the development is shielded. This measure is only required when the reviewing Permittee deems it necessary to shield other wetlandsfrom adjacent development or to avoid direct or indirect effects from the adjacent development (e.g., trespass).
8. The reviewing Permittee will make a determination if fencing shall be required on a case-by-case basis. If needed, the type of fencing will match the activity and impact types. For example, projects that have the potential to cause erosion will require erosion-control barriers, and projects that may bring more household pets to a site must have permanent fencing to exclude pets. The temporal requirements for fencing also depend on the activity and impact type. For example, fencing to minimize permanent effects will be permanent, and fencing to minimize short-term effects will be removed after the activity is completed. Permanent fencing will be installed after grading or other construction activities in the area have been completed. If installed, a party responsible for maintenance will be identified prior to construction.

6.3.2.1.4 Community Condition 1.4, Salvage of Vernal Pool Constituent Habitat

Covered Activities that result in the conversion of vernal pool constituent habitat must grant adequate and timely access to allow for salvage as directed by the permitting jurisdiction or PCA.

If a project cannot avoid effects, vernal pool constituent habitat wetland soil and other wetland biota may be salvaged through the collection and storage of seeds, cysts, eggs, spores, and similar inocula for other vernal pool constituent habitats that will be created or restored elsewhere in the Plan Area. Work will be undertaken by the PCA, and the decision regarding whether to salvage, the protocol used to salvage, storage arrangements, and the amount to be collected will be at the discretion of the PCA, based on consultation with CDFW and USFWS.

Collection from vernal pool constituent habitat usually occurs when the pool is dry (typically June 15 to October 15), and the collection of other wetland biota may occur at other times, but should occur during the dry season for best possible preservation of seeds and other resources contained in the soil. Prior to collection, the PCA staff conducting the salvage will determine whether the vernal pool constituent habitats is infested with invasive plants. If a vernal pool constituent habitats is found to be infested, the PCA will first consult with CDFW and USFWS regarding the appropriateness of harvesting inoculum from the affected vernal pool constituent habitats.

This condition requires that a project applicant schedule grading and construction in coordination with PCA salvage. Project applicants notify the PCA of their construction schedule to allow the PCA the opportunity to salvage soils, and the PCA must make salvage plans sufficiently far in advance so as to not unreasonably impair construction.

6.3.2.1.5 Community Condition 1.5, Wetlands Restoration

Covered Activities that permanently or temporarily affect vernal pool constituent habitat and other wetlands,must contribute to restoration or creation of these resources as mitigation.

In general, the PCA will be responsible for implementing restoration or creation projects for vernal pool constituent habitat and other wetlands. The project applicant is responsible for paying a fee, as specified in Chapter 9, *Costs and Funding*. The PCA will select restoration or creation sites on the Reserve System based on criteria in Chapter 5, *Conservation Strategy*. Alternately, credits may be purchased at a qualifying mitigation bank (Section 8.4.7, *Private Mitigation and Conservation Banks*), or—with pre-approval by the PCA—restoration or creation may be undertaken on the project site. Restoration and/or creation on the project site itself would be overseen by the PCA, consistent with restoration and creation guidelines described in Chapter 5, *Conservation Strategy*.

6.3.2.2 Community Condition 2, Riverine and Riparian Avoidance and Minimization

This condition, focusing specifically on the riverine and riparian constituent habitat components of the Riverine/Riparian Complex community, is supplemental to Stream System Condition 1, *Stream System Avoidance and Minimization*.

6.3.2.2.1 Community Condition 2.1, Riverine and Riparian Avoidance

Covered Activities that avoid effects on the riparian constituent habitat by excluding construction or other ground disturbance from existing riparian vegetation are not subject to special habitat fees.

Riparian can be credited as avoided and a project will not be assessed special habitat fees if the project does not modify any area within a buffer that extends 50 feet outward from the outermost bounds of the riparian vegetation. The riparian buffer does not include patches of invasive, non-native vegetation that extends beyond the riparian vegetation.

If a project cannot avoid effects on riparian vegetation and surrounding buffer, Community Condition 2.2, *Minimize Riverine and Riparian Effects*, will apply. An avoidance buffer is not required for streams not otherwise addressed through the Stream System conditions (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*); however, all other Community Condition 2 requirements apply.

6.3.2.2.2 Community Condition 2.2, Minimize Riverine and Riparian Effects

Where riverine and riparian constituent habitat avoidance is not feasible, Covered Activities shall minimize effects on riverine and riparian constituent habitat by following design, construction, and operations minimization measures.

Project applicants are incentivized to avoid riverine and riparian constituent habitat (see Community Conditions 2.1 and 2.3, *Riverine and Riparian Woodland Avoidance* and *Riverine and Riparian Woodland Restoration,* respectively). Nonetheless, some Covered Activities will occur within the riverine and riparian constituent habitat; therefore, projects will adhere to avoidance measures, as applicable. Note that separate conditions to address avoidance and minimization of effects on the Stream System (Section 6.3.3, *Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System*), and Covered Species (Section 6.3.5, *Conditions to Minimize Effects on Covered Species*) are also required, if applicable, as described in this chapter.

Placer County Water Agency (PCWA) activities are covered separately under Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices*.

The design requirements and construction BMPs identified below reflect current and forthcoming regulations and guidelines for in-stream project design (e.g., the State Water Board's draft *Procedures for Discharges of Dredged or Fill Materials to Waters of the State* and NMFS's *Guidelines for Salmonid Passage at Stream Crossings*). These BMPs will be updated as new information is available. Updated BMPs shall be at least as restrictive for protection of the species as those described here, and Wildlife Agencies will approve proposed changes to the BMPs before the revised BMPs are applied to Covered Activities.

Types of Projects Subject to Condition

Covered Activities in the Stream System are subject to BMPs to reduce effects on streams. BMPs will apply to all Covered Activities in the Stream System in the Plan Area as well as to open canals, except for PCWA canals, which are addressed in Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices.*

BMPs

BMPs are listed in Table 6-1. These BMPs will be applied to Stream System projects and will decrease the potential for degradation of streams in the Plan Area. Additional BMPs are required for projects that are covered under the CARP.

Separate conditions to address avoidance and minimization of effects on Covered Species are also required, if applicable, as described in this chapter.

Table 6-1. In-stream and Stream System BMPs

ID[a]	Avoidance and Minimization Measure	Location[b]
	Project Planning and Design	
	All Covered Activities shall minimize the area of disturbance in Stream System to the maximum extent practicable.	Stream System
	Prior to final project design, site characteristics will be evaluated to determine if non-traditional designs, such as bioengineered bank treatments that incorporate live vegetation, or other engineered habitat improvements, can be successfully utilized while meeting the requirements of the project.	Stream System
	If structural changes to the channel bed are necessary as part of project design, provisions for fish passage will be incorporated into the project design.	Channel
	To minimize impact of new construction, existing access routes and levee roads shall be used.	Stream System
	Removal of riparian vegetation shall be minimized so the amount cleared will only be the amount necessary to accomplish the required activity and comply with public health and safety directives. Where riparian vegetation requires removal, removal will first be targeted in areas dominated by invasive vegetation.	Stream System
	Maintenance of natural stream characteristics, such as riffle-pool sequences, riparian canopy, sinuosity, floodplain, woody debris, and a natural channel bed, will be incorporated into the project design.	Channel
	Stream bank repair design will first consider only use of compacted soil, and will be re-seeded with native grasses or sterile non-native hybrids and stabilized with natural erosion control fabric. If compacted soil is not sufficient to stabilize the slope, bioengineering techniques must be used. No hardscape (e.g., concrete or any sort of bare riprap) or rock gabions may be utilized in streams not managed for flood control (i.e., streams where channel clearing, vegetation and debris removal, and conveyance maintenance activities are conducted) except in cases where infrastructure or human safety is threatened (e.g., undercutting of existing roads).	Stream System
	Rock riprap may only be used to stabilize channels experiencing extreme erosion or posing a threat to public safety. When used, rock riprap must be large enough and installed to withstand a 100-year flow event, and planted with native riparian species suitable for planting in such a manner.	Channel
	Limit removal of instream woody material (IWM) and vegetation in channels, on stream banks, and along levees and maintenance roads to only that necessary to meet the objective of the Covered Activity, or to meet regulatory requirements or guidelines.	Stream System
	In streams not managed for flood control purposes (i.e., streams where channel clearing, vegetation and debris removal, and conveyance maintenance activities are conducted) woody material (including live leaning trees, dead trees, tree trunks, large limbs, and stumps) will be retained unless it is threatening a structure, impedes reasonable access, or is causing bank failure and sediment loading to the stream.	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
	If debris blockages threaten bank stability and may increase sedimentation of downstream reaches, debris will be removed. When clearing natural debris blockages (e.g., branches, fallen trees, soil from landslides) from the channel, only remove the minimum amount of debris necessary to maintain flow conveyance (i.e., prevent significant backwatering or pooling). Non-natural debris (e.g., trash, shopping carts) will be fully removed from the channel.	Channel
	To minimize the effect of increased local erosion due to in-channel vegetation removal, the top of the bank shall be protected by leaving vegetation in place to the maximum extent possible.	Stream System
	Avoid access routes on slopes of greater than 20 percent used to access upland areas adjacent to streams and riparian areas. Any upland access across sloped areas shall be examined for evidence of instability and either revegetated or filled to prevent future landslide or erosion.	Stream System
	Avoid activities in the active (i.e., flowing) channel to the maximum extent practicable, especially during the migration, spawning, and egg incubation season for listed fish species, or before amphibians have undergone metamorphosis. If activities must be conducted in the active channel, limit the use of equipment for in-water work to hand tools to the extent practicable.	Channel
	Bank stabilization site design shall evaluate hydraulic effects immediately upstream and downstream of the work area to minimize downstream erosion caused by changes in water velocity. Design of bank stabilization projects shall incorporate similar roughness and characteristics of the bank surrounding the project area.	Channel
	Trails will be sited and designed with the smallest footprint necessary to cross through the Stream System. Trail crossings of streams will be aligned perpendicular to the channel and be designed to avoid any potential for future erosion.	Stream System
	Trail crossings of freshwater streams and drainages will adhere to the BMP above regarding the preference of bridges, or other over water structures, to minimize disturbance. Culverts may also be used if that is the least environmentally damaging design.	Channel
	Trail design shall minimize need for drainage structures. At the outfalls of drainage structures, erosion control measures shall be taken to prevent erosion.	Channel
	Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek. Native plantings, natural debris, or scattered rocks will be installed under bridges to provide wildlife cover and encourage the use of crossings.	Stream System
Dewatering		
	While in-stream work is performed, the entire streamflow shall be diverted around the work area by a barrier, except where it has been determined by a qualified biologist that the least environmentally disruptive approach is to work in a flowing stream and fish and amphibian passage is not a concern at that time. Where feasible, water diversion techniques shall allow stream flows to gravity flow around or through the work site.	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
	Cofferdams for isolating in-channel activities shall be installed both upstream and downstream not more than 100 feet from the extent of the work areas to prevent seepage into or from the work area when dewatering of the entire channel is necessary; otherwise, cofferdams shall affect no more of the stream channel than is necessary to support completion of the work. All water shall be discharged in a non-erosive manner (e.g., through gravel or vegetated bars, on hay bales, on plastic, on concrete, or in storm drains when equipped with filtering devices) provided that it first has been properly treated to eliminate contaminants, including raw concrete. Treated water discharged to the channel shall be consistent with ambient conditions, including temperature and pH. Turbid water or water contaminated with other pollutants pumped out of cofferdams shall be discharged to upland areas (e.g., grassy field) providing overland flow and infiltration and not allowed to re-enter the channel, or pumped to containers (e.g., baker tanks) for disposal.	Channel
	In channels with low flows, small in-channel berms constructed of imported, non-erosive materials (e.g., washed, rounded, spawning-sized gravel between 0.4 and 4.0 inches [10 to 100 millimeters] in diameter) or other temporary structures (gravel-filled sandbags, inflatable rubber cofferdams) that deflect water to one side of the channel during project implementation may be built. Following berm removal, the channel shall be restored to its original condition; gravel in contact with flowing water shall be left in place and allowed to disperse naturally by high winter flows.	Channel
	Sumps or basins may be used to collect water, where appropriate (e.g., in channels with low flows). If pumps are used, a fish screen must be installed to prevent entrapment of small fish.	Channel
	To prevent increases in temperature and decreases in dissolved oxygen (DO), properly sized bypass pipes shall be used (i.e., larger diameter pipes to better pass the flows). Creation of a low-flow channel or other methods to isolate the work area may be used to avoid the use of bypass pipes.	Channel
	Diversions shall not diminish quantity or degrade quality of the discharged water, and shall maintain ambient stream flows below the diversion. When the work is completed, all de-watering materials placed in the channel shall be removed and normal flows shall be restored to the affected stream as soon as is feasible and safe. To the extent feasible, all temporary diversion structures and the supportive material shall be removed no more than 48 hours after work is completed; clean gravel in contact with flowing water shall be left in place and allowed to disperse naturally by high winter flows.	Channel
Construction		
	The applicant shall maintain a copy of project conditions—as determined by the local jurisdiction and/or PCA—at the site. Site supervisors shall be familiar with all permit conditions.	Stream System
	A qualified biologist will train all personnel working within or adjacent to the Stream System (i.e., those people operating ground-disturbing equipment) regarding these avoidance and minimization measures and the permit obligations of project applicants working under this Plan.	Stream System
	Personnel shall utilize equipment that minimizes the area and degree of disturbance, such as appropriately-tired vehicles (either tracked or wheeled, depending on the situation), or avoidance of vehicles if possible.	Channel
	No vehicles other than necessary construction equipment shall be allowed within the Stream System.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
	All wetlands, other waters, and Stream Systems that are adjacent to a Covered Activity project site and that will be avoided shall be marked with bright construction fencing. Temporary fencing shall be removed upon completion of the project.	Stream System
	Deep pools located outside and adjacent to the construction footprint shall be fenced or blocked with barriers to prevent encroachment of equipment and personnel from affecting deep-pool habitats, which are used as refuge for fish and wildlife.	Channel
	When practicable, avoid maintenance and construction activities at night. When night work cannot be avoided: • Minimize use of temporary lighting. • Shield and focus lights on work areas. • Use the lowest intensity lighting necessary to complete the work.	Stream System
	Wildlife entering the construction site shall be allowed to leave the area unharmed, or shall be flushed or herded humanely in a safe direction from the site.	Stream System
	All utility pipe sections shall be capped or inspected for wildlife before being placed in a trench. Pipes within a trench shall be capped at the end of each day to prevent entry by wildlife.	Stream System
	At the end of each workday all open trenches will be provided with a ramp of dirt or wood to allow trapped animals to escape.	Stream System
	Staging and storage areas for equipment, stockpiled materials, fuels, lubricants, and solvents shall be located outside of the Stream System. If site conditions prevent locating staging areas outside the Stream System, at a minimum they shall be located outside the top of the bank, ideally on an existing disturbed area (e.g., access road) or other area that can be readily returned to pre-project conditions at the conclusion of the activity.	Stream System
	Handle and dispose of invasive plant species removed during Covered Activity implementation in such a manner as to prevent further spread of the invasive species.	Stream System
	To minimize the spread of pathogens all staff working in aquatic systems (i.e., streams, ponds, and wetlands), including site monitors, construction crews, and surveyors, will adhere to the most current guidance for equipment decontamination provided by the Wildlife Agencies at the time of activity implementation.	Channel
	Only herbicides registered with the California Department of Pesticide Regulation shall be used in streams, ponds, and lakes, and shall be applied in accordance with label instructions. A list of all pesticides that may be used in the project area shall be submitted to the PCA before use. The USFWS and NMFS do not issue incidental take permits for pesticide and rodenticide use; pesticide and rodenticide use, and resultant “take” of ESA-listed species, are not covered under this Plan for the federal permits.	Stream System
	Avoid or minimize the amount of fertilizer used during hydro seeding to minimize introducing these materials into waterways.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
Post-Construction		
	Temporary fills, such as for access ramps, diversion structures, or cofferdams, shall be completely removed upon finishing the work.	Stream System
	The stream bed will be returned to as close to pre-project condition—considering such characteristics as elevations, profile, and gradient—as appropriate. Ecologically improved conditions shall be incorporated into project design when appropriate.	Channel
	Any disturbed soils will be revegetated with native plants; non-invasive species; or non-reproductive (i.e., sterile hybrids) plants suitable for the altered soil conditions.	Stream System
	Projects that cross beneath streams must provide a post-construction summary of any unanticipated effects (e.g., stream channel disturbance due to a frac-out) resulting from implementation of the project. Additional fees may be owed (as required by General Conditions 3 and 4, *Land Conversion* and *Temporary Effects*, respectively), based on the actual effects of the project.	Stream System
Operations and Maintenance		
	For stream maintenance activities, only in-stream work that is necessary to maintain the channel consistent with designated management purposes (e.g., flood control, groundwater recharge) will be conducted.	Channel
	When conducting vegetation management, retain as much understory brush and as many trees as feasible, emphasizing shade producing and bank stabilizing vegetation.	Stream System
	Vegetation thinning and removal in streams managed for flood control will be phased to ensure that some riparian habitat remains at all times. Projects will be planned so that the least amount of riparian vegetation will be removed while still meeting the desired flood control needs.	Stream System
	If a project alters the stream bed during stream maintenance, the stream low flow channel shall be returned to its approximate prior location with appropriate depth for fish passage without creating a potential future bank erosion problem.	Channel
	Sediment removal in the stream channel shall use the approach with the least impact, such as phasing of removal activities or only removing sediment along one half of the channel bed, allowing the other half to remain relatively undisturbed.	Channel
	Maintenance and operation of pumps and generators placed in stream will minimize impacts to water quality and aquatic species.	Channel
	Temporary crossings shall be installed no earlier than April 15 and shall be removed no later than October 15. This work window could be modified at the discretion of the County, City, and Wildlife Agencies.	Channel
	Work in Stream Systems shall not disturb active bird nests until young birds have fledged. To avoid effects to nesting birds in Stream Systems, trees and shrubs shall be removed outside of the nesting season approximately between August 15 and February 1. Tree and shrub removal at other times is at the PCA's discretion and will require surveys by a qualified biologist to determine the absence of nesting birds.	Stream System

ID[a]	Avoidance and Minimization Measure	Location[b]
	The following will be implemented to minimize noise effects on fish and wildlife during pile driving: • Vibratory pile drivers, or other Wildlife Agency-approved methods, shall be used to drive piles, to the maximum extent practicable. • Where feasible, the use of impact hammers to drive piles will be limited to areas outside of the stream channel or in dry cofferdams. • Bubble curtains will be used to attenuate sound when it is necessary to drive piles with an impact hammer in water. • Where feasible, metal-to-metal contact of the driver hammer and metal piles will be avoided. • The smallest pile driver and the minimum force necessary to complete the work will be used. • All types of pile driving will be limited to daylight hours only to provide fish and wildlife with extended quiet periods. • Prior to initiating pile driving with an impact hammer, an acoustic analysis using the most recent interagency standards and guidelines will be conducted to predict impacts of pile driving noise on listed fish species. A hydroacoustic monitoring plan will be developed and implemented and underwater noise levels will be monitored during all impact pile driving on land, in dry cofferdams and in water (using bubble curtains) to ensure that the peak and cumulative sound exposure levels do not exceed predicted values.	Channel
	Wood treated with oil-type preservatives (e.g., creosote, pentachlorophenol) shall not be used in waterways. Wood treated with waterborne preservative chemicals shall be used instead, provided that the preservative being used has been approved by the Western Wood Preservers Institute (WWPI), and WWPI guidelines and BMPs to minimize effects on aquatic environments during implementation are followed (www.wwpinstitute.org).	Channel

ID[a]	Avoidance and Minimization Measure	Location[b]
Utility Line Installation		
	Utility lines that cross waterways shall be attached to bridges, when feasible.	Stream System

	When it is necessary to bury utility lines beneath stream channels, a frac-out plan will be prepared, and will include a plan for response and containment. In addition, the following factors shall be considered as part of project design :
	• Utility lines shall be buried below the maximum extent of channel bed scour and aligned as perpendicular as possible to the stream channel.
	• Avoid siting crossings at meander bends, braided stream segments, alluvial fans, active floodplains, or other inherently unstable reaches, areas of groundwater upwelling or locations with documented spawning habitat.
	• Trenching through stream banks and channels shall be avoided in favor of trenchless construction methods (e.g., jack and bore, directional drilling), to the maximum extent practicable.
	• If trenching is required:
	  ○ Trench widths should be as narrow as feasible to accommodate the pipeline/utility line.
	  ○ Trench excavation shall be conducted in the dry or in areas isolated from flowing water (e.g., cofferdams, stream diversions) and other Avoidance and Minimization Measures associated with cofferdams and water diversions described in this table shall be implemented.
	• The amount of disturbance shall be kept to the minimum necessary to complete the work.
	• Disturbed areas shall be returned to pre-project conditions prior to returning flow to the stream.
	• If directional drilling is required:
	  ○ Drill paths shall be designed at an appropriate depth below the stream channel to minimize the risk of frac-out where drilling mud is released through fractured bedrock.
	  ○ Drill entry and exit points shall be located away from channel banks to minimize impact on the Stream System and channel.
		Stream System

	Overland trenches shall be required to be backfilled with the native soils originally excavated from that area (as opposed to imported engineered fills) to the maximum extent feasible. Additionally, where technically feasible, topsoil shall be required to be stripped, stockpiled, and reapplied to original depth in all areas disturbed by construction over and adjacent to overland trenches.	Stream System

[a] To be provided in the Final HCP/NCCP.

[b] *Location* column denotes where the measure applies:

The channel is the area of a stream where normal to high flows occur. It is usually marked by bed-and-bank morphology. The Stream System is as defined in Chapter 3, *Physical and Biological Setting*, and at the beginning of this chapter.

BMP = best management practice

ESA = Endangered Species Act

HCP/NCCP = Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

NMFS = National Marine Fisheries Service

PCA = Placer Conservation Authority

Plan = Western Placer County Habitat Conservation Plan and Natural Community Conservation Plan

USFWS = U.S. Fish and Wildlife Service

6.3.2.2.3 Community Condition 2.3, Riverine and Riparian Restoration

Covered Activities that affect riverine or riparian constituent habitat must contribute to restoration as mitigation to compensate for loss of riverine or riparian constituent habitat.

Projects that affect riverine and riparian must contribute to replacement of these resources. Riverine restoration measures will be located in the same watershed and salmonid habitat type (e.g., spawning or migrating if the effects occur in a salmonid stream) in which the effects occur.

Generally, restoration and replacement actions will be undertaken by the PCA and funded by additional fees imposed on projects. Riverine and riparian restoration to offset project effects may be implemented on site to replace the functions of the riparian woodland degraded or lost to the Covered Activity. Riparian restoration implemented on site will be credited to Plan restoration targets if the restoration helps to meet the biological goals and objectives of the Plan. When it is deemed infeasible to implement restoration at the project site, in-kind restoration will be required at an off-site location or through the payment of fees to the PCA. Stream enhancement will be implemented in concert with Community Condition 2.2, *Minimize Riverine and Riparian Effects*.

6.3.2.2.4 Community Condition 2.4, Placer County Water Agency Operations and Maintenance Best Management Practices

Placer County Water Agency will apply Operations and Maintenance Best Management Practices in addition to any other applicable community and species conditions.

PCWA operates an extensive raw water distribution system that includes canals, ditches, flumes, and several small reservoirs. The PCWA will implement its Natural Resource Management Plan (NRMP) (Appendix L, *Cost Model and Assumptions*) for O&M of its raw water distribution system to comply with this condition. The NRMP describes natural resource conditions along the PCWA distribution system in the region, regulatory requirements for system O&M, and potential effects of O&M activities on natural resource conditions. It also identifies BMPs for PCWA O&M activities. BMPs described in the NRMP are provided below and will be implemented as applicable.

Pre-implementation BMPs

When the PCWA has need to conduct maintenance activities, it will apply the following pre-implementation BMPs to reduce potential effects of PCWA O&M activities on natural resources in the Plan Area. These BMPs will be applied at facilities as maintenance needs need arise; PCWA will not apply these BMPs unless otherwise conducting ground-disturbing activities.

1. Improve canal bank stability and install sediment traps at canal outlets by:
    a. Installing velocity dissipaters at canal outlets;
    b. Lining banks at canal outlets;
    c. Installing erosion control blankets in areas of soil disturbance;
    d. Installing temporary fiber rolls in areas of soil disturbance; and/or
    e. Applying spray-on soil binders in areas of soil disturbance.

2. Avoid potential wet-weather effects by:
    a. Patrolling canals and removing potential obstructions to prevent erosion;
    b. Minimizing the amount of water purchased from water purveyors during periods of high precipitation;
    c. Distributing flood releases from the canal system by releasing flows at numerous intermediate outlets;
    d. Planning and designing projects to minimize land disturbance;
    e. Installing erosion and sedimentation control measures prior to land-disturbing activities;
    f. Identifying areas that are susceptible to erosion for future canal lining activities; and/or
    g. Choosing canal crossing sites where erosion potential is low.

Ongoing or Post-implementation Best Management Practices

In order to prevent degraded water from entering streams after PCWA O&M activities are performed, the following BMPs will be applied, if applicable:

a. Modifying canal operations to gradually restore reservoir releases to canals at a slower rate
b. Applying sediment traps at storm drains for dewatering before canal lining
c. Treating first-flush flows and other flushing to reduce downstream water quality effects, including minimizing sediment releases during the breeding seasons for covered amphibians and fish

6.3.2.3 Community Condition 3, Valley Oak Woodland Avoidance, Minimization, and Mitigation

This Community Condition addresses issues related to valley oak woodlands.

6.3.2.3.1 Community Condition 3.1, Valley Oak Woodland Avoidance

Covered Activities that avoid effects on valley oak woodland wherever it occurs by excluding construction or other ground disturbance from existing valley oak woodland will not be assessed the land conversion fee.

As valley oak woodland is a scarce land-cover type that can provide ecological value even when isolated (e.g., it can be a pollen source [wind and insect dispersal] and an acorn source, both promoting genetic diversity), it is important to protect, even in small acreages. Any valley oak woodland stand greater than 1 acre can be credited as avoided and will not be assessed impact fees if the project does not:

- Modify any area within the outer edge of a buffer that extends 50 feet outward from the outermost bounds of the valley oak canopy
- Irrigate in and around valley oak woodland or otherwise alter the hydrology of the site, including the location of septic leach fields, such that the valley oak woodland receives more water than under pre-project conditions

If a project can avoid effects on valley oak woodland, no additional conditions related to valley oak woodland are necessary.

6.3.2.3.2 Community Condition 3.2, Valley Oak Woodland and Individual Valley Oak Trees Restoration

Covered Activities must compensate for loss of Valley Oak Woodland natural community, and individual valley oak trees.

Projects that affect individual valley oak trees or stands of valley oak woodland will pay the Plan land conversion fee. All revenue will be provided to the PCA and applied to in-kind mitigation of effects on valley oaks and valley oak woodlands (see Section 9.4.1.3, *Land Conversion Fee*).

6.3.3 Conditions to Avoid, Minimize, and Mitigate Effects on the Stream System

The primary objective of Stream System Conditions is protection of watershed integrity (health and hydrology) by defining the extent of the Stream System and providing an incentive (in the form of a fee) for the project applicant to avoid land conversion within the Stream System boundary. Projects where effects on riparian and riverine constituent habitat are unavoidable must also comply with Community Condition 2, *Riverine and Riparian Avoidance and Minimization*. Effects within the Stream System must be mitigated by stream enhancement. Effects on the riverine and riparian land-cover types must also be mitigated, but this is addressed in Community Condition 2, *Riverine and Riparian Avoidance and Minimization*.

A definition for the Stream System boundary is provided in Section 3.2.7, *Stream System*. The variable boundary widths for streams in western Placer County are listed in Table 3-4. In addition, the FEMA floodplain boundary will dictate how the Stream System is defined. When implementing a project, both the Stream System boundary widths as listed in Table 3-4 and shown in Figure 3-8, and the Stream System floodplains as mapped in Figure 3-10, determine avoidance as described below. For a full description of the Stream System boundary to determine whether a project is in the Stream System, see Section 3.2.7, *Stream System*. The Stream System boundary is different from the watercourse structural setback requirements of local zoning codes.

The Stream System boundary will be determined by a qualified biologist, and approved by the Permittee with jurisdiction over the Covered Activity. Project proponents are encouraged to contact CDFW to verify survey information, if needed to comply with California Fish and Game Code section 1600 et seq. (see Section 1.5.2.3, *California Fish and Game Code Sections 1600-1616*).

6.3.3.1 Stream System Condition 1, Stream System Avoidance and Minimization

Design and implement Covered Activities in such a way as to avoid and minimize adverse effects on the Stream System.

This condition allows applicants to avoid portions of the Stream System and therefore avoid paying fees, as described in Stream System Condition 2, *Stream System Mitigation: Restoration*.

6.3.3.2 Stream System Condition 2, Stream System Mitigation: Restoration

Where Covered Activities result in the permanent or temporary impacts on the Stream System, regardless of the community or constituent habitat type affected, effects shall be mitigated by appropriate restoration or enhancement.

This measure works in concert with Community Condition 2.3, *Riverine and Riparian Restoration*.

6.3.3.2.1 Fee within the Stream System

Projects that occur in the Stream System but do not avoid permanent effects will pay the Stream System fee. Projects in the Stream System with only temporary effects do not pay the Stream System fee. This will apply to all areas of the project that occur in the Stream System boundary that is not otherwise assessed a special habitat fee (see Section 9.4.1.4, *Restoration and Enhancement Fees*), including affected upland communities within the Stream System.

6.3.3.2.2 Stream System Fee Exemptions

Some Covered Activities are required to occur in the Stream System and, as such, cannot meet the avoidance criteria described in Stream System Condition 1, *Stream System Avoidance and Minimization*.

Existing structures, uses, and activities (including legal non-conforming structures, uses, and activities) are exempt from the Stream System fee unless subject to future modification that would require approval by a Permittee. Maintenance activities may also be exempt pending approval of the Permittee.

6.3.4 Regional Public Programs

The conditions listed here set design and construction requirements to minimize the effects of regional public programs (described in Section 2.6.5 *Regional Public Programs*) on wildlife movement, Covered Species, and their habitat. All such projects will also be subject to the General Conditions on land conversion and to such conditions on natural communities and Covered Species as may apply. Projects that affect the Stream System are also subject to Stream System Condition 1, *Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration.*

6.3.4.1 Regional Public Projects Condition 1, Transportation and Other Infrastructure Projects Design Requirements

Implement design requirements for applicable public transportation projects located in the RAA to reduce the effects of barriers in potential conservation lands and minimize effects on Covered Species, natural communities, and wildlife movement.

6.3.4.1.1 Types of Projects Subject to Condition

The following public projects if occurring in the RAA are subject to design requirements or construction practices because they are expected to result in new ground disturbance or they may create new barriers to wildlife movement or augment existing barriers. Each project category is subject to a specific combination of requirements, listed in Table 6-2 and described in detail in Sections 6.3.4.1.4, *Design Guidance Measures*, and 6.3.4.2.1, *Construction Practices BMPs*. The requirements are described below.

Table 6-2. Conditions on Covered Transportation Projects

Design Requirements and Construction Practices	Highway Projects	Roadway Projects and Interchange Upgrades	Road Safety Improvements
Transportation Project Design Requirements			
Coordination between project applicant, PCA, and Wildlife Agencies to ensure project meets Plan requirements	M	M	-
Enhance existing undercrossings	M	M	-
Implement minimum sizing of culverts	M	M	-
Install grating over tunnels/culverts for penetration of light	P	P	-
Install fencing around undercrossings to maximize use of crossing	P	P	-
Road barrier and passage designs for wildlife (to direct wildlife to safe crossing)	P	P	-
Construction Practices			
Best Management Practices	M	M	M
Post-construction Practices			
Control roadside vegetation adjacent to reserves	M	M	M
Revegetate cut/fill slopes with native vegetation	M	M	M
Vegetation management around undercrossings	M	M	M

Notes:
M = Mandatory
P = Possible (required unless data demonstrate action would not benefit wildlife and California Department of Fish and Wildlife and U.S. fish and Wildlife Service agree to omit).

Highway Projects

Highway projects are those projects identified by the County of Placer, the City of Lincoln, or the Placer County Transportation Planning Agency that call for the expansion of existing highways or the construction of new highway ramps and interchanges within the RAA. This includes limited-access thoroughfares, thoroughfares, freeways, and conventional highways.

Two major transportation projects proposed for construction during the permit term of this Plan are the Placer Parkway project and the Interstate 80/State Route 65 interchange improvements. These are subject in their entirety to this condition.

Roadway Projects and Interchange Upgrades

All new road and interchange projects are considered roadway projects. These include road widening, realignment, extension, connection, or improvement projects that do not qualify as exempt (see *Exempt Transportation Projects,* below, for a list of exempt projects). Also included are road repairs from damage caused by landslides, flooding and other natural disasters. Repair may require the installation of retaining wall or drainage management features such as under-road culverts (this includes arterial, collector, and local roadways).

Road Safety Improvements

Road safety improvements involve minimal ground-disturbing activities, such as traffic control signs, and lengthening existing turning lanes. They are not expected to impede or substantially worsen wildlife movement unless they cumulatively alter a large segment of a rural roadway. Cumulative improvements (i.e., multiple, contiguous improvements implemented in phases) longer than 1,000 feet are subject to this condition.

Other Infrastructure Projects

New infrastructure projects or modifications to existing infrastructure projects involving ground-disturbing activities not otherwise exempt (as described below) are subject to this condition.

Separate conditions to address avoidance and minimization of effects on Covered Species are also required, if applicable, as described in this chapter.

6.3.4.1.2 Exempt Transportation Projects

The following projects are not subject to the design requirements or construction practices specified in this condition because they are not expected to result in new ground disturbance, create new barriers to wildlife movement, or augment existing barriers.

a. Installing traffic signals, signs, pavement markings, flashing beacons (e.g., railroad crossing signals), or other safety warnings within existing improved public rights-of-way

b. Painting new lane striping

c. Installing "rumble" strips, channelizers, or other safety markers

d. Installing guardrails or similar structures within existing improved public rights-of-way that do not impede wildlife movement

e. Installing ramp metering

f. Regrading existing shoulders (this activity is considered maintenance; see Regional Public Projects Condition 3, *Operation and Maintenance BMPs*)

g. Implementing other road safety improvements on less than 1,000 feet of roadway within the existing developed area (including gravel shoulders)

Note that road safety improvements that cross creeks are subject to Stream System Condition 1, *Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration*, above.

The following projects are exempt from this condition because of their small footprint. The exemption would apply only if the project does not include the installation of median barriers or other impermeable safety barriers; if no stream, riparian, pond, or wetland land-cover types are present; and if the activity is not located in the Stream System. For the area being considered for exemption, the length of the road improvement (as measured along the centerline of the road) must be compared against all new adjacent projects constructed since the time of Plan implementation to determine whether the cumulative thresholds have been exceeded.

a. Widening roads to add lanes where the project is less than or equal to 1,000 feet in length

b. Realigning roads for safety or operational purposes where the project is less than or equal to 1,000 feet in length

c. Constructing new turn lanes less than or equal to 1,000 feet in length

d. Constructing a new road shoulder less than or equal to 1,000 feet in length

6.3.4.1.3 Review Process

Public projects will be evaluated on a case-by-case basis through the review process described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*, and appropriate measures from the guidance listed below will be made a binding project requirement by the PCA. A key step is determining what target species will guide design at specific locations and how the design will perform to benefit the target species. Any project design responding to this condition needs to include a proposed list of target species and an explicit program of monitoring and maintenance.

Design guidance measures are based on current techniques for minimizing effects of transportation projects. Because the effectiveness of road crossings designed for wildlife is an active area of research, frequent advances in design are expected throughout the permit term and are expected to be implemented through the adaptive management process. Measures may be updated by the PCA after consultation with the Wildlife Agencies if new information shows more effective ways to encourage safe wildlife movement across transportation corridors.

6.3.4.1.4 Design Guidance Measures

1. **Coordination between project applicant, PCA, and Wildlife Agencies to ensure project meets Plan requirements.** Project applicants will coordinate with the PCA and Wildlife Agencies.

2. **Enhance Existing Undercrossings**. Undercrossing enhancements must incorporate design requirements identified for culverts and stream crossings in Community Condition 2.2, *Minimize Riverine and Riparian Effects*, and Species Condition 7, *Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)*. When new roadways are constructed or road expansion projects span an undercrossing, such as a culvert, existing undercrossing structures will be retrofitted within safety and engineering limitations to allow for Covered Species movement. Existing culverts or other potential crossing points will be enhanced based on the best available information and appropriate to the conditions at the project site (e.g., repair of culverts in existing urban settings would not be required to upgrade to be wildlife-friendly). Meeting these objectives will be secondary to the primary engineered objectives of the undercrossing, as determined by Permittee land development engineering requirements. Wildlife crossings that can serve multiple species will be used whenever possible. Examples of enhancements include incorporation of light sources, shortening the overall length of the under-

crossing (while still meeting project objectives), or installing or removing cover throughout (depends on target species' needs).

3. **Implement minimum sizing of culverts.** Culvert sizing is dictated by various conditions that include site-specific and hydrologic conditions, which may not be suitable for adjustment depending upon the drainage objective. On streams that support salmonids, culverts must also be sized according to the requirements for Species Condition 7*, Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids).* In addition, where space allows, culverts for public works projects should be sized to the minimum length, height, and width necessary to provide safe passage under the road for the Covered Species (as proposed by the project applicant and reviewed and agreed upon by the PCA). Culverts associated with rural public projects will provide a natural substrate on which wildlife can travel (e.g., an open-bottom box culvert) when such designs are compatible with hydrologic design criteria and when appropriate for the conditions at the site.

4. **Install grating over tunnels/culverts for penetration of light**. Grating to allow ambient light to penetrate undercrossings shall be installed for rural public projects when necessary for Covered Species. For major roadways, grating installation will be subject to determination in the field as to the need. When installed, culverts will include grating on the inactive part of the roadbed (e.g., road shoulders or median) to allow filtration of ambient light and moisture but minimize noise intrusion. Artificial lighting inside tunnels or culverts will not be used; these devices have not been shown to be effective and may deter nocturnal wildlife. Such devices may also be vandalized. Other mechanisms for improving visibility may be proposed by the applicant, such as painting the inside of the crossing with a light color. The PCA will review and approve all such proposals in consultation with the Wildlife Agencies.

5. **Install fencing around undercrossings to maximize use of crossing**. Fencing will be required in areas where giant garter snake, California red-legged frog, and western pond turtle that attempt to cross the road may suffer high rates of mortality. Fencing will be used along the perimeter of the roadway to direct these Covered Species to undercrossings and minimize their access to the road. Fencing designs will be tailored to the Covered Species expected to use the undercrossing and will be based on the best available information on species use and best fencing designs available at the time. Fencing will extend out from the undercrossing along the road to an appropriate distance and serve as a barrier to wildlife species that attempt to cross the road. The distance that fencing extends from the undercrossing will be determined on a case-by-case basis and will consider locations of known collisions in the area. Right-of-way fencing could be designed to serve this purpose. Fencing must be attached to the undercrossing to prevent wildlife from passing through a gap between the undercrossing and the beginning of the fence. Fencing must be monitored at least annually and repairs made promptly to ensure effectiveness.

6. **Road barrier and passage designs for wildlife (to direct wildlife to safe crossing)**. New passages will be placed or located only in areas that connect suitable habitats for target species, as determined by a qualified biologist, so that wildlife is not directed into urbanized areas.

   When compatible with vehicle safety, road median barriers or shoulder barriers will allow wildlife to cross under or over the barrier in the event they become trapped in the right-of-way.

6.3.4.2 Regional Public Projects Condition 2, Transportation and Other Infrastructure Projects Construction BMPs

Implement construction BMPs for applicable transportation or other infrastructure projects located in the rural portion of the Plan Area where appropriate and feasible to reduce the effects of construction on natural communities and native species.

6.3.4.2.1 Construction Practices BMPs

Avoidance and minimization measures identified in this condition will be used for all covered road construction and operation and maintenance activities, as applicable.

BMPs for Gravel Road Projects

1. For construction of new gravel roads, prevent rills (small channel or gully) by breaking large or long bare areas up into smaller patches that can be effectively drained before rills can develop.
2. For construction of new gravel roads, disconnect and disperse runoff flow paths, including roadside ditches, which might otherwise deliver fine sediment to stream channels.
3. When constructing gravel roads, install road surface and ditch drainage structures frequently enough so that gullies do not form at drainage points and so that the road and drainage systems are generally dry.
4. For construction of new gravel roads, prevent gullies by dispersing runoff from road surfaces, ditches, and construction sites by correctly designing, installing, and maintaining drainage structures (e.g., road shape, rolling dips, out-sloped roads, culverts) and keeping streams in their natural channels. No single point of discharge from a road or other disturbed area should carry a flow that would be capable of creating gullies. If gullies continue to develop, additional drainage structures will be needed to disperse the runoff.

BMPs for Roadside Drainage

1. When constructing or reconstructing a ditch, utilize designs for the outlet such that runoff is first filtered and/or spread to improve water quality and reduce flow velocity prior to the runoff entering surface waters, when practical. If not practical, implement sediment management BMPs to trap sediment before it reaches a stream. BMPs described in General Condition 1, *Watershed Hydrology and Water Quality*, and Community Condition 2.2, *Minimize Riverine and Riparian Effects*, will be applied as appropriate.
2. When designing or redesigning roads, evaluate—and where appropriate, implement—opportunities to restore natural drainage patterns. Install culverts or rolling dips to retain water in its drainage of origin, which will decrease the potential for erosion downstream. On problem roads, evaluate—and where appropriate, implement—opportunities to reconstruct the road segment in order to improve and maintain natural drainage patterns; for example, add rolling dips, emergency water bars, and additional cross drains.

BMPs for Roadside Construction

1. Equipment storage, fueling, and staging areas will be sited on disturbed areas or on non-sensitive, non-native grassland land-cover types, when these sites are available, to minimize the risk of direct discharge into riparian areas or other sensitive land-cover types. When such sites

are not available, staging will occur on the road used to access the site. BMPs, such as those developed in the West Placer Storm Water Management Plan pertaining to staging, must be utilized.

2. No erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels, on adjacent banks, or where it may enter into any river, stream or lake.
3. Silt fencing or other sediment trapping methods will be installed below the grade of new road construction or road widening activities to minimize the transport of sediment off the site.
4. Temporary barriers will be constructed to keep wildlife out of construction sites, as appropriate.
5. On-site monitoring will be conducted by a qualified biologist throughout the construction period to ensure that disturbance limits, BMPs, and Plan conditions/restrictions are being implemented properly.
6. Active construction areas will apply standard dust control measures to minimize the effects of dust on adjacent vegetation and wildlife habitats, if warranted.
7. Portions of the project that occur in streams (e.g., bridge or culvert construction) will comply with Community Condition 2.2, *Minimize Riverine and Riparian Effects.*

Post-construction BMPs

8. Following construction, the areas beyond road shoulders and inside the right-of-way will be returned to a natural state or pre-project conditions when a natural state is not achievable within 1 year of project groundbreaking. These actions will most likely be applied differently to each road project and will decrease the potential for the spread of invasive species.
9. Invasive plants within the project area and any construction staging areas will be removed to prevent the spread of these species into nearby or adjacent reserves.
10. Cut-and-fill slopes will be revegetated with native plants, if possible, or with non-invasive plants (see the California Invasive Plant Council website for designated invasive species [http://www.cal-ipc.org/paf/]) suitable for the altered soil conditions.
    - All temporarily disturbed areas, such as staging areas, will be returned to pre-project conditions or improved with native plants within 1 year of project groundbreaking.
    - Vegetation and debris will be managed in and near culverts and under and near bridges to ensure that entryways remain open and visible to wildlife and that the passage through the culvert or under the bridge remains clear.
11. Invasive Species. Permittee shall conduct project activities in a manner that prevents the introduction, transfer, and spread of invasive species, including plants, animals, and microbes (e.g., algae, fungi, parasites, bacteria), from one project site and/or waterbody to another. Prevention BMPs and guidelines for invasive plants can be found on the California Invasive Plant Council's website at: http://www.cal-ipc.org/ip/prevention/index.php and for invasive mussels and aquatic species can be found at the Stop Aquatic Hitchhikers website: http://www.protectyourwaters.net/.
12. Inspection of Project Equipment. Permittee shall inspect all vehicles, watercraft, tools, waders and boots, and other project-related equipment and remove all visible soil/mud, plant materials,

and animal remnants prior to entering and exiting the project site and/or between each use in different waterbodies.

13. Decontamination of Project Equipment. Permittee shall decontaminate all tools, waders and boots, and other equipment that will enter the water prior to entering and exiting the project site and/or between each use in different waterbodies to avoid the introduction and transfer of organisms between waterbodies. Permittee shall decontaminate project gear and equipment utilizing one of three methods: drying, using a hot water soak, or freezing, as appropriate to the type of gear or equipment. For all methods, Permittee shall begin the decontamination process by thoroughly scrubbing equipment, paying close attention to small crevices such as boot laces, seams, net corners, etc., with a stiff-bristled brush to remove all organisms. To decontaminate by drying, Permittee shall allow equipment to dry thoroughly (i.e., until there is a complete absence of water), preferably in the sun, for a minimum of 48 hours. To decontaminate using a hot water soak, Permittee shall immerse equipment in 140 degrees Fahrenheit (°F) or hotter water and soak for a minimum of 5 minutes. To decontaminate by freezing, Permittee shall place equipment in a freezer 32°F or colder for a minimum of 8 hours. Repeat decontamination is required only if the equipment/clothing is removed from the site, used within a different waterbody, and returned to the project site.
14. Decontamination of Vehicles and Watercraft. Permittee shall decontaminate vehicles, watercraft, and other project-related equipment too large to immerse in a hot water bath by pressure washing with hot water a minimum of 140°F at the point of contact or 155°F at the nozzle. Additionally, Permittee shall flush watercraft engines and all areas that could contain standing water (e.g., live wells, bilges) for a minimum of 10 minutes. Following the hot water wash, Permittee shall dry all vehicles, watercraft, and other large equipment as thoroughly as possible.
15. Decontamination Sites. Permittee shall perform decontamination of vehicles, watercraft, and other project gear and equipment in a designated location where runoff can be contained and not allowed to pass into CDFW jurisdictional areas and other sensitive habitat areas.
16. Notification of Invasive Species. Permittee shall notify CDFW and USFWS immediately if an invasive species not previously known to occur within the project site is discovered during project activities by submitting a completed Suspect Invasive Species Report. Upon receiving notification, CDFW will provide Permittee with guidance for further action as appropriate to the species.

6.3.4.3 Regional Public Projects Condition 3, Operation and Maintenance BMPs

O&M BMPs for applicable transportation or other infrastructure projects in the rural portion of the Plan Area will be implemented where appropriate and feasible to reduce the effects of construction on natural communities and native species.

This condition applies to O&M activities: (1) on public lands and (2) on private lands where the activities are authorized pursuant to land use approvals granted by the Permittees and governed by conditions of approval. O&M activities include utility line and facilities maintenance, public or private road maintenance, vegetation management, and mitigation monitoring. Road and utility maintenance activities have the potential to affect Covered Species directly through management activities such as mowing or resurfacing and may indirectly affect Covered Species by introducing sediment and other pollutants into downstream waterways or by spreading invasive species.

- Most O&M will occur as ongoing activities. The determination regarding which BMPs will be required and how they will be monitored will be made as part of the HCP/NCCP participation package described in Section 6.2, *Program Participation: Receiving Take Authorization under the Plan*.
- Projects occurring in streams or the Stream System will also comply with Stream System Condition 1, *Stream System Avoidance and Minimization*, and Stream System Condition 2, *Stream System Mitigation: Restoration,* as appropriate.

6.3.4.3.1 O&M BMPs

a. Silt fencing or other sediment control devices will be installed down-slope from maintenance activities that disturb soil to minimize the transport of sediment off site.

b. In the course of rural road maintenance, no erodible materials will be deposited into watercourses. Brush, loose soils, or other debris material will not be stockpiled within stream channels (including road side drainage ditches) or on adjacent banks where it could be washed into the channel or drainage ditch.

c. Alternatives, such as mechanical control, shall be considered to substantially lessen any significant effect on the environment before using pesticides. Integrated pest management BMPs shall be used for all vegetation control. Limitations may occur because of fire management requirements and local integrated pest management ordinances.

d. Herbicides and other pesticides will be used only when necessary and applied in strict compliance with label requirements and state and federal regulations. Herbicides and pesticides will be applied only when weather conditions minimize drift and effects on non-target sites. Herbicide and pesticide use is not a Covered Activity under the federal permits.

e. Maintenance activities on rural roads adjacent to natural land-cover types will be seasonally timed, when safety permits and regulatory restrictions allow, avoiding or minimizing adverse effects on active nests of resident and migratory birds, including bird Covered Species. This measure is particularly relevant for right-of-way mowing, brush clearing, and tree trimming. Project applicants will coordinate with the PCA to develop work schedules that optimize logistic, safety, and financial needs while minimizing potential effects on nesting birds.

f. Mowing equipment will be thoroughly cleaned before use so it is free of noxious weeds (as defined by the U.S. Department of Agriculture in cooperation with the California Department of Food and Agriculture) and does not introduce such weeds to new areas.

g. Ground-disturbing road maintenance activities, such as regrading, will be timed so that the moisture content of the soil will support re-compaction of the soil and reduce the need for an imported water source to achieve soil compaction. Similarly, activities will be timed so that the use of heavy equipment will not result in the creation of mud puddles and ruts.

h. Regularly scheduled visual inspection of all roads shall be conducted to identify sites where erosion is contributing sediment to local streams and stabilize eroding areas.

i. Annual clearing of flow lines (e.g., culverts and ditches) shall be conducted such that flow lines are maintained free of debris.

j. Existing roads shall be used for access and disturbed areas for staging as site constraints allow. Off-road travel will avoid sensitive communities.

k. Utility pole or line replacement and maintenance shall follow the suggested practices of the Avian Power Line Interaction Committee's publication *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (Avian Power Line Interaction Committee 2012).

6.3.5 Conditions to Minimize Effects on Covered Species

The following conditions provide measures to avoid or minimize effects on Covered Species.

Most of the survey measures specify when surveys must be conducted and provide seasonal restrictions or spatial buffers to separate certain Covered Species from potential disturbance from Covered Activities. The conditions listed here are based on existing guidelines, regulatory principles, and expert sources available at the time when the Plan was drafted. These measures can be modified based on monitoring data from the PCA, the scientific literature, and new regulations, with review and approval of the Wildlife Agencies consistent with the criteria listed in Section 6.3, *Conditions on Covered Activities*.

6.3.5.1 Surveys for Select Covered Wildlife Species

The timing of species habitat surveys, pre-construction surveys, and construction monitoring relative to impacts are described below. For projects that occur over multiple years, including projects that are phased, the frequency and timing of required surveys will be determined by the Permittee reviewing the application in consultation with the Wildlife Agencies. At a minimum, surveys and monitoring (if required) will be conducted prior to each construction phase if the entire project area is not continuously disturbed between phases.

Surveys will be conducted by qualified biologists, as defined in Section 6.1.5, *Qualified Biologist/Qualified Professional*. If survey results indicate that a Covered Species that is subject to a Species Condition is present, then applicable avoidance and minimization measures and construction monitoring, as specified in the corresponding Species Condition, must be implemented.

Surveys are required when certain land-cover types and other conditions are present on a project site. See Species Conditions and Table 6-3 for a description of the locations and land-cover types that trigger species surveys.

Species Conditions may be revised by the PCA over time without requiring an HCP/NCCP amendment so long as the revisions are reviewed and approved by the Wildlife Agencies. It is expected that the majority of these revisions will be undertaken to integrate new or revised species survey protocols.

Table 6-3. Species Survey Summary

Species	Location, community types, constituent habitat, and habitat features where surveys are required	Survey Period
**Swainson's hawk	In the Valley only in these communities within 0.25 mile (1,320 feet) of the project site: • Grassland (if trees are present) • Valley oak woodland • Riverine/Riparian Complex (if trees are present) • Semi-natural (agricultural; if trees are present) • Other agricultural (if trees are present) • Rural residential (if trees are present) • Urban (if trees are present) *Also see Species Condition 1.*	February 1 to September 15
**California black rail	In these constituent habitats: • Project occurs within 250 feet of fresh emergent marsh > 0.2 acre in size. *Also see Species Condition 2.*	March 15 to Early July
**Western burrowing owl	In these communities and habitat features: • Grassland • Vernal Pool Complex • Semi-natural (agriculture) • Other agricultural • Rural residential and urban if potential burrow sites are available • Man-made structures such as underground pipes, irrigation canal banks, ditches • Banks of intermittent drainages if potential burrow sites are available *Also see Species Condition 3.*	Year-round Breeding season (February 1 to August 31) Non-breeding season (September 1 to January 31)
**Tricolored blackbird	Project sites with the following communities or habitat features if they are within 1,640 feet of open water (e.g., fresh emergent marsh, stock pond, non-vernal pool seasonal wetland, riverine): • Grassland • Aquatic/Wetland Complex • Field Agriculture when planted in wheat or triticale • Blackberry patches (often associated with the riparian constituent habitat) *Also see Species Condition 4.*	March 15 to July 31

Species	Location, community types, constituent habitat, and habitat features where surveys are required	Survey Period
Giant garter snake	Within the mapped range of modeled habitat for giant garter snake (Appendix D, *Species Accounts*) with these communities, constituent habitats, and habitat features: • Rice agriculture • Aquatic/Wetland Complex (including stock ponds) • Non-vernal pool seasonal wetland • Riverine (low-gradient streams) • Canal *Also see Species Condition 5.*	N/A
Valley elderberry longhorn beetle	Below 650 feet elevation in: • Riverine/Riparian Complex • Valley oak woodland • Stream System (excluding frequently disked or flooded agricultural lands such as rice that would not likely support elderberry shrubs) *Also see Species Condition 7.*	Year-round
Conservancy Fairy Shrimp	In vernal pool complex constituent habitat wetlands within the survey boundary depicted in Figure 5-7. *Also see Species Condition 9.*	Wet season and dry season (see current USFWS protocol for details)
Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp	In vernal pool complex constituent habitat wetlands. *Also see Species Condition 10.*	Wet season and dry season (see Species Condition 10 for details)

* Habitat model is a subset of Placer County Wildlife Habitat Relationship land-cover types associated with species and is subject to revision.

** These species are protected under two or more regulations including the federal Migratory Bird Treaty Act, California Fish and Game Code Sections 3503 and 3503.5.

6.3.5.2 Survey Documentation

If applicable community types, constituent habitat, or habitat features are present on site, the applicant must describe in the HCP/NCCP participation package which surveys were conducted, detail the results of those surveys, and provide a map that displays where the surveys were conducted and where Covered Species, if any, were detected.

As described in Section 6.2.4, *HCP/NCCP Participation Package*, the HCP/NCCP participation package will be prepared and approved before project construction. To ensure compliance with pre-construction survey requirements, the Permittee will determine which surveys are required, when they will be performed, and how they will be applied to the project (Item 8 of the HCP/NCCP participation package). This description will follow the requirements in the Species Conditions and will be incorporated into the conditions of project approval.

The survey report submitted to the local jurisdiction and PCA will also document the condition of all occurrences found on the project. Reports will include CNDDB California Native Species Field Survey Form; copies of these forms will also be submitted to the CNDDB and the Wildlife Agencies as part of the Annual Report.

6.3.5.3 Construction Monitoring for Certain Covered Wildlife

Occupied breeding habitat (or for giant garter snake, suitable aquatic habitat) will trigger the species surveys described in Table 6-3 and Species Conditions. Construction monitoring will be carried out by a qualified biologist to ensure that these avoidance and minimization requirements are being implemented properly and that they are adequately protecting the target species. Because the selected wildlife species are rare in the Plan Area, it is expected that few projects will require construction monitoring. If required, the construction monitoring frequency and protocols are described for the appropriate species in the Species Conditions.

Construction monitoring will occur after the local government entitlements (for the County and the City) have been issued authorizing construction and HCP/NCCP participation package is prepared, reviewed, and approved. To ensure compliance with the Plan, the HCP/NCCP participation package must describe which construction monitoring and avoidance and minimization requirements may be required and how they will be applied to the project if pre-construction surveys identify occupied habitat. This description will follow the requirements in the Species Conditions and will be incorporated into the conditions of project approval. The specification will include a description of monitoring frequency and duration (including the time when monitoring will be initiated relative to effects) and specific construction activities to be monitored. It will also establish the authority of the on-site construction monitor to modify or temporarily stop implementation of the activity if necessary to ensure compliance with the Plan.

Construction monitoring is necessary to ensure that avoidance and minimization measures are implemented in accordance with permit requirements and is the responsibility of the project applicant.

The project applicant shall notify the Permittee that processed the HCP/NCCP participation package immediately if Covered Species not expected on the site, and for which applicable Conditions of Covered Activities were not implemented, are discovered during construction activities. The project applicant shall suspend work and notify the Permittee for guidance. The Permittee may contact the PCA or Wildlife Agencies for additional guidance.

6.3.5.4 Exemptions from Species Surveys, Pre-construction Surveys, and Construction Monitoring

The following types of Covered Activities are exempt from species survey and construction monitoring requirements for target Covered Species. Covered Activities exempt from species surveys must still submit a HCP/NCCP participation package as a basis for making the exempt determination and tracking other applicable Plan Conditions. These activities are not precluded from other avoidance and minimization measures, BMPs, etc.

1. **No Ground Disturbance.** Covered O&M activities, including those on the Reserve System, that do not result in any ground disturbance or removal of natural communities.
2. **Continuous Ground Disturbance.** Ongoing O&M activities with ground disturbance that occur monthly or more frequently within the same location are exempt from repeat surveys for Covered Species so long as applicable surveys are conducted once before initiating the activity, surveys are conducted in the appropriate season (i.e., wildlife and plant surveys must be conducted during the appropriate time of year), and the survey results are negative. Such activities are likely to result in repeated disturbance that will preclude establishment or

persistence of the Covered Species targeted by these surveys. If at any time the project applicant becomes aware that Covered Species may be on the site, applicable surveys and avoidance measures, as described in the following conditions, must be implemented.

6.3.5.5 Exemptions from Setbacks from PCA Reserves

When the PCA acquires land adjacent to existing or planned development or agriculture that has no buffer zone or an inadequate buffer zone, one must be created on the reserve (see Section 5.3.1.3, *Reserve System Components*). Therefore, the buffers described below will not extend onto private land when the species occurs on PCA reserves.

6.3.5.6 Species Condition 1, Swainson's Hawk

Conditions for the Swainson's hawk are based on avoidance, minimization, and mitigation guidelines from the *Draft Staff Report: Recommended Mitigation Strategies for the Swainson's Hawk* (Buteo swainsoni) *within the California Breeding Range* (California Department of Fish and Game 1994) and measures developed to avoid and minimize effects on Swainson's hawks by activities covered by the East Contra Costa County HCP/NCCP (2006).

6.3.5.6.1 Survey Requirements

Surveys for Swainson's hawk nests are required on the following communities in the Valley, within 0.25 mile (1,320 feet) of the project site:

- Valley oak woodland
- Grassland (if trees are present)
- Riparian
- Semi-natural (if trees are present)
- Other agricultural (if trees are present)
- Rural residential (if trees are present)
- Urban (if trees are present)

In addition, a CNDDB record search is required to determine whether any active nests are present within 1,320 feet of the project site. A nest is assumed active if it has been used within the previous 5 years.

Swainson's Hawk 1. Swainson's hawk surveys and CNDDB record searches are required well in advance of project construction to determine whether Swainson's hawk is nesting on or within 1,320 feet of the project site. If the project cannot be designed to avoid active Swainson's hawk nest trees and the construction must occur during the nesting season (approximately February 1 to September 15), a preconstruction survey must be conducted no more than 15 days prior to ground disturbance. Surveys will be conducted consistent with current guidelines (Swainson's Hawk Technical Advisory Committee 2000), with the following exceptions:

- Surveys will be required within a 1,320-foot radius around the project site. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all potential nest tree(s) from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without trespassing, using binoculars and/or a spotting scope to look for Swainson's hawk nesting activity;

- Surveys will be required from February 1 to September 15 (or sooner if it is found that birds are nesting earlier in the year); and
- If a Swainson's hawk nest is located and presence confirmed, only one follow-up visit is required (to avoid disturbance of the nest due to repeated visits).

6.3.5.6.2 Applicable Measures

If surveys determine that a Swainson's hawk nest is occupied, the project must adopt the minimization measure listed below:

Swainson's Hawk 2. During the nesting season (approximately February 1 to September 15 or sooner if it is found that birds are nesting earlier in the year), ground-disturbing activities within 1,320 feet of occupied nests or nests under construction will be prohibited to minimize the potential for nest abandonment. While the nest is occupied, activities outside the buffer can take place provided that they do not stress the breeding pair.

If the active nest site is shielded from view and noise from the project site by other development, topography, or other features, the project applicant can apply to the PCA for a reduction in the buffer distance or waiver of this avoidance measure. A qualified biologist would be required to monitor the nest and determine that the reduced buffer does not cause nest abandonment. If a qualified biologist determines nestlings have fledged, Covered Activities can proceed normally.

Swainson's Hawk 3. Active (within the last 5 years) nest trees on a project site will not be removed during the nesting season. If a nest tree must be removed (as determined by the PCA), tree removal shall occur only between September 15 and February 1, after any young have fledged and are no longer dependent on the nest and before breeding activity begins.

6.3.5.6.3 Construction Monitoring

Swainson's Hawk 4. Construction monitoring will be conducted by a qualified biologist and will focus on ensuring that activities do not occur within the buffer zone. The qualified biologist performing the construction monitoring will ensure that effects on Swainson's hawks are minimized. If monitoring indicates that construction outside of the buffer is affecting nesting, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the young have fledged from the nest (as confirmed by a qualified biologist).

The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that direct effects on Swainson's hawks are minimized. The qualified biologist will train construction personnel on the avoidance procedures and buffer zones.

6.3.5.7 Species Condition 2, California Black Rail

6.3.5.7.1 Survey Requirements

Take of black rail occurrences are limited by the Plan (see Section 5.3.1.6.2, California Black Rail*). Therefore, surveys are critical for determining whether the wetland that may be affected is occupied, and for tracking take of California black rail. As such, surveys are required to determine the presence/absence of California black rails, if a Covered Activity is within 500 feet of the perimeter of a fresh emergent wetland greater than 0.2 acre in size.*

California Black Rail 1. Surveys will be initiated sometime between March 15 and May 31, preferably before May 15. A minimum of four surveys will be conducted. The survey dates will be spaced at least 10 days apart and will cover the time period from the date of the first survey through the end of June to early July. This will allow the surveys to encompass the time period when the highest frequency of calls is likely to occur. Projects must conduct surveys during this time period, regardless of when the project is scheduled to begin, and shall be conducted the year in which ground disturbance activities commence.

This survey requirement also applies to Covered Activities that will alter the supply of water feeding potential breeding habitat for California black rails (e.g., fixing a leak in an irrigation canal). Some wetlands supported by leaks from water conveyance structures such as irrigation canals may also be supported hydrologically by other sources of water. Fixing a leak in an irrigation canal may therefore not substantially alter the extent and/or quality of the wetland habitat for California black rail. In such cases, the project proponent may provide the results of a hydrological study of the affected wetland to the PCA and Wildlife Agencies to determine whether altering the source of water would result in take of a wetland occupied by California black rail.

Surveys must be conducted using survey protocol based on the methods used in Richmond et al. (2008) or guidance agreed upon by the Permittees and Wildlife Agencies**Error! Bookmark not defined.**. Surveys will be conducted if a fresh emergent wetland greater than 0.2 acre in size occurs on an adjacent parcel that is within 500 feet of the project site (as determined by aerial photographs), using survey methods that rely on call playback to elicit response from California black rails (e.g., those used by Richmond et al. 2008). Calls will be played from edge of the adjacent parcel, or where most appropriate to elicit a response, without trespassing.

If a California black rail is determined to be present, no project activities are permitted within 500 feet of the outside perimeter of the occupied wetland. Project proponents may conduct activities within 500 feet of an occupied wetland based on site-specific conditions (e.g., noise barriers) and if approved by the PCA and the Wildlife Agencies and an qualified biologist monitors construction activities within 500 feet to ensure that California black rail nests are not disturbed.

6.3.5.7.2 Applicable Measures

Projects in occupied wetlands will not be permitted unless approval is granted by the PCA. When granting approval, the PCA will consider if take is available under the Plan.

California Black Rail 2. If the PCA does not grant take coverage, a buffer around the avoided wetland will be demarcated 500 feet from the outside perimeter of the occupied wetland with an exclusion fence to prevent construction activities from encroaching into the buffer zone and to identify the occupied wetland and buffer zone as a no-work area within the covered project. If the work would dewater occupied habitat and the PCA does not grant coverage, the activity could not take place under the Plan.

California Black Rail 3. If the PCA grants take coverage, clearing of the habitat (or dewatering) will occur between September 15 and February 1 (outside the breeding season). For ground disturbing activities, if the project will not convert all of the wetland habitat present, a buffer around the avoided wetland will be demarcated with exclusion fencing to prevent construction activities from encroaching into California black rail habitat and to identify the occupied wetland and buffer zone as a no-work area.

6.3.5.7.3 Construction Monitoring

California Black Rail 4. A qualified biologist will monitor on-site during construction to ensure that no Covered Activities occur within the buffer zone established around the occupied wetland, or if take allowance is granted outside of the breeding season, to ensure that adverse effects are minimized.

The frequency of monitoring will be approved by the PCA based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases daily monitoring may be appropriate to ensure that direct effects on California black rail are minimized. The qualified biologist may increase the buffer size if s/he determines that activities are particularly disruptive (e.g., use of dynamite, or other explosives).

Prior to the start of construction, the qualified biologist will train construction personnel on the avoidance procedures and buffer zones.

6.3.5.8 Species Condition 3, Western Burrowing Owl

The following measures will be implemented to avoid or minimize effects of Covered Activities on western burrowing owls. This condition is based on the *Staff Report on Burrowing Owl Mitigation* (California Department of Fish and Game 2012) and measures to avoid and minimize effects in the East Contra Costa County HCP/NCCP (2006).

6.3.5.8.1 Survey Requirements

Surveys for burrowing owl must be conducted for projects that occur on the following communities and features in the Valley, or as determined by a qualified biologist, to ensure that occupied burrowing owl nests are not taken:

- Grassland
- Vernal pool complex
- Semi-natural (agriculture)
- Other agricultural
- Rural residential and urban community if potential burrow sites are available
- Man-made structures such as underground pipes, irrigation canal banks, ditches

- Banks of intermittent drainages if potential burrow sites are available

Burrowing Owl 1. Two surveys will be conducted within 15 days prior to ground disturbance to establish the presence or absence of burrowing owls. The surveys will be conducted at least 7 days apart (if burrowing owls are detected on the first survey, a second survey is not needed) for both breeding and non-breeding season surveys. All burrowing owls observed will be counted and mapped.

During the breeding season (February 1 to August 31), surveys will document whether burrowing owls are nesting in or within 250 feet of the project area.

During the non-breeding season (September 1 to January 31), surveys will document whether burrowing owls are using habitat in or directly adjacent to any area to be disturbed. Survey results will be valid only for the season (breeding or non-breeding) during which the survey was conducted.

The Qualified Biologist will survey the proposed footprint of disturbance and a 250-foot radius from the perimeter of the proposed footprint to determine the presence or absence of burrowing owls. The site will be surveyed by walking line transects, spaced 20 to 60 feet apart, adjusting for vegetation height and density. At the start of each transect and, at least, every 300 feet, the surveyor, with use of binoculars, shall scan the entire visible project area for burrowing owls. During walking surveys, the surveyor will record all potential burrows used by burrowing owls, as determined by the presence of one or more burrowing owls, pellets, prey remains, whitewash, or decoration. Some burrowing owls may be detected by their calls; therefore, observers will also listen for burrowing owls while conducting the survey. Adjacent parcels under different land ownership will be surveyed only if access is granted. If portions of the survey area are on adjacent sites for which access has not been granted, the qualified biologist will get as close to the non-accessible are as possible, and use binoculars to look for burrowing owls.

The presence of burrowing owl or their sign anywhere on the site or within the 250-foot accessible radius around the site will be recorded and mapped. Surveys will map all burrows and occurrence of sign of burrowing owl on the project site. Surveys must begin 1 hour before sunrise and continue until 2 hours after sunrise (3 hours total) or begin 2 hours before sunset and continue until 1 hour after sunset. Additional time may be required for large project sites.

6.3.5.8.2 Applicable Measures

If a burrowing owl or evidence of presence at or near a burrow entrance is found to occur within 250 feet of the project site, the following measures must be implemented:

Burrowing Owl 2. If burrowing owls are found during the breeding season (approximately February 1 to August 31), the project applicant 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 (occupation includes individuals or family groups foraging on or near the site following fledging).
- Establish a 250-foot non-disturbance buffer zone around nests. The buffer zone will be flagged or otherwise clearly marked. Should construction activities cause the nesting bird to vocalize, make defensive flights at intruders, or otherwise display agitated behavior, then

the exclusionary buffer will be increased such that activities are far enough from the nest so that the bird(s) no longer display this agitated behavior. The exclusionary buffer will remain in place until the chicks have fledged or as otherwise determined by a qualified biologist. Construction may only occur within the 250-foot buffer zone during the breeding season only if a qualified raptor biologist monitors the nest and determines that the activities do not disturb nesting behavior, or the birds have not begun egg-laying and incubation, or that the juveniles from the occupied burrows have fledged and moved off site. Measures such as visual screens may be used to further reduce the buffer with Wildlife Agency approval and provided a biological monitor confirms that such measures do not cause agitated behavior.

Burrowing Owl 3. If burrowing owls are found during the non-breeding season (approximately September 1 to January 31), the project applicant will establish a 160-foot buffer zone around active burrows. The buffer zone will be flagged or otherwise clearly marked. Measures such as visual screens may be used to further reduce the buffer with Wildlife Agency approval and provided a biological monitor confirms that such measures do not cause agitated behavior.

Burrowing Owl 4. During the non-breeding season only, if a project cannot avoid occupied burrows after all alternative avoidance and minimization measures are exhausted, as confirmed by the Wildlife Agencies, a qualified biologist may passively exclude birds from those burrows. A burrowing owl exclusion plan must be developed by a qualified biologist consistent with the most recent guidelines from the Wildlife Agencies (e.g., California Department of Fish and Game 2012) and submitted to and approved by the PCA and the Wildlife Agencies. Burrow exclusion will be conducted for burrows located in the project footprint and within a 160-foot buffer zone as necessary.

6.3.5.8.3 Construction Monitoring

Burrowing Owl 5. A biological monitor will be present on site daily to ensure that no Covered Activities occur within the buffer zone. The qualified biologist performing the construction monitoring will ensure that effects on burrowing owls are minimized. If monitoring indicates that construction outside of the buffer is affecting nesting, the buffer will be increased if space allows (e.g., move staging areas farther away). If space does not allow, construction will cease until the young have fledged from all the nests in the colony (as confirmed by a qualified biologist) or until the end of the breeding season, whichever occurs first.

A biological monitor will conduct training of construction personnel on the avoidance procedures, buffer zones, and protocols in the event that a burrowing owl flies into an active construction zone (i.e., outside the buffer zone).

6.3.5.9 Species Condition 4, Tricolored Blackbird

The following measures will be implemented to avoid or minimize effects of Covered Activities on tricolored blackbird nesting colonies and actively used foraging habitat.

6.3.5.9.1 Survey Requirements

The PCA will provide a map of active colony sites to help determine where a survey for tricolored blackbird must occur. A colony site is considered active if it has been used for nesting in the prior 10 years. Surveys for nesting tricolored blackbird must occur if the PCA-provided map indicates an active colony site occurs on the project site or within 1,300 feet of a colony site. Surveys for nesting tricolored blackbird must also be conducted for project sites below 300 feet elevation, within the following communities.

- Aquatic/Wetland complex
- Field Agriculture when planted in wheat, grain, triticale, or similar crop
- Patches of thorny or spiny vegetation such as blackberry, nettle, or thistle (blackberry is often associated with the riparian constituent habitat)

If an active colony site is within 3 miles of the project site and construction will occur within the nesting season (March 15 to July 31), then a survey of foraging habitat at and immediately surrounding the project site will be conducted within the following communities.

- Grassland
- Rice Agriculture
- Field Agriculture
- Aquatic/Wetland Complex
- Vernal Pool Complex

Tricolored Blackbird 1. *Preconstruction Surveys – Nest Colony Sites*. Prior to initiation of Covered Activities in all project work areas and within 1,300 feet of project work areas, the qualified biologist(s) shall conduct preconstruction surveys to evaluate the presence of tricolored blackbird nesting colonies. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all potential nest colony site(s) from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without trespassing, using binoculars and/or a spotting scope to look for tricolored blackbird nesting activity.

Surveys should be conducted at least twice with at least one month between surveys during the nesting season 1 year prior to initial ground disturbing for the Covered Activity if feasible, and the year of ground disturbing for the Covered Activity (required). If Covered Activities will occur in the project work area during the nesting season, three surveys shall be conducted within 15 days prior to the Covered Activity, with one of the surveys occurring within 5 days prior to the start of the Covered Activity. The survey methods will be based on Kelsey (2008) or a similar protocol approved by the PCA and the Wildlife Agencies based on site-specific conditions.

If the first survey indicates that suitable nesting habitat is not present on the project site or within 1,300 feet of the project work area, additional surveys for nest colonies are not required. Preconstruction surveys are still required, however, as described below in Tricolored Blackbird 2.

Tricolored Blackbird 2. *Preconstruction Surveys – Foraging Habitat.* If an active colony is known to occur within 3 miles of the project site, a qualified biologist will conduct two surveys of foraging habitat within the project site and within a 1,300-foot radius around the project site to determine whether foraging habitat is being actively used by foraging tricolored blackbirds. The qualified biologist will map foraging habitat, as defined by the land cover types listed above, within a 1,300-foot radius around the project site to delineate foraging habitat that will be surveyed. The surveys will be conducted approximately one week apart, with the second survey occurring no more than 5 calendar days prior to ground-disturbing activities. Two surveys are required because tricolored blackbirds may not visit a site during a single survey period, as they may be foraging elsewhere.

Each survey shall last 4 hours, and begin no later than 8:00 a.m. The qualified biologist will survey the entire project site and a 1,300-foot radius around the project site by observing and listening from accessible vantage points that provide views of the entire survey area. If such vantage points are not available, the qualified biologist will survey from multiple vantage points to ensure that the entire survey area is surveyed. In instances where an adjacent parcel is not accessible to survey because the qualified biologist was not granted permission to enter, the qualified biologist will scan all foraging habitat from the adjacent property, road sides, or other safe, publicly accessible viewpoints, without trespassing, using binoculars and/or a spotting scope to look for tricolored blackbird foraging activity. The qualified biologist will map the locations on the site and within a 1,300-foot radius around the project site where tricolored blackbirds are observed and record an estimate of the numbers of tricolored blackbirds observed (estimated by 10s, 100s, or 1,000s), the frequency of visits (e.g., if individuals or a flock makes repeated foraging visits to the site during the survey period), whether tricolored blackbirds are leaving the site with food in their bills, and the direction they fly to/from.

6.3.5.9.2 Applicable Measures

If a tricolored blackbird nesting colony is found, the project applicant will abide by the following measures:

Tricolored Blackbird 3. *Nesting Colony – Avoidance and Minimization.* Construction activity or other covered activities that may disturb an occupied nest colony site, as determined by a qualified biologist, will be prohibited during the nesting season (March 15 through July 31 or until the chicks have fledged or the colony has been abandoned on its own) within a 1,300-foot buffer zone around the nest colony, to the extent practicable. The intent of this condition is to prevent disturbance to occupied nest colony sites on or near project sites so they can complete their nesting cycle. This condition is not intended to preserve suitable breeding habitat on project sites but to ensure impacts to active colony sites only take place once the site is no longer occupied by the nesting colony. The buffer will be applied to extend beyond the nest colony site as follows.

- If the colony is nesting in a wetland, the buffer must be established from the outer edge of all hydric vegetation associated with the colony.
- If the colony is nesting in non-wetland vegetation (e.g., Himalayan blackberry), the buffer must be established from the edge of the colony substrate.

This buffer may be modified to a minimum of 300 feet, with written approval from the Wildlife Agencies, in areas with dense forest, buildings, or other features between the Covered Activities and the occupied active nest colony; where there is sufficient topographic relief to protect the colony from excessive noise or visual disturbance; where sound curtains have been installed; or other methods developed in consultation with the Wildlife Agencies where conditions warrant reduction of the buffer distance. If tricolored blackbirds colonize habitat adjacent to Covered Activities after the activities have been initiated, the project applicant shall reduce disturbance through establishment of buffers or noise reduction techniques or visual screens, as determined in consultation with the Wildlife Agencies and PCA. The buffer must be clearly marked to prevent project-related activities from occurring within the buffer zone.

Tricolored Blackbird 4. *Actively used Foraging Habitat – Avoidance and Minimization*. Construction activity or other covered activities that may disturb foraging tricolored blackbirds, as determined by a qualified biologist, will be prohibited within 1,300-feet of the foraging site to the extent feasible during the nesting season (March 15 through July 31 or until the chicks have fledged or the colony has been abandoned on its own) if the foraging habitat was found to be actively used by foraging tricolored blackbirds during at least one of the two foraging habitat surveys conducted under Tricolored Blackbird 2. If survey results indicate that the area provides marginal foraging habitat (e.g., tricolored blackbirds were observed foraging, but only briefly, and most were not successfully capturing prey), or site specific conditions may warrant a reduced buffer, the PCA technical staff will consult with the Wildlife Agencies to evaluate whether the project needs to avoid the foraging habitat or whether a reduced buffer may be appropriate. In such cases, additional surveys may be needed to assess site conditions and the value of the foraging habitat.

The buffer must be clearly marked to prevent project-related activities from occurring within the buffer zone. This buffer may be modified to a minimum of 300 feet, with written approval from the Wildlife Agencies, in areas with dense forest, buildings, or other features between the Covered Activities and the actively used foraging habitat; where there is sufficient topographic relief to protect foraging birds from excessive noise or visual disturbance; or in consultation with the Wildlife Agencies if other conditions warrant reduction of the buffer distance. If tricolored blackbird begins using foraging habitat adjacent to Covered Activities after the activities have been initiated, the project applicant shall reduce disturbance through establishment of buffers or noise reduction techniques or visual screens, as determined in consultation with the Wildlife Agencies and PCA.

Similar to Tricolored Blackbird 3, the intent of this condition is to allow actively nesting colonies on or near project sites to complete their nesting cycle prior to the loss of the foraging habitat on site. Protecting actively used-foraging habitat during the nesting season will help to enable the tricolored blackbird nesting colony complete its nesting cycle, as loss of valuable foraging habitat could cause the nesting colony to fail. This condition is not intended to preserve suitable foraging habitat on project sites in the long term.)

6.3.5.9.3 Construction Monitoring

Tricolored Blackbird 5. *Nesting Colony – Construction Monitoring*. Active nesting colonies that occur within the no-disturbance buffer shall be monitored by the qualified biologist(s) to verify the Covered Activity is not disrupting the nesting behavior of the colony. The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the active nest. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that direct effects on tricolored blackbird are minimized. The biologist will train construction personnel on the avoidance procedures and buffer zones.

If the qualified biologist(s) determines that the Covered Activity is disrupting nesting and/or foraging behavior, the qualified biologist(s) shall notify the project applicant immediately, and the project applicant shall notify the PCA within 24 hours to determine additional protective measures that can be implemented. The qualified biologist(s) shall have the authority to stop Covered Activities until additional protective measures are implemented. Additional protective measures shall remain in place until the qualified biologist(s) determine(s) tricolored blackbird behavior has normalized. If additional protective measures are ineffective, the qualified biologist(s) shall have the authority to stop Covered Activities as needed until the additional protective measures are modified and nesting behavior of tricolored blackbird returns to normal.

Additional protective measures may include increasing the size of the buffer (within the constraints of the project site), delaying Covered Activities (or the portion of Covered Activities causing the disruption) until the colony is finished breeding and chicks have left the nest site, temporarily relocating staging areas, or temporarily rerouting access to the project work area. The project proponent shall notify the PCA and Wildlife Agencies within 24 hours if nests or nestlings are abandoned. If the nestlings are still alive, the qualified biologist(s) shall work with the Wildlife Agencies to determine appropriate actions for salvaging the eggs or nestlings. Notification to PCA and Wildlife Agencies shall be via telephone or email, followed by a written incident report. Notification shall include the date, time, location, and circumstances of the incident.

Tricolored Blackbird 6. *Actively used Foraging Habitat – Construction Monitoring.* Foraging habitat within the buffer shall be monitored by the qualified biologist(s) to verify that the Covered Activity is not disrupting tricolored blackbird foraging behavior. The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of foraging tricolored blackbirds. In most cases, monitoring will occur at least every other day, but in some cases, daily monitoring may be appropriate to ensure that effects on tricolored blackbird are minimized. The biologist will train construction personnel on the avoidance procedures and buffer zones.

If the qualified biologist(s) determines that the Covered Activity is disrupting foraging behavior, the qualified biologist(s) shall notify project applicant immediately, and the project applicant shall notify the PCA within 24 hours to determine additional protective measures that can be implemented. The qualified biologist(s) shall have the authority to stop Covered Activities until additional protective measures are implemented. Additional protective measures shall remain in place until the qualified biologist(s) determine(s) tricolored blackbird behavior has normalized. If additional protective measures are ineffective, the qualified biologist(s) shall have the authority to stop Covered Activities as needed until the additional protective measures are modified and foraging behavior of tricolored blackbird returns to normal. Additional protective measures may include increasing the size of the buffer (within the constraints of the project site), temporarily relocating staging areas, or temporarily rerouting access to the project work area.

6.3.5.10 Species Condition 5, Giant Garter Snake

The following measures will be implemented to avoid or minimize effects of Covered Activities on giant garter snakes. This condition is based on the USFWS's *Standard Avoidance and Minimization Measures during Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat* (U.S. Fish and Wildlife Service 1999a).

6.3.5.10.1 Survey Requirements

If the communities listed below are present on or adjacent to a project site and within the geographic range of giant garter snake habitat in the Plan Area (see Appendix D, *Species Accounts*), a qualified biologist will conduct a survey to assess whether the communities provide suitable habitat for giant garter snake. Giant garter snake surveys will be conducted according to the USFWS's *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat*[7]or the current Wildlife Agency–approved protocol. If there is any deviation in the written text below and the formal USFWS guidelines, then the USFWS guidelines or otherwise current Wildlife Agency–approved protocol takes precedence. Project-by-project mitigation requirements do not apply. Mitigation will be addressed through the requirements of the conservation strategy, as described in Section 5.4.5, *Giant Garter Snake*.

a. Aquatic/Wetland Complex (Fresh Emergent Marsh, seasonal wetlands, and ponds)

b. Rice Agriculture

c. Riverine/Riparian in Low-gradient Streams

d. Managed Open Water (sloughs, small lakes, irrigation and drainage canals)

If there is any question about the suitability of the habitat to support giant garter snakes and/or potential for species occurrence, USFWS and CDFW may be consulted. If the surveyor cannot legally access neighboring land within 200 feet of a project site, the qualified biologist may survey the adjacent parcel with binoculars or a spotting scope.

6.3.5.10.2 Applicable Measures

Giant Garter Snake 1. To avoid effects on giant garter snake aquatic habitat, the project proponent will conduct no in-water/in-channel activity and will maintain a permanent 200-foot non-disturbance buffer from the outer edge of suitable habitat. If the project proponent cannot avoid effects of construction activities, the project proponent will implement the following measures to minimize effects of construction projects.

- Conduct preconstruction clearance surveys using USFWS and CDFW-approved methods within 24 hours prior to construction activities within identified giant garter snake aquatic and adjacent upland habitat. If construction activities stop for a period of 2 weeks or more, conduct another preconstruction clearance survey within 24 hours of resuming construction activity.
- Restrict all construction activity involving disturbance of giant garter snake habitat to the snake's active season, May 1 through October 1. During this period, the potential for direct mortality is reduced, because snakes are expected to actively move and avoid danger.
- In areas where construction is to take place, encourage giant garter snakes to leave the site on their own by dewatering all irrigation ditches, canals, or other aquatic habitat (i.e., removing giant garter snake aquatic habitat) between April 15 and September 30. Dewatered habitat must remain dry, with no water puddles remaining, for at least 15 consecutive days prior to excavating or filling of the habitat. If a site cannot be completely dewatered, netting and salvage of giant garter snake prey items may be necessary to discourage use by snakes.
- Provide environmental awareness training for construction personnel. Training may be implemented through the distribution of approved brochures and other materials that describe resources protected under the Plan and methods for avoiding effects. If a live giant garter snake

[7] U.S. Fish and Wildlife Service. 2015. *Standard Avoidance and Minimization Measures During Construction Activities in Giant Garter Snake* (Thamnophis gigas) *Habitat*. Appendix C. Available: http://www.fws.gov/sacramento/es/Survey-Protocols- Guidelines/Documents/GGS%20Appendix%20C.pdf.

is encountered during construction activities, immediately notify the project's biological monitor and USFWS and CDFW. The monitor will stop construction in the vicinity of the snake, monitor the snake, and allow the snake to leave on its own. The monitor will remain in the area for the remainder of the work day to ensure the snake is not harmed or, if it leaves the site, does not return. The qualified biologist will work with the PCA, USFWS, and CDFW to redirect the snake away from the disturbance area within 3 days of reporting the snake's presence at the construction site to USFWS and CDFW.

- Employ the following management practices to minimize disturbances to habitat.
  - Install temporary fencing to identify and protect adjacent marshes, wetlands, and ditches from encroachment from construction equipment and personnel.
  - Maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. No plastic, monofilament, jute, or similar erosion control matting that could entangle snakes or other wildlife will be permitted.

6.3.5.11 Species Condition 6, California Red-legged Frog, Foothill Yellow-legged Frog, and Western Pond Turtle

California red-legged frog, foothill yellow-legged frog, and western pond turtle are all species that rely on aquatic habitats for a portion of their life cycles. Many of the avoidance measures in this chapter focus on the avoidance and minimization of impacts on these aquatic habitats, addressing minimizing converted land as well as degradation of habitat (water quality and other indirect effects). Conditions on Covered Activities that provide avoidance and minimization for California red-legged frog, foothill yellow-legged frog, and western pond turtle include:

- General Condition 1, *Watershed Hydrology and Water Quality*
- Community Condition 1.1, *Avoidance of Vernal Pool Complex Constituent Habitat*
- Community Condition 1.2, *Avoidance of Aquatic/Wetland Complex Constituent Habitat*
- Community Condition 2, *Riverine and Riparian Avoidance and Minimization*
- Community Condition 3, *Valley Oak Woodland Avoidance, Minimization, and Mitigation*
- Stream System Condition 1, *Stream System Avoidance and Minimization*
- Regional Public Projects Condition 1, *Transportation and Other Infrastructure Projects Design Requirements*
- Regional Public Projects Condition 2, *Transportation and Other Infrastructure Projects Construction BMPs*
- Regional Public Projects Condition 3, *Operation and Maintenance BMPs*
- Species Condition 4, *Tricolored Blackbird*
- Species Condition 7, *Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)*

In addition to these avoidance and minimization measures, General Condition 3, *Land Conversion*, provides a process for accounting for loss of natural and semi-natural that is more encompassing than standard practice. This approach better addresses the piecemeal loss of high-quality, contiguous habitat that would occur without a plan such as that HCP/NCCP.

Finally, Chapter 5, *Conservation Strategy*, provides guidance on how impacts that cannot be avoided and minimized are mitigated. Mitigation not only includes addressing loss of aquatic resources, but surrounding uplands and loss of habitat connectivity as well. Because the effects on California red-legged frog, foothill yellow-legged frog, and western pond turtle are addressed through the approach to assessing impact and applying extensive avoidance and minimization measures, no additional avoidance and minimization measures specific to these species are required.

6.3.5.12 Species Condition 7, Central Valley Steelhead and Central Valley Fall-/Late Fall-Run Chinook Salmon (Salmonids)

This condition applies stream avoidance and minimization BMPs specific for salmonid habitat in the Plan Area. The distribution of Central Valley steelhead habitat in Plan Area streams has been modeled by NMFS (2014) (Appendix D, *Species Accounts*). Because no similar modeled habitat exists for fall-/late fall-run Chinook salmon, habitat for fall-/late fall-run Chinook salmon is assumed to be the same as that for Central Valley steelhead because of overlap of life history requirements between species. Effects on steelhead and Chinook salmon by Covered Activities will be minimized by the following General Conditions that apply to the Stream System throughout the Plan Area:

a. General Condition 1, *Watershed Hydrology and Water Quality*

b. Community Condition 2.1, *Riverine and Riparian Avoidance*

c. Community Condition 2.2, *Minimize Riverine and Riparian Effects*

d. Community Condition 2.4, *Placer County Water Agency Operations and Maintenance Best Management Practices*

e. Stream System Condition 1, *Stream System Avoidance and Minimization*

Habitat for steelhead and Chinook salmon will be protected, managed, and restored in the Reserve System (see Chapter 5, *Conservation Strategy*).

6.3.5.12.1 Guidelines for Salmonid Passage at Stream Crossings

All Covered Activities within salmonid habitat will adhere to the NMFS *Guidelines for Salmonid Passage at Stream Crossings* (National Marine Fisheries Service 2001) (or most current guidance provided by NMFS), where feasible, unless otherwise noted in this chapter. In addition, the *California Salmonid Stream Habitat Restoration Manual* (California Department of Fish and Game 2011) will be consulted for specific in-stream design features and protocols to enhance habitat for salmonids. Key guidelines described in *Guidelines for Salmonid Passage at Stream Crossings* (National Marine Fisheries Service 2001) are described below.

1. For stream crossings, the following structure types (listed in descending order of preference) will be considered:

    a. Free-span bridges that fully span (from top-of-bank to top-of bank) the stream and allow for long-term dynamic channel stability.

    b. Streambed simulation approaches, including a bottomless arch, embedded culvert design, or ford that maintains the natural streambed. The structure shall be sufficiently large and embedded deep enough into the channel to allow the natural movement of bedload and formation of a stable bed inside the culvert or structure. There should not be an excessive drop at the outlet or too high water velocity through the passage structure.

c. Non-embedded culvert (often referred to as a hydraulic design), for use in low-gradient areas, that allows fish passage.

d. Baffled culvert (creases in the culvert create a series of short high-velocity runs and low-velocity backwater areas that allow the fish to swim in short bursts and then rest), for use in high-gradient areas, that allows fish passage.

2. If the project's site is in an active salmonid spawning area, only free-span bridges or streambed simulations (i.e., culverts with a bed that simulates the natural streambed) are acceptable (National Marine Fisheries Service 2001).

3. Most stream crossings, regardless of the design (i.e., bridge or culvert) or material used, will be designed to accommodate the 100-year peak floodflow with appropriate clearance to prevent structural damage to the crossing, where feasible. In the Valley, the 100-year floodplain can be thousands of feet wide on some Stream Systems, so it may not be feasible to build stream crossings to accommodate the 100-year peak floodflow). Unless culverts are intentionally designed to be undersized for storm water detention or retention, culverts must at a minimum accommodate the 100-year flood without causing any adjacent flooding around the crossing that could result in mass erosion of the bank or the structural support of the crossing. (Note: State or local requirements may require that the 200-year floodplain be considered for stream crossings. The standards contained in this section do not supersede those more stringent requirements). This requirement will reduce the risk of channel degradation, stream diversion, and failure that may lead to adverse effects on salmonids over the lifespan of the crossing (National Marine Fisheries Service 2001).

4. For in-stream culvert installation or replacement projects that may affect stream hydraulics, the project must be designed so that the elevations of surface waters in the stream reach exhibit gradual flow transitions, both upstream and downstream. Abrupt changes in water surface and velocities must be avoided, with no hydraulic jumps, turbulence, or drawdown at the entrance. Hydraulic controls may be necessary to provide resting pools, concentrate low flows, prevent erosion of streambed or banks, and allow passage of bedload material (National Marine Fisheries Service 2001).

5. If a free-span bridge is not feasible, bridge piers and footings will be designed to have minimum impact on the stream. This applies in all Stream Systems, not just active salmonid spawning areas. A hydraulic analysis must be prepared that shows piers or footings will not cause significant scour or channel erosion. Whenever possible, the span of bridges will also allow for upland habitat beneath the bridge to provide undercrossing areas for wildlife species that will not enter the creek. Native plantings, natural debris, or large rocks (not riprap) will be installed under bridges to provide wildlife cover and encourage the use of crossings.

6. All in-stream structures will be aligned with the stream, with no abrupt changes in flow direction upstream or downstream of the crossing. This requirement can often be accommodated by changes in road alignment or slight elongation of the culvert. Where elongation would be excessive, such a solution must be weighed against a better crossing alignment and/or modified transition sections upstream and downstream of the crossing. Project components that may result in disruption of stream hydraulics and alterations to the

natural streambed will be anticipated and mitigated in the project design (National Marine Fisheries Service 2001).

7. If structural changes to the channel bed are necessary as part of project design, provisions for fish passage will be incorporated into the project design. If the project applicant has the opportunity to incorporate new fish passage into the project design in an area where fish passage is currently lacking, the project applicant will work with the PCA to determine if new fish passage would support Covered Species recovery.

6.3.5.12.2 Applicable Measures

Salmonid 1. Fish Passage Design. Streamflow through new and replacement culverts, bridges, and over stream gradient control structures must meet the velocity, depth, and other passage criteria for salmonid streams as described by NMFS and CDFW guidelines or as developed in cooperation with NMFS and CDFW to accommodate site-specific conditions (*Guidelines for Salmonid Passage at Stream Crossings* [National Marine Fisheries Service 2001]).

Salmonid 2. Fish Passage During Construction. Fish passage through dewatered channel sections shall be maintained at all times during the adult and juvenile migration season on streams with Covered Species to allow for unimpeded passage of migrating adults and juveniles (smolts). In addition, fish passage shall be maintained during summer on streams supporting summer rearing of Covered Species to allow for seasonal movement of resident (over-summering) fish when the natural channel segment within the vicinity of work areas also supports the movement of resident fish.

To allow for fish passage, the diversion shall:

- Maintain continuous flows through a low flow channel in the channel bed or an adjacent artificial open channel
- Present no vertical drops exceeding six inches and follow the natural grade of the site
- Maintain water velocities that shall not exceed 1.5 feet per second and provide velocity refugia, as necessary
- Maintain adequate water depths consistent with normal conditions in the project reach
- Be lined with cobble/gravel to simulate stream bottom conditions
- Be checked daily to prevent accumulation of debris at diversion inlet and outlet

A closed conduit pipe shall not be used for fish passage. Pipes may be used to divert flow through dewatered channel segments on streams that do not support migratory species, or during low flow conditions when the channel segment within the vicinity of work areas at the time of construction does not support movement of fish.

Salmonid 3. Pre-construction Relocation. Prior to the start of work or during the installation of water diversion structures, if fish Covered Species are present and it is determined that they could be injured or killed by construction activities, a qualified biologist will first attempt to gently herd fish Covered Species away from work areas and exclude them from work areas with nets, if practicable. If herding is not practicable or ineffective, a qualified biologist shall capture fish Covered Species and transfer them to another appropriate reach. In considering the relocation, the qualified biologist will determine whether relocation is ecologically appropriate using a number of factors, including site conditions, system carrying capacity for potential relocated fish, and flow regimes (e.g., if flows are managed). If fish Covered Species are to be relocated, the following factors will be considered when selecting release site(s):

- Similar (within 3.6°F [2 degrees Celsius (°C)]) water temperature as capture location. In addition, fish must be held in water that is at the same temperature as release sites at time of release. If raising or lowering of water temperature in holding apparatus is required, water temperatures in holding apparatus containing fish should not be changed at a rate that exceeds 1.8°F (1°C) every 2 minutes, and should not exceed 41°F (5°C) per hour.
- Ample habitat availability prior to release of captured individuals.
- Presence of others of the same species so that relocation of new individuals will not upset the existing prey/predation function.
- Carrying capacity of the relocation location.
- Potential for relocated individual to transport disease.
- Low likelihood of fish reentering work site or becoming impinged on exclusion net or screen.

Capture and relocation of fish Covered Species is not required at individual project sites when site conditions preclude reasonably effective operation of capture gear and equipment, or when the safety of the biologist conducting the capture may be compromised.

Salmonid 4. Spawning Gravel Cleaning. Spawning gravel cleaning and replacement activities should be timed to occur during the dry season and after fry have emerged from the gravel (generally July 1 through October 1). Applicants may submit requests for extension of this work window to the PCA for review by CDFW and NMFS. In streams that receive summer irrigation flows, spawning gravel cleaning and replacement activities should be timed to occur after the irrigation season has ended and stream flows are at a minimum to minimize the need for site dewatering (if needed) and to minimize the potential for downstream turbidity and sedimentation effects. If dewatering is needed, other applicable Avoidance and Minimization Measures shall be implemented prior to commencing spawning gravel cleaning and replacement activities. Gravel to be placed in streams shall be washed (to remove fines), rounded (i.e., non-angular) and spawning-sized (between 0.4 and 4.0 inches [10 to 100 millimeters] in diameter). For gravel augmentation projects, gravels should be placed such that high flows naturally sort and distribute the material.

Salmonid 5. Use of Riprap When Necessary. When riprap is required to be placed below the OHWM, it shall have a cleanliness value of no less than 85 percent and shall be covered with clean, uncrushed rock consistent with NMFS spawning gravel size requirements (currently 98 to 100 percent of the clean, uncrushed rock must pass through a 4-inch sieve, and 60 to 80 percent must pass through a 2-inch sieve). Of the total volume of rock placed, 50 percent shall consist of clean, uncrushed rock. This measure may be updated with more current standards.

6.3.5.12.3 Salmonid Stream Fees

Projects affecting riverine constituent habitat in a salmonid stream will be assessed a special habitat fee based on linear feet of impact. This will apply to both permanent and temporary impacts.

6.3.5.13 Species Condition 8, Valley Elderberry Longhorn Beetle

The following measures will be implemented to avoid or minimize effects of Covered Activities on valley elderberry longhorn beetle.

Surveys for valley elderberry longhorn beetle are required for Covered Activities within the following habitat features when below 650 feet elevation (above mean sea level):

a. Riparian constituent habitat

b. Valley oak woodland community

c. Stream System (excluding frequently disked or flooded agricultural lands such as rice that would not likely support elderberry shrubs)

The project applicant will apply avoidance and minimization measures as specified in the USFWS's *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (U.S. Fish and Wildlife Service 1999b) or the current Wildlife Agency–approved avoidance and minimization protocol. When take is authorized the project applicant must coordinate with the PCA to provide transplants and seedlings/cuttings for planting in suitable habitat on the Reserve System consistent with the USFWS Guidelines/Framework. Project-by-project mitigation requirements for valley elderberry longhorn beetle cannot be applied to the restoration requirements of 6.3.2.2.3 (*Community Condition 2.3, Riverine and Riparian Restoration*) for a project's associated riparian native trees/shrubs impacts to be planted as replacement habitat (i.e., mitigation for impacts to valley elderberry longhorn beetle [transplants and plantings of seedlings/cuttings] does not count as mitigation for impacts to riverine and riparian [restoration of riverine and riparian]). The distinction between valley elderberry longhorn beetle impacts and riverine/riparian impacts will be addressed through project-specific mitigation requirements that provide for restoration of natural communities, including riverine/riparian complex (i.e., restoration dependent on effects; see Table 5-4).

6.3.5.14 Species Condition 9, Conservancy Fairy Shrimp

6.3.5.14.1 Survey Requirements

Surveys for Conservancy fairy shrimp are required if vernal pools and seasonal wetland occur on the project site and if the project site falls within the survey boundary depicted in Figure 5-7.

Conservancy Fairy Shrimp 1. Surveys will be conducted for Conservancy fairy shrimp in vernal pools, vernal swales, and other seasonal wetlands. The qualified biologist will conduct protocol-level surveys using the *Survey Guidelines for the Listed Large Branchiopods* (Guidelines) (U.S. Fish and Wildlife Service 2015). Among other requirements, this protocol states that a complete survey consists of one wet season survey and one dry season survey within a 3-year period. As such, applicants must plan ahead to allow sufficient time to complete these surveys. The results of the protocol-level survey will be valid for 5 years after completion, which means no more than 5 years may lapse between the survey and PCA approval of the Covered Activity.

If another occurrence is found in the Plan Area but outside of the survey requirement area, a similar requirement will be established in consultation with the Wildlife Agencies.

6.3.5.14.2 Applicable Measures

Covered Activities must avoid taking Conservancy fairy shrimp, except as stated in Section 5.4.11, *Vernal Pool Branchiopods* (CM1 VPC-2, Protection of Conservancy Fairy Shrimp Occurrences). If Conservancy fairy shrimp is found to occur on a project site, the following measures will be required for full avoidance:

Conservancy Fairy Shrimp 2. Maintain a 250-foot upland buffer from the outer edge of all hydric vegetation associated with occupied wetlands.

At the request of the project applicant, representatives of the PCA and the Wildlife Agencies may conduct site visits to inspect the particular characteristics of specific project sites and may approve reductions of the buffer. Buffer reductions may be approved for all or portions of the site whenever reduced buffers will maintain the hydrology of the seasonal wetland and achieve the same or greater habitat values as would be achieved by the original buffer. Avoidance and minimization measures will be incorporated into the project design and other portions of the application package prior to submission for coverage under the Plan.

An avoided occurrence can count toward the project's mitigation requirements if it is incorporated into the Reserve System and managed according to the Plan's conservation strategy.

In the event that complying with this condition to avoid an occurrence of Conservancy fairy shrimp would severely affect a property owner's use or economic interest in private property, the PCA and the Wildlife Agencies shall promptly consult with the property owner to consider whether any modifications to this condition are appropriate to reduce the impact on the property owner or whether the PCA may instead purchase the property as part of the Reserve System.

Conservancy Fairy Shrimp 3. Activities inconsistent with the maintenance of seasonal wetlands within the buffers and disturbance of the on-site watershed will be prohibited, including:

- Altering existing topography
- Placing new structures within the buffers
- Dumping, burning, and/or burying garbage or any other wastes or fill materials
- Building new roads or trails
- Removing or disturbing existing native vegetation
- Installing storm drains
- Using pesticides or other toxic chemicals

Conservancy Fairy Shrimp 4. To avoid or minimize effects on Conservancy fairy shrimp being retained on site, the 250-foot upland buffer will be marked by brightly colored fencing throughout the construction process. Activities will be prohibited within this buffer.

6.3.5.14.3 Construction Monitoring

Conservancy Fairy Shrimp 5. If occupied habitat is retained on site, a qualified biological monitor will be present to ensure compliance with the buffer zone restrictions. A qualified biologist will inform all construction personnel about the life history of Conservancy fairy shrimp, the importance of avoiding its habitat, and the terms and conditions of the Plan related to avoiding and minimizing effects on Conservancy fairy shrimp.

The frequency of monitoring will be approved by the PCA and based on the frequency and intensity of construction activities and the likelihood of disturbance of the occupied pool(s). In most cases, monitoring will occur at least every third day.

6.3.5.15 Species Condition 10, Vernal Pool Fairy Shrimp and Vernal Pool Tadpole Shrimp

Surveys are required in vernal pools that will be lost to Covered Activities to determine the occupancy rate of vernal pool fairy shrimp and vernal pool tadpole shrimp in these wetlands. These occupancy rates will be used to calculate the Occupancy Rate Standards8 for these species. The Occupancy Rate Standards will help to ensure that the PCA protects, restores, and creates vernal pools that are occupied by vernal pool fairy shrimp and vernal pool tadpole shrimp at a rate and quality equal to or greater than vernal pools lost to Covered Activities. The Occupancy Rate Standards will be determined after at least 37 wetted acres of vernal pools have been surveyed. Existing data (i.e., data collected prior to issuance of the state and federal permits) collected within the PFG will count toward the requirement to survey a minimum of 37 wetted acres of vernal pools if the surveys were conducted using USFWS-established or –approved protocols, and data are sufficient to quantify occupancy rates, as defined below (see Occupancy Phase). Once the Occupancy Rate Standards are established and approved by the Wildlife Agencies, no further vernal pool occupancy surveys will be required for sites to be affected under the Plan. See Section 5.3.1.6.10, *Vernal Pool Branchiopods*, for more details on the Occupancy Rate Standards and the Plan's requirements to protect, enhance, restore, and create habitat on the Reserve System occupied by vernal pool fairy shrimp and vernal pool tadpole.

6.3.5.15.1 Survey Requirements

Wet season surveys to determine occupancy of vernal pools by vernal pool fairy shrimp and vernal pool tadpole shrimp will be required during the Initial Survey Phase. . The PCA will inform the applicant if the Plan is in the Initial Survey Phase and surveys are required.

Vernal Pool Fairy Shrimp and Tadpole Shrimp 1. Wet season surveys will be conducted for vernal pool fairy shrimp and vernal pool tadpole shrimp in vernal pools, as determined by wetland delineation (See Section 6.2.4.4, *Item 4: Mapping HCP/NCCP Aquatic Features* for details). The qualified biologist will conduct protocol-level wet season surveys, using modified Guidelines, as approved by USFWS (see below). Modifications include requiring that all vernal pools at a site be surveyed, rather than allowing for the survey to be terminated when presence on a project site is confirmed. This modification is necessary to obtain data on presence and

[8] The Occupancy Rate Standard is the proportion of occupied vernal pools relative to all vernal pools sampled, expressed as a percentage. The Occupancy Rate Standard will be represented in two ways: as an Area-Based Occupancy Rate Standard and a Pool-Based Occupancy Rate Standard. See the following footnotes for more details.

absence in all of the available vernal pools, to facilitate the determination of the Occupancy Rate Standards. This, and other exceptions and additions to the Guidelines, as follows.

- If presence is confirmed for vernal pool fairy shrimp and vernal pool tadpole shrimp in an individual vernal pool, surveys may be stopped for that vernal pool.
- All vernal pools on the project site must be surveyed. Surveys cannot be suspended prior to completion, as allowed by the Guidelines, if one or more of the six listed large branchiopods, identified in the Guidelines is determined to be present.
- The Guidelines define a complete survey as consisting of one wet-season and one dry-season survey conducted and completed in accordance with the Guidelines within a 3-year period. For the purposes of the Plan, only one wet-season survey is required; dry-season surveys are not required. Applicants must plan ahead to allow sufficient time to complete these surveys.
- Data that will be collected at each vernal pool surveyed during the wet season survey will include the presence or absence of vernal pool fairy shrimp and vernal pool tadpole shrimp, species identity and the estimated abundance (10s, 100s, 1,000s) of immature and mature vernal pool fairy shrimp and vernal pool tadpole shrimp present, and estimated maximum surface area of the vernal pool. Other information on the USFWS data sheet are not required to be collected (i.e., air and water temperature, average and estimated maximum depth of the vernal pool, presence of non-target crustaceans, insects, and platyhelminths, and habitat condition). This will allow surveys to be conducted more efficiently, while providing the essential information necessary to calculate the Pool-based Occupancy Rate Standard9 and the Area-based Occupancy Rate Standard10. Because these vernal pools will be affected by Covered Activities, collection of additional information is not necessary.
- Information will be recorded on the PCA-provided data sheet, which will be the USFWS data sheet (included as Appendix A to the Guidelines), modified to include the above information.
- Voucher specimens will not be collected during wet season surveys unless the identity of the mature shrimp is uncertain and cannot be identified in the field. The Guidelines allow for a limited number of voucher specimens to be collected for each vernal pool. For the purpose of the Plan, the modified survey protocol further limits the collection of voucher specimens to instances where identity is uncertain.

The biologist conducting a survey for vernal pool fairy shrimp and vernal pool tadpole shrimp should participate in the wetland delineation to map the area of each vernal pool. If the biologist cannot participate in the wetland delineation, and the wetland delineation does not provide area for each vernal pool, the biologist will conduct follow-up surveys to map the perimeter of each vernal pool with a global positioning system (GPS). Each vernal pool will be given a unique

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[9] The Pool-based Occupancy Rate Standard is defined as the total number of vernal pools occupied by a covered branchiopod species divided by the total number of vernal pools surveyed and expressed as the percentage of occupied pools and seasonal swales. A pool-based Occupancy Rate Standard will be set for vernal pool fairy shrimp and for vernal pool tadpole shrimp individually.

[10] The Area-based Occupancy Rate Standard is defined as the total wetted area of vernal pools occupied by a covered branchiopod species divided by the total wetted area of vernal pools surveyed, and is expressed as the percentage of the wetted area occupied. An Area-based Occupancy Rate Standard will be set for vernal pool fairy shrimp and for vernal pool tadpole shrimp individually.

identification number that will be used to track survey data collected during wet- season surveys.

6.3.5.15.2 Applicable Measures

The applicant must submit completed data sheets to the PCA prior to ground disturbance activities.

6.3.6 Reserve Management Conditions

The conditions listed here establish requirements for public access and recreation on the Reserve System and describe incorporation of these requirements into reserve unit management plans.

6.3.6.1 Reserve Management Condition 1, Public Access and Recreation on Future Reserve Lands

Land acquisition is a primary component of the conservation strategy. Lands acquired during Plan implementation will be enrolled into the Reserve System and managed for the benefit of Covered Species and natural communities. The primary purpose of all Reserve System lands is the conservation of the Covered Species and natural communities in the HCP/NCCP. However, limited recreation may be allowed on some reserves as long as that recreation does not inhibit the ability of the PCA to achieve the biological goals and objectives of the Plan. There will be some areas of the Reserve System in which recreation will be prohibited either at all times or certain times of the year. This condition describes the limited allowable recreational uses on future lands acquired for the Reserve System during Plan implementation, and the limited situations in which that is allowed (also see Section 6.3.6.2, *Reserve Management Condition 2, Recreation Component of Reserve Unit Management Plans*).

Jump Start lands are eligible to be included in the Reserve System at the time the Plan is permitted and will be enrolled in the Reserve System upon recording of a conservation easement. Some of these existing lands have established trails and existing recreational uses and will, therefore, be assessed separately. Limitations on recreation in Jump Start lands are described in Section 6.3.6.3, *Reserve Management Condition 3, Jump Start Lands.*

The level of recreation allowed on future reserves will be minimal (e.g., docent-led tours, hiking). Hunting and fishing will be allowed under limited circumstances, applying the conditions described below. No off-road vehicles will be allowed in new reserves except for management purposes. New trails may be constructed but designed to be minimally invasive. Within the future Reserve System up to 70 miles of new trails with an average width of 6 feet may be developed (approximately 50 acres of ground disturbance) upon approval of the PCA and Wildlife Agencies. An 18-foot buffer that encompasses the trail will be deducted from enrolled acres of any future reserve (up to 153 acres over the course of the permit term). Trail location and density in any given reserve unit will not impact the biological goals and objectives that the acquisition is designed to meet or for which acquisition credit is given. Recreation facilities, such as parking lots, will be located offsite to the extent practicable and will not be enrolled in the Reserve System (see item 14 below). Section 2.6.7.1.4, *Recreation*, describes facilities construction and trail construction as Covered Activities, the footprint of these effects will be counted against the proposed direct effect limits provided in Table 4.1.

ATTACHMENT G

CARP Section 7

Chapter 7.
CARP PROCEDURES, TIMELINES, AND CONDITIONS OF APPROVAL

7.1. Introduction

CARP procedures are designed to occur concurrently with the HCP/NCCP permitting process (HCP/NCCP Chapter 6, Section 6.2 *Program Participation: Receiving Take Authorization under the Plan*) and, as needed, the CEQA process. This Chapter explains the permitting processes, procedures, and timelines that can be anticipated when submitting a CARP Authorization Form. A detailed description of the documents required for submittal of a CARP application is provided in Chapter 5 of this document. A detailed description of the avoidance, minimization, and mitigation requirements of the CARP authorization is provided in Chapter 6. Applicants are encouraged to review the requirements described in CARP Chapters 5 and 6, as well as the procedures outlined in this Chapter prior to submitting an application for a CARP Authorization.

7.2. Initial Screening and Consultation

For discretionary projects subject to CEQA, the Applicant initiates the first step in determining whether compliance with the CARP is required by submitting an application with an environmental supplement to the Local Jurisdiction (Appendices D-1 through D-3). For ministerial projects not subject to CEQA, the project proponent will file the appropriate land development application (e.g., building permit). These applications will be reviewed by a Local Jurisdiction's staff to: 1) determine the completeness of the application, 2) determine the project's complexity, and 3) assess the likelihood that Aquatic Resources of Placer County are present on the proposed project site. The Local Jurisdiction will review the best available information and resources (e.g., LiDAR, high-resolution aerial photography, or other available imagery of the site) and may need to conduct a site visit to determine if Aquatic Resources of Placer County are present. If aquatic resources are present or are likely to be present, a CARP Authorization will be required, and a full site assessment and aquatic resource delineation will be required, and the application will be required to file a CARP Application (Appendix E). Many Applicants will already know that they have Aquatic Resources present and will submit the CARP Application with their development project applications.

For larger, more complex projects (i.e., projects that will be permitted through a LOP or standard permit), prior to submitting a CARP application, Applicants must participate in an Initial Consultation (pre-application meeting) with Local Jurisdiction staff to review the proposed project and determine whether a CARP Authorization is needed. The Initial Consultation will also help to determine the level of CEQA review necessary and will identify any studies that may be needed in addition to the required aquatic resource delineation and Biological Resources Assessment (CARP Chapter 5). The process of the Initial Screening and Consultation is illustrated in Figure 7-1.

During Initial Consultation, Applicants will be expected to adequately describe the site and provide aerial photographs, drawings, site plans, or tentative maps with enough information to determine if aquatic resources are present on the project site, and if the proposed project will impact those resources that are identified as Aquatic Resources of Placer County. A list of application requirements is provided in CARP Chapter 5. Some sites may not have Aquatic Resources of Placer County present, and/or some activities may not affect Aquatic Resources of Placer County, and thus, compliance with the CARP may not be required. If the Applicant or Local Jurisdiction representative identifies aquatic resources onsite, the resources must be shown on a project map, site plan, or tentative map. In all cases, Aquatic Resources of Placer County are to be depicted even if an Applicant is proposing avoidance of all direct and indirect effects.

If compliance with the CARP is not required due to the absence of Aquatic Resources of Placer County or the absence of any effect on Aquatic Resources of Placer County, the Applicant may proceed through the HCP/NCCP application process.

If Aquatic Resources of Placer County are present and impacts to these resources are anticipated, compliance with the CARP will be required, and the Applicant will be provided with both the HCP/NCCP and CARP Application packages (Appendix E). The Applicant will be required to complete and submit both applications along with the Local Jurisdiction's standard planning project application forms (Appendix D).

7.3. CARP Authorization Process

The CARP Authorization process closely follows the Local Jurisdiction's environmental review (i.e., CEQA) and discretionary entitlement review process. As part of the entitlement review process, Local Jurisdictions require that all Applicants fill out a project application and a supplemental environmental form. After review of these two forms, the Local Jurisdiction will determine if a CARP Authorization and CARP Application are required for the Covered Activity. For non-discretionary projects that are Covered Activities, the Local Jurisdiction and PB will evaluate the project's ministerial application (e.g., building permit) to determine if there is any potential impact to Aquatic Resources (See Section 5.2)

If the project's impacts to aquatic resources exceed the threshold(s) authorized by the USACE PGP and the Applicant is required to obtain a LOP or Standard Permit to comply with section 404 of the CWA , the Applicant must notify the Local Jurisdiction that one or more applications is being processed by the USACE by completing the relevant portion of the CARP Authorization Form (Appendix E) and, once issued, must provide a copy of the approved LOP or Standard Permit to the Local Jurisdiction. For these projects, a CARP Authorization will not be required, provided the project complies with the terms and conditions of the LOP or Standard Permit and the requirements of the HCP/NCCP, including but not limited to the payment of applicable PCCP Development Fees. The process described below applies to Covered Activities authorized by the Local Jurisdiction that meet the threshold for the PGP.

As illustrated in Figure 7-2, once the Applicant submits the CARP application, the Local Jurisdiction will have 15 calendar days to review it for completeness and request additional information. Once the application is deemed complete, the PB will have 15 calendar days to conduct a site assessment to evaluate the extent of aquatic resources that are present and to determine if habitat for Covered Species or cultural resources will be affected by the proposed project (CARP Chapter 5). The PB will either map the aquatic resources within the proposed project site for small projects (projects with less than 0.01 acres of aquatic resources) if one is not provided by the Applicant, or review the delineation provided by the Applicant. The purpose of the review is to ensure that the delineation meets the USACE's minimum standards for delineations in order to expedite the verification process at the USACE. The PB's review is not intended to provide a two-step verification process. The review of the delineation will occur during the 15-calendar day review period. The Applicant may be asked to provide additional information and conduct further studies after the PB has conducted the site assessment.

Once the aquatic resource delineation is reviewed by the PB, the Local Jurisdiction will submit it to the USACE for verification, as necessary under the USACE Section 404 permitting strategy for Covered Activities. This step is not necessary if the Applicant has already received a valid aquatic resources verification or preliminary or approved jurisdictional determination from the USACE. This step is also not necessary if the Applicant notifies the Local Jurisdiction that it is filing a separate LOP or Standard Permit application with the USACE. In addition to a delineation, the Applicant will also submit any other documents required to complete the application, and once these have been received and the delineation has been verified, the CARP Application will be deemed complete, and the process will continue. The proposed project will be evaluated by Local Jurisdiction staff and the PB to ensure that Aquatic Resources of Placer County within or adjacent to the Stream System, or an existing preserve, are being avoided to the greatest extent practicable. The Applicant may be required to modify their project to avoid aquatic resources.

If a Water Quality Certification is required for the project, a fee as required by Section 2200(a)(3) of the California Code of Regulations must accompany the CARP Application, and the application will be placed on public notice through the Central Valley RWQCB website for 21-days or as otherwise required by the State. If the Applicant indicates that project activities will not impact waters of the U.S. (WOUS) and will only impact WOS, the Local Jurisdiction will forward the CARP Application to the RWQCB for review and issuance of Waste Discharge Requirements (WDRs). The CARP Application fulfills the requirement under California Water Code Section 13260 to submit a Report of Waste Discharge for WDRs.

If the activities will require Notification under FGC Section1602, the Applicant will submit a complete Notification package and applicable fee to CDFW for review and determination of whether a LSAA will be issued. The HCP/NCCP and the CARP can, under most circumstances, serve as the framework for determining the avoidance and minimization measures and compensatory mitigation requirements to offset impacts from activities subject to FGC 1600 et seq.

The CEQA process will run concurrently with the permitting process described above and integrate the CARP's BMPs and mitigation measures into the final environmental document. This timeline may vary depending on the outcome of the analysis of impacts (such as traffic, air quality, noise, biology, etc.) and the level of environmental review required for the project (Negative Declaration [Neg. Dec.], Mitigated Negative Declaration [MND], or Environmental Impact Report [EIR]).

After all approvals have been obtained and the Applicant has paid all the applicable fees, the CARP Authorization will be granted through a CARP Authorization Form.

7.4. Process for CARP Authorizations of Local Jurisdiction Projects

To gain CARP Authorization for Local Jurisdiction projects, a site assessment will be conducted, and all aquatic resources will be mapped. A Site Assessment Form will be completed to determine the extent and type of biological, aquatic, and cultural resources present. The Site Assessment Form will establish applicable CARP requirements for the project. If the proposed project meets all the requirements of the CARP as noted on the Site Assessment Form, then the project will have authorization under the CARP.

CARP Authorizations are not required for a Local Jurisdiction project if a LOP or Standard Permit is issued for the project by the USACE.

All Site Assessment Forms will be submitted to the PCA, which will maintain a record of all CARP information provided by the Local Agencies for all projects covered by the CARP.

7.5. CARP Authorization Conditions of Approval

The following conditions apply to all Covered Activities that have the potential to impact Aquatic Resources of Placer County:

Administrative

- All work within the Plan Area that impacts Aquatic Resources of Placer County shall be completed according to the plans and documents included in the CARP application, Water Quality Certification, and, if applicable, WDRs. All changes to those plans shall be reported to the Local Jurisdiction. Minor changes may require an amendment to the CARP Authorization, Water Quality Certification, and, if applicable, WDRs. Substantial changes may render the authorization, Water Quality Certification, and, if applicable, WDRs, void, and a new application may be required.
- A copy of the CARP conditions and Water Quality Certification and WDRs shall be given to individuals responsible for activities on the site. Site personnel, (employees, contractors, and subcontractors) shall be adequately informed and trained to implement all permit, Water Quality Certification, and WDR conditions and shall have a copy of all permits available onsite at all times for review by site personnel and agencies.
- Any construction within the Stream System shall be implemented in a way to avoid and minimize impacts to vegetation outside the construction area. All preserved wetlands, other Aquatic Resources of Placer County, and the Stream Zone shall be protected with bright construction fencing. Temporary fencing shall be removed immediately upon completion of the project.
- Before beginning construction, the project Applicant must have a valid CARP authorization or waiver notice. In order to obtain a permit, the Applicant must pay all mitigation fees or purchase appropriate credits from an agency-approved mitigation bank.
- All deviations from plans and documents provided with the Application and approved by the Local Jurisdiction must be reported to the Local Jurisdiction immediately.

Erosion Control

- Erosion control measures shall be specified as part of the CARP application, and the application is not complete without them. All erosion control specified in the permit application shall be in place and functional before the beginning of the rainy season and shall remain in place until the end of the season. Site supervisors shall be aware of weather forecasts year-round and shall be prepared to establish erosion control on short notice for unusual rain events. Erosion control features shall be inspected and maintained after each rainfall period. Maintenance includes, but is not limited to, removal of accumulated silt and the replacement of damaged barriers and other features.
- All required setbacks shall be implemented according to the HCP/NCCP Condition 4 (HCP/NCCP Section 6.1.2).

Work Period

- All work in aquatic resources within the Stream System shall be restricted to periods of low flow and dry weather between April 15 and October 15, unless otherwise permitted by Local Jurisdictions and approved by the appropriate State and federal regulatory agency. Work within aquatic resources in the Stream System outside of the specified periods may be permitted under some circumstances. The Applicant must provide the Local Jurisdiction with the following information: a) the extent of work already completed; b) specific details about the work yet to be completed; and c) an estimate of the time needed to complete the work in the Stream System.

Restoration

- Following work in a stream channel, the low flow channel shall be returned to its natural state to the extent possible. The shape and gradient of the streambed shall be restored to the same gradient that existed before the work to the extent possible.
- Work shall not disturb active bird nests until young birds have fledged. To avoid impacts to nesting birds, any disturbance shall occur between September 1 and February 1 prior to the nesting season. Tree removal, earthmoving or other disturbance at other times is at the Local Jurisdiction's discretion and will require surveys by a qualified biologist to determine the absence of nesting birds prior to the activity.
- All trees marked for removal within the Stream System must be shown on maps included with the Application. Native trees over five inches diameter at breast height (DBH) shall not be removed without the consent of the Local Jurisdiction.

Dewatering/Diversion

- Except for site preparation for the installation and removal of dewatering structures, no excavation is allowed in flowing streams unless dredging WDRs are issued by the RWQCB. Detailed plans for dewatering must be part of the Application.
- Temporary crossings as described in the Application shall be installed no earlier than April 15 and shall be removed no later than October 15, unless otherwise permitted by Local Agencies and approved by the appropriate State and federal regulatory agency. This work window could be modified at the discretion of the Local Jurisdiction and the CDFW.

Equipment/Staging Areas

- No vehicles other than necessary earth-moving and construction equipment shall be allowed within the Stream System after the section of stream where work is performed is dewatered. The equipment and vehicles used in the Stream System shall be described in the Application.
- Staging areas for equipment, materials, fuels, lubricants, and solvents shall be located outside the stream channel and banks and away from all preserved aquatic resources. All stationary equipment operated within the Stream System must be positioned over drip-pans. Equipment entering the Stream System must be inspected daily for leaks that could introduce deleterious materials into aquatic resources. All discharges, unintentional or otherwise, shall be reported immediately to the Local Jurisdiction. The Local Jurisdiction shall then immediately notify the appropriate state and federal agencies.
- Cement, concrete, washings, asphalt, paint, coating materials, oil, other petroleum products, and other materials that could be hazardous to aquatic life shall be prevented from reaching streams, lakes, or other water bodies. These materials shall be placed a minimum of 50 feet away from aquatic environments. All discharges, unintentional or otherwise, shall be reported immediately to the Local Jurisdiction. The Local Jurisdiction shall then immediately notify the appropriate state and federal agencies.
- During construction, no litter or construction debris shall be dumped into water bodies or other aquatic resources; nor shall it be placed in a location where it might be moved by wind or water into aquatic resources. All construction debris shall be removed from the site upon completion of the project.
- Only herbicides registered with the California Department of Pesticide Regulation shall be used in streams, ponds, and lakes, and shall be applied in accordance with label instructions. A list of all pesticides that may be used in the project area shall be submitted to the Local Jurisdiction before use.

Wildlife

- The Local Jurisdiction shall be notified immediately if threatened or endangered species that are not Covered Species are discovered during construction activities. The Local Jurisdiction shall suspend work and notify the USFWS, NMFS, and the CDFW for guidance.
- Wildlife entering the construction site shall be allowed to leave the area unharmed or shall be flushed or herded humanely in a safe direction away from the site.
- All pipe sections shall be capped or inspected for wildlife before being placed in a trench. Pipes within a trench shall be capped at the end of each day to prevent entry by wildlife, except for those pipes that are being used to divert stream flow.
- At the end of each workday, all open trenches will be provided with a ramp of dirt or wood to allow trapped animals to escape.

Cultural Resources

- If human remains or cultural artifacts are discovered during construction, the Applicant shall stop work in the area and notify the Local Jurisdiction immediately. Work will not continue in the area until a qualified coroner and archaeologist have evaluated the remains, conducted a survey, prepared an assessment, and required consultations are completed.

Additional Conditions

- Additional conditions may be required by CDFW if the Covered Activity is subject to a LSAA.

DRAFT FIGURE 7-1
CARP Initial Screening and Consultation

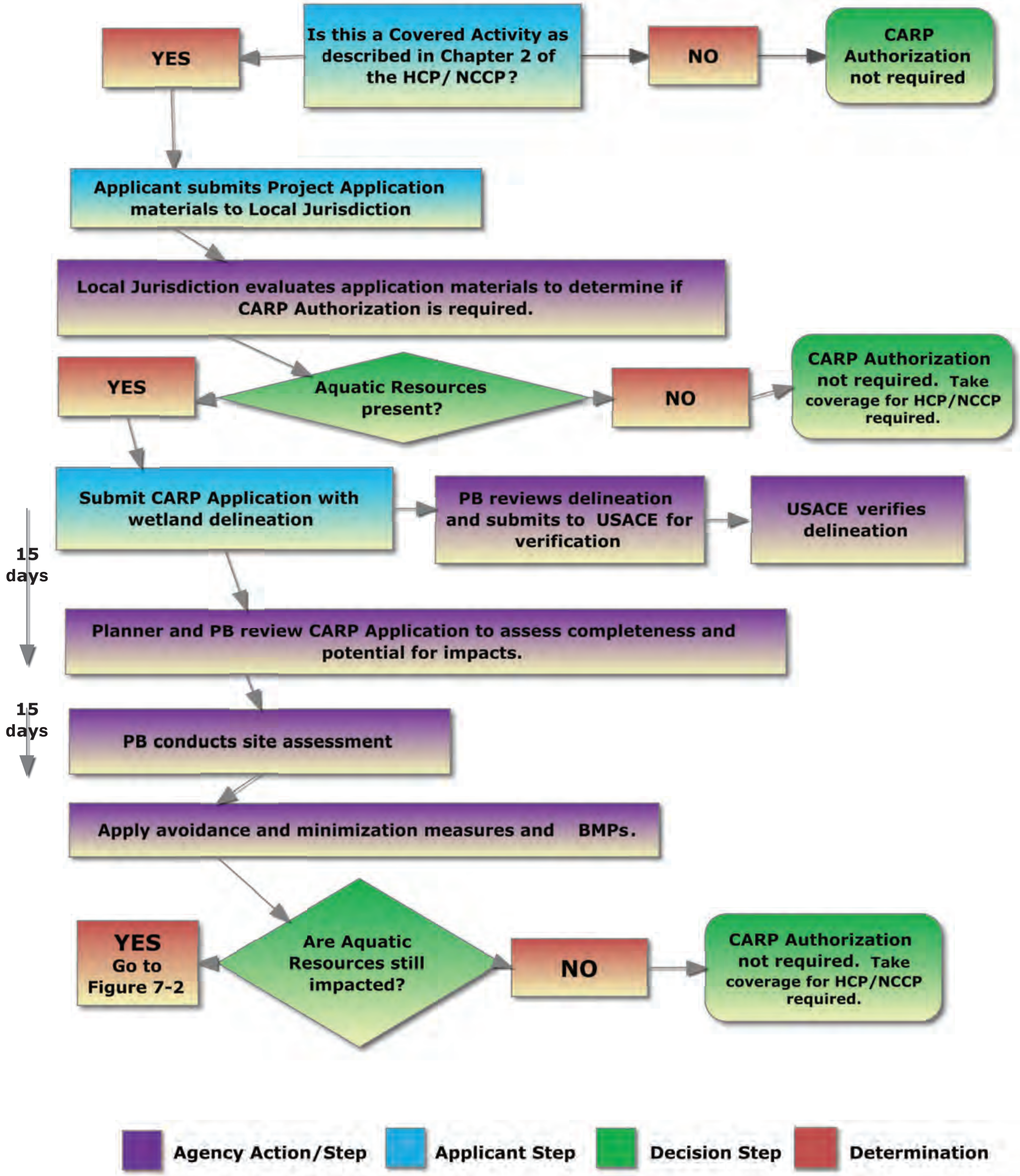
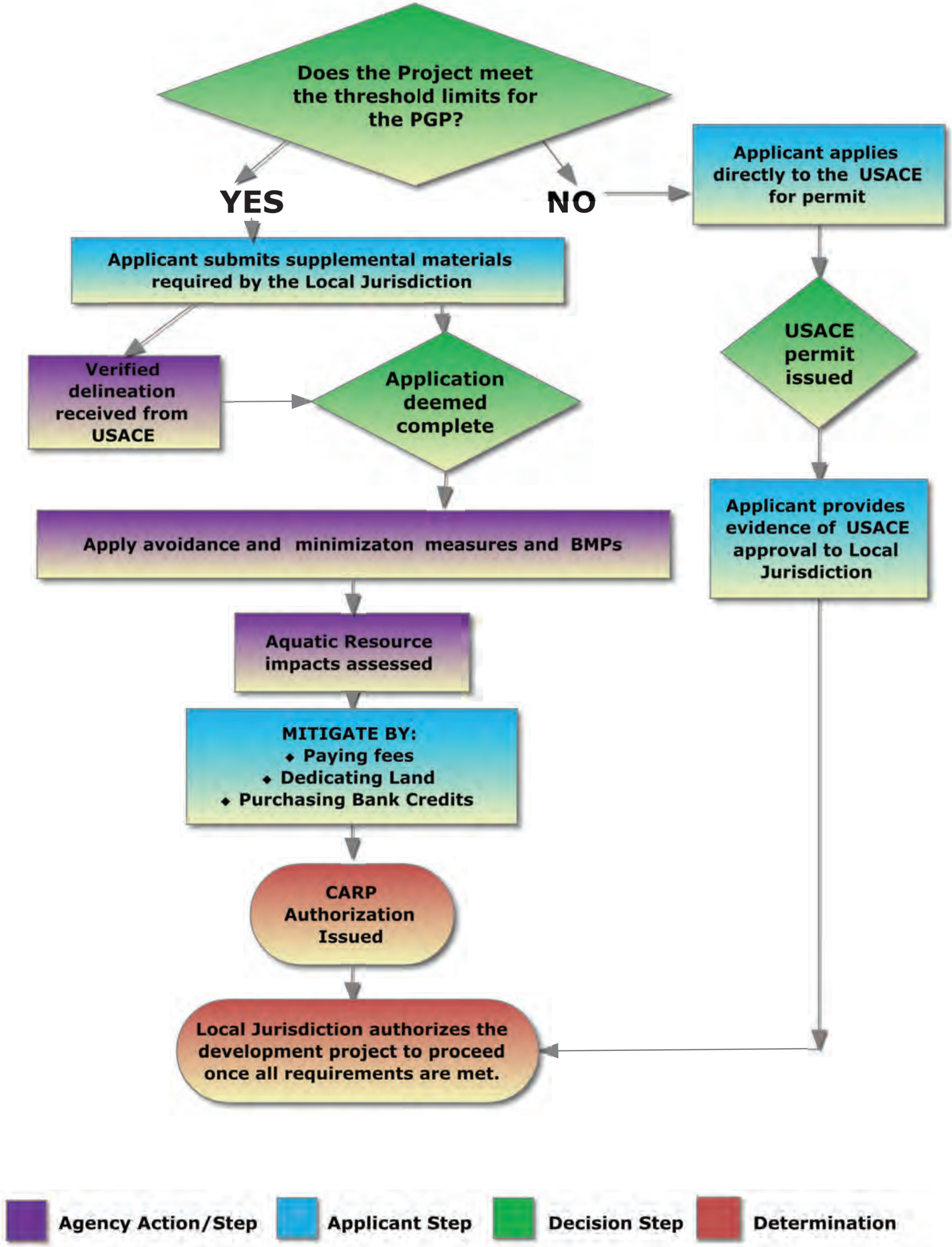


Figure 7-2
CARP Authorization Process



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APPENDIX 3.3 B

Arborist Report
(ECORP Consulting, Inc.)

Arborist Survey Report

Hemphill Diversion Structure Removal Project

Placer County, California

Prepared for:

Nevada Irrigation District

October 29, 2020

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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LIST OF ATTACHMENTS

Attachment A – Tree Inventory for the Hemphill Diversion Structure Removal Project
Attachment B – Representative Site Photographs
Attachment C – Tree Survey Data (August and September 2020)

LIST OF ACRONYMS AND ABBREVIATIONS

dbh	Diameter at breast height
NID	Nevada Irrigation District
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
Project	Hemphill Diversion Structure Removal Project
Tree Preservation Code	Placer County Code (Article 12.16.020) for Tree Preservation
USGS	U.S. Geological Survey

1.0 INTRODUCTION

On behalf of Nevada Irrigation District (NID), ECORP Consulting, Inc. conducted an arborist survey for the Hemphill Diversion Structure Removal Project (Project), located in Placer County, California. The purpose of this survey was to identify, map, and assess the general condition of trees within the Project site according to the Placer County Code (Article 12.16.020) for Tree Preservation (Tree Preservation Code). Due to the large size of the Project, trees within the "Riparian Zone" (as defined below) were not included as part of this survey. Follow up surveys may be required in the future to address Riparian areas within the Project, once the Project design has been further refined.

The following are definitions from the Tree Preservation Code that were used to guide the methodology and data collection for this survey effort.

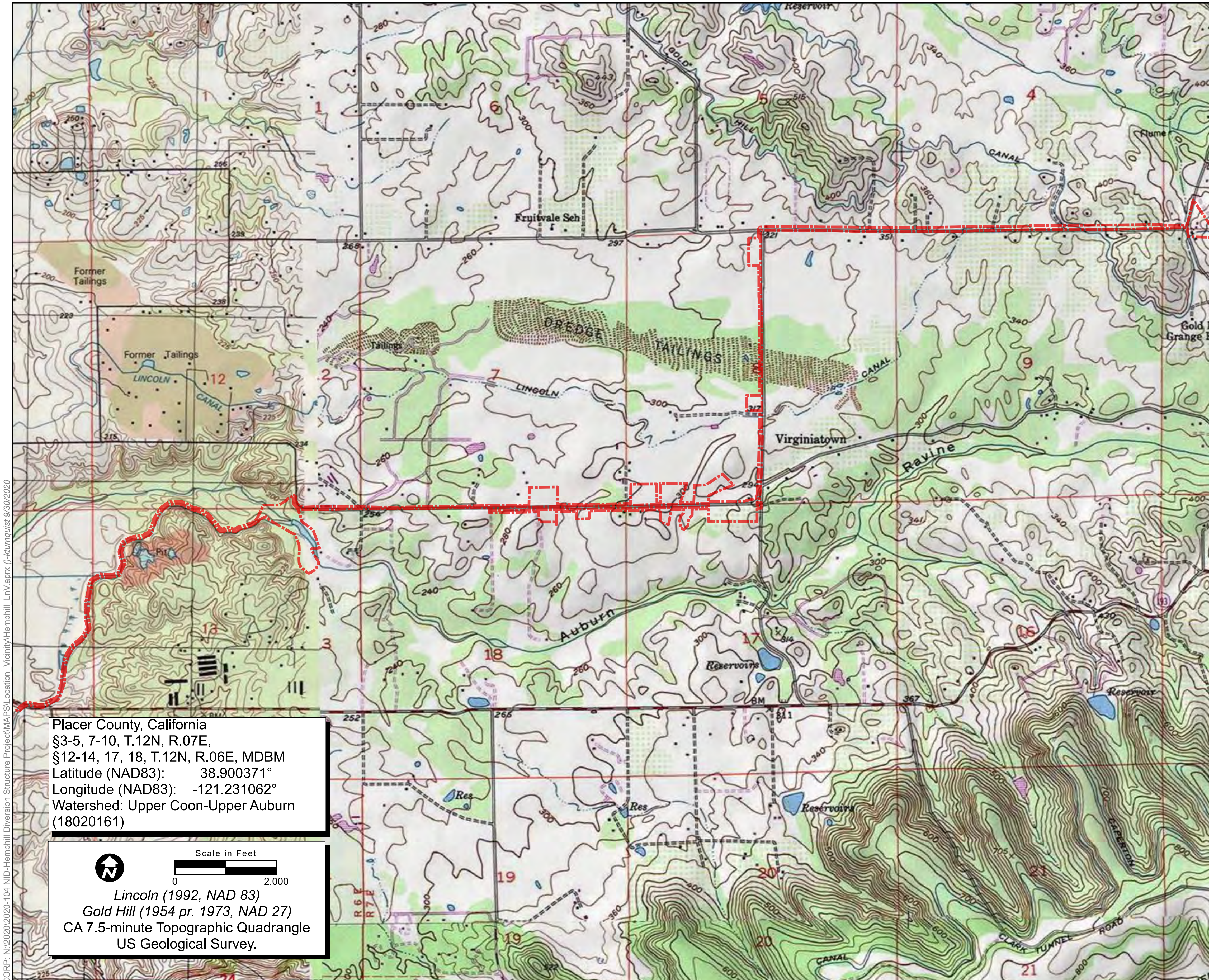
Tree: A tall woody plant native to California, with a single main stem or trunk at least six inches diameter at breast height (dbh), or a multiple trunk with an aggregate of at least 10 inches dbh. (Note: Grey pines [*Pinus sabiniana*] are exempt from this article.)

Riparian Zone: Any area within 50 feet from the centerline of a seasonal creek or stream; any area 100 feet from the centerline of a year-round creek, stream, or river; and any area within 100 feet from the shoreline of a pond, lake, or reservoir. At a minimum, all streams, creeks, ponds, lakes, and reservoirs as shown on 7.5-minute U.S. Geological Survey (USGS) maps are included in this definition. (Note: All trees regardless of size within riparian areas within the tree preservation zones and as a part of any discretionary project county-wide are subject to this article.)

Landmark Tree: A tree or grove of trees designated by resolution of the Board of Supervisors to be of historical or cultural value, an outstanding specimen, an unusual species and/or of significant community benefit. Notwithstanding any other provision of this section, a tree that is not native to California may be designated as a landmark tree.

2.0 SITE DESCRIPTION

The Project is located along the extent of the Hemphill Canal from State Highway 193 through the Turkey Creek Golf Club to Auburn Ravine and the Hemphill Diversion Structure. From the Diversion Structure, the Project Area follows Virginiatown Road east to Fowler Road; north on Fowler Road to Fruitvale Road; and east on Fruitvale Road to the NID Placer Yard at 1900 Gold Hill Road (Figure 1. *Project Location and Vicinity*). The approximately 98.05-acre Project corresponds to portions of Sections 3-5 and 7-10, Township 12 North, and Range 7 East (Mount Diablo Base and Meridian) of the "Gold Hill, California" and "Lincoln, California" 7.5-minute quadrangles (USGS 1954, photorevised 1973 and 1992, respectively). The approximate center of the Study Area is located at 38.900371° latitude and -121.231062° longitude within the Upper Coon-Upper Auburn Watershed (Hydrologic Unit Codes #18020161) (Natural Resources Conservation Service [NRCS], et al. 2016).



Placer County, California
§3-5, 7-10, T.12N, R.07E,
§12-14, 17, 18, T.12N, R.06E, MDBM
Latitude (NAD83): 38.900371°
Longitude (NAD83): -121.231062°
Watershed: Upper Coon-Upper Auburn (18020161)

Scale in Feet
0 2,000

Lincoln (1992, NAD 83)
Gold Hill (1954 pr. 1973, NAD 27)
CA 7.5-minute Topographic Quadrangle
US Geological Survey.

Map Contents

Project Boundary - 98.05 ac.

Sources: Esri, USGS

ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Location_Vicinity\Hemphill_LnV.aprx (l-kturnquist 9/30/2020)

Map Date: 9/30/2020

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Figure 1. Project Location and Vicinity

2020-104 NID Hemphill Diversion Structure

The Project is located within flat to gently rolling terrain situated in the Sierra Nevada Foothills Subregion of the California Floristic Province (Baldwin et al. 2012). Elevations within the Project range from approximately 180 to 430 feet above mean sea level. Based on information gathered from the closest weather station, the average annual precipitation for the vicinity of the Study Area is approximately 20.3 inches (with the wettest period November-March), and average daily temperatures range from 41.5 degrees Fahrenheit (˚F) in winter to 91.2˚F in summer (National Oceanic and Atmospheric Administration [NOAA] 2020).

The Study Area is largely composed of developed areas including the Hemphill Canal, the Hemphill Diversion Structure, and associated dirt and gravel access roads; paved two-lane roads, portions of the Turkey Creek Golf Course, residential yards, agricultural fields, and the NID maintenance yard. Vegetation within undeveloped portions of the Study Area is primarily oak woodland, although annual grassland occurs on portions of rural residential parcels adjacent to the roadways; and patches of riparian, wetland, or ruderal vegetation is associated with aquatic features or disturbed areas.

3.0 METHODS

ECORP arborist Krissy Walker-Berry (ISA Certification #WE-11308A) conducted the field survey on August 10, 14, 17, 18, and September 3, 8, 10, 15, 16, 21, 22, and 25, 2020, with ECORP biologists Gabrielle Attisani, Caroline Hinkelman, Hannah Kang, Dean Podolsky, Eric Stitt, and Hannah Stone. During the field survey, ECORP staff walked the accessible portions of the Project site and recorded data using a sub-meter accuracy Global Positioning System unit. Where access was not available, trees from the ground were mapped via aerial photograph review; however, additional trees may not have been mapped as it was not possible to obtain the necessary data for those trees (see Attachment A). Additionally, some trees were surveyed that look like they are located outside of the Project (see Attachment A); these were included in the survey due to the approximate nature of the Project limits.

Data collected included species, tree tag number, dbh, dripline radius, structure, and condition. In accordance with the Tree Preservation Code, all native trees with a dbh of six inches for single-stemmed trees, or with an aggregate dbh of 10 inches for multiple-stemmed trees, were surveyed. In addition, any large nonnative tree that could potentially be considered a landmark tree was also documented.

The survey results are intended for general project planning purposes only; therefore, these results should not be considered a detailed tree analysis (i.e., results do not include hazard assessment, tree health diagnosis, preservation/removal recommendations, or pruning advisement). The following terms define the collected data:

Dbh: Trunk diameter at 4.5 feet above grade. Occasional deviations from this height were required for trees with branching at this level or with unusual structural configurations (e.g., horizontal trunks). On multi-trunked trees (trees with multiple vertical trunks in contact at or near ground level), the report lists total aggregate diameter along with the total number of trunks that were measured.

Dripline Radius: The maximum distance from trunk to the edge of the canopy.

Condition: An estimate of the tree's overall health. This includes evaluation of foliage, evidence of wound healing, evidence of fungal attack, density of insect galls, and the amount and condition of attached deadwood. Condition was rated on a six-point scale (excellent, good, fair to good, fair, fair to poor, and poor).

Structure: An estimate of the tree’s structural soundness, based on obvious external evidence. This evaluates the obvious potential for structural failure of one or more major branches or trunks, the environment and condition of the root crown, symmetry of the canopy, and any noticeable effects of crowding caused by adjacent trees. Structure was rated on a six-point scale (excellent, good, fair to good, fair, fair to poor, and poor).

In addition, where appropriate, notes were taken regarding any unusual features (e.g., large trunk cavities, obvious damage or disease, girdling by barbed wire).

4.0 RESULTS

A total of 1,611 trees were inventoried that had either their stem or their dripline within the Project. Of these trees, 827 trees were either inaccessible, located outside of the Project limits, or located on unknown property ownership. Therefore, tree tags were not installed on these trees. A map depicting the locations of the inventoried trees is included in Attachment A. Representative site photographs are included in Attachment B. Detailed tree survey data for each tree are included in Attachment C.

There are 12 species of native tree that were inventoried for the Project. The most common species is interior live oak (*Quercus wislizeni*) with 681 individuals. In addition, there are 395 valley oak (*Quercus lobata*), 216 blue oak (*Quercus douglasii*), 163 northern California black walnut (*Juglans hindsii*), 44 white alder (*Alnus rhombifolia*), 30 Arroyo willow (*Salix lasiolepis*), 28 California buckeye (*Aesculus californica*), 21 Fremont’s cottonwood (*Populus fremontii*), 16 Goodding’s black willow (*Salix gooddingii*), 14 Oregon ash (*Fraxinus latifolia*), two American sycamore (*Platanus racemosa*), and one red willow (*Salix lasiolepis*).

There are four Project alternatives shown in Attachment A: Alternatives 1 and 2 (which are located in the same general area), Alternative 3, and Alternative 4. Based on the tree locations, including their dripline radius, the potential impacts by Project alternative is as follows:

Alternative	Number of Trees[1]
1 and 2	516
3	617
4	488

5.0 CONCLUSION

The Project contains 1,611 trees with potential to be impacted by Project activities. If the proposed Project activities occur within the dripline or remove any of these trees, a Tree Permit will be required and the Placer County Tree Ordinance shall be consulted for tree mitigation and preservation measures. Additionally, once the Project impacts have been refined, ECORP recommends an additional survey within the Riparian Zones for all native trees (regardless of size) to make sure that the trees are captured appropriately.

6.0 REFERENCES

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_____. 1954. pr. 1973. "Gold Hill" 7.5-minute Topographic Quadrangle. Geological Survey. Denver, Colorado.

[1] Ten trees are counted in more than one alternative due to their dripline falling across another alternative's boundary.

LIST OF ATTACHMENTS

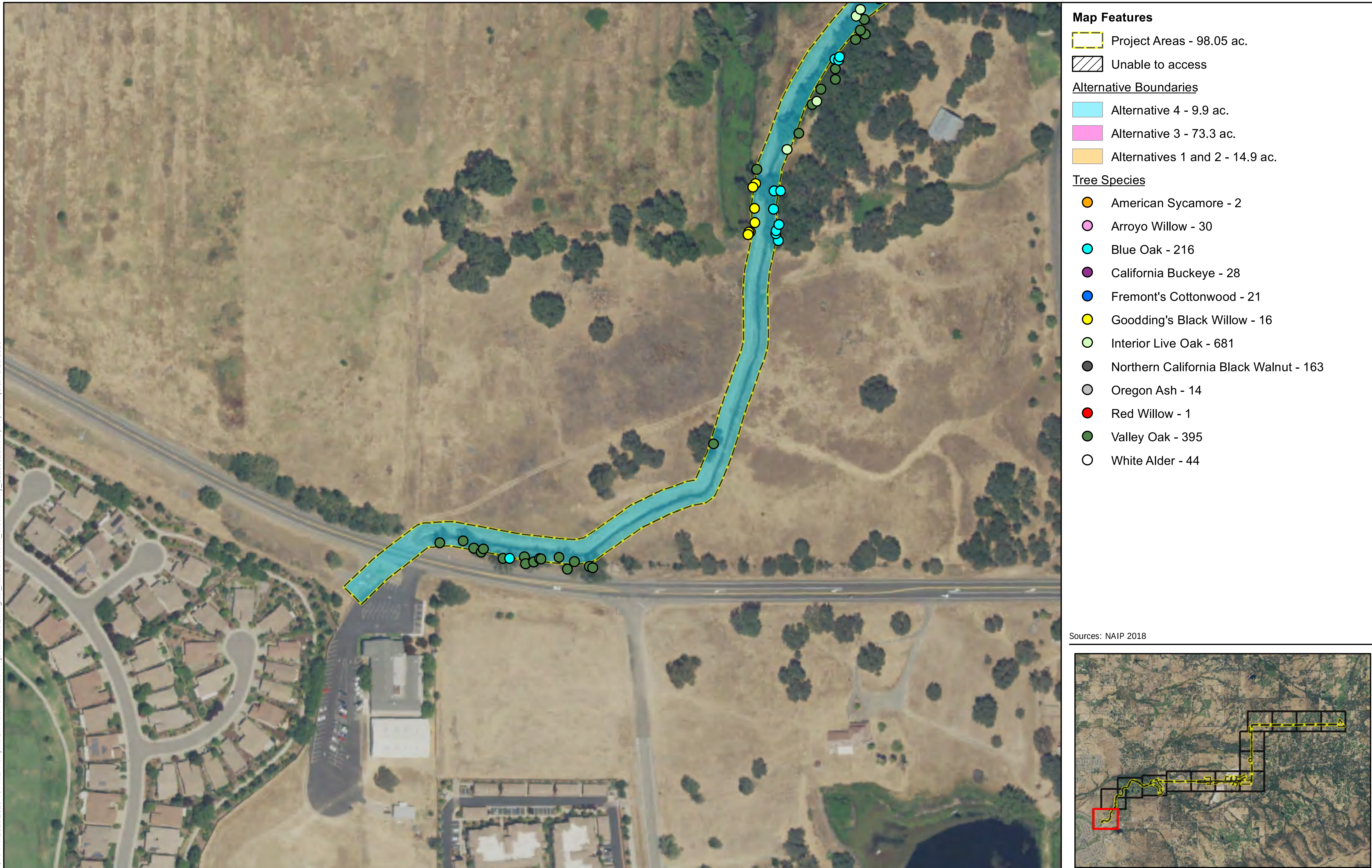
Attachment A – Tree Inventory for the Hemphill Diversion Structure Removal Project

Attachment B – Representative Site Photographs

Attachment C – Tree Survey Data (August and September 2020)

ATTACHMENT A

Tree Inventory at the Hemphill Diversion Structure Removal Project



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Map Date: 10/20/2020

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Scale in Feet
0 200

Attachment A. Tree Inventory of Hemphill Diversion Structure Removal Project

2020-104 NID-Hemphill Diversion Structure Project

Map Features

- Project Areas - 98.05 ac.
- Unable to access

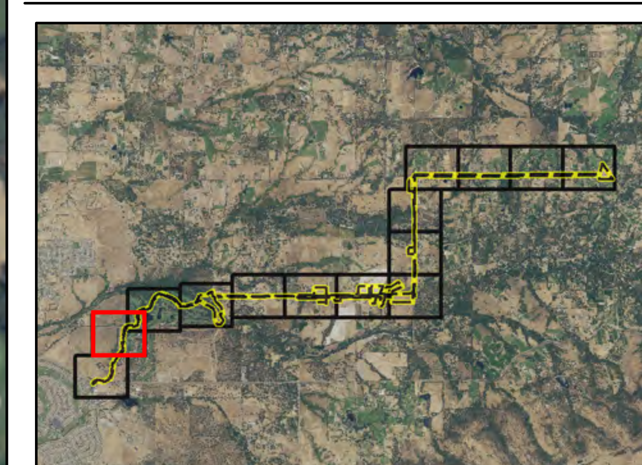
Alternative Boundaries

- Alternative 4 - 9.9 ac.
- Alternative 3 - 73.3 ac.
- Alternatives 1 and 2 - 14.9 ac.

Tree Species

- American Sycamore - 2
- Arroyo Willow - 30
- Blue Oak - 216
- California Buckeye - 28
- Fremont's Cottonwood - 21
- Gooding's Black Willow - 16
- Interior Live Oak - 681
- Northern California Black Walnut - 163
- Oregon Ash - 14
- Red Willow - 1
- Valley Oak - 395
- White Alder - 44

Sources: NAIP 2018



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Map Date: 10/20/2020

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Scale in Feet
0 200

Attachment A. Tree Inventory of Hemphill Diversion Structure Removal Project

2020-104 NID-Hemphill Diversion Structure Project

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Unable to access

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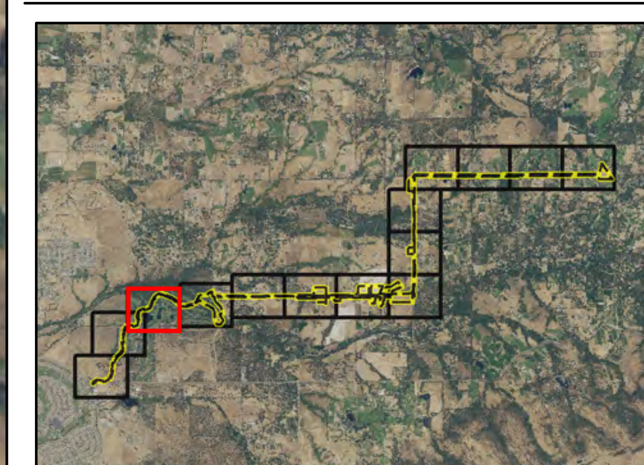

Map Date: 10/20/2020

ECORP Consulting, Inc.
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Scale in Feet
0 200

Attachment A. Tree Inventory of Hemphill Diversion Structure Removal Project

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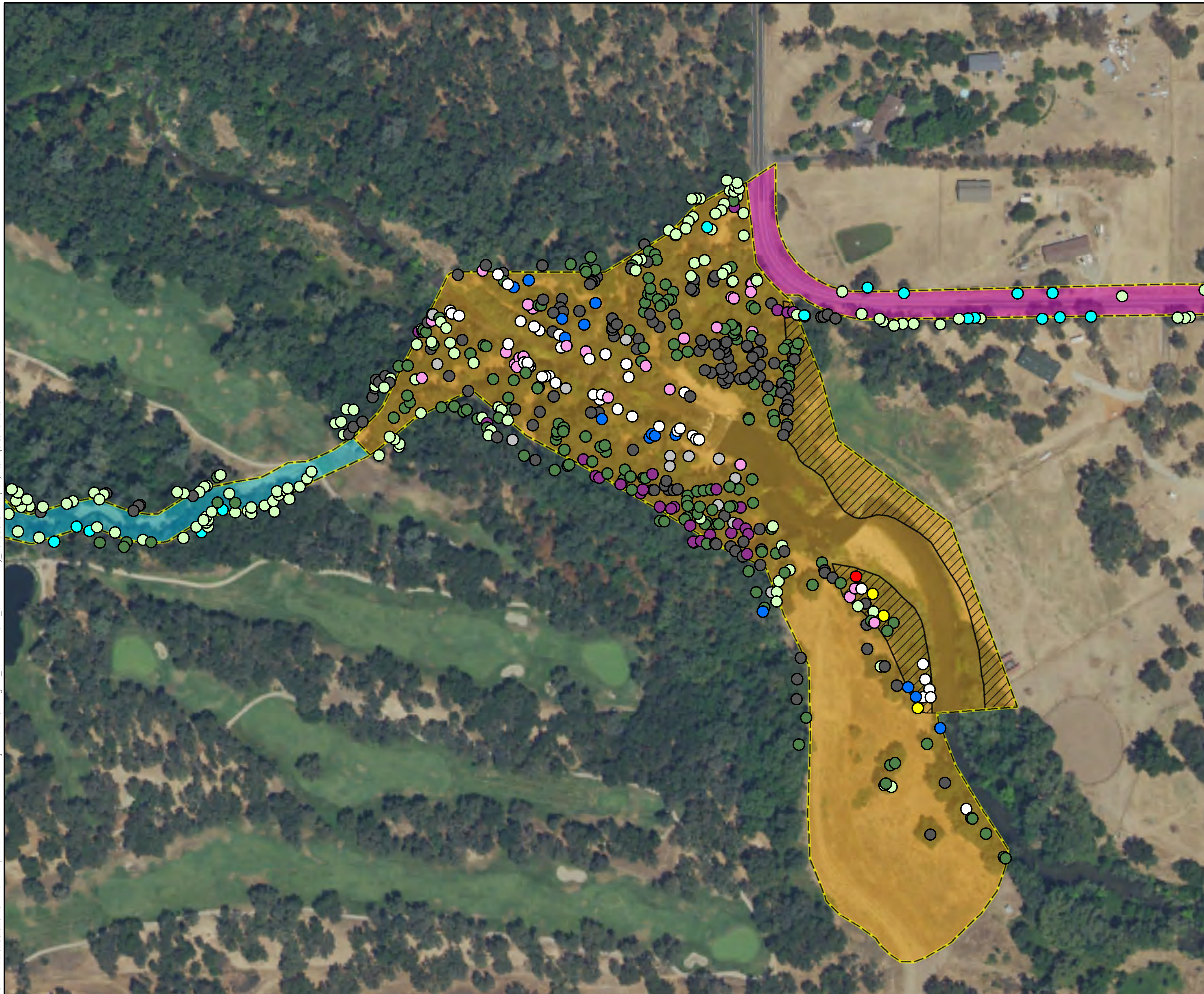

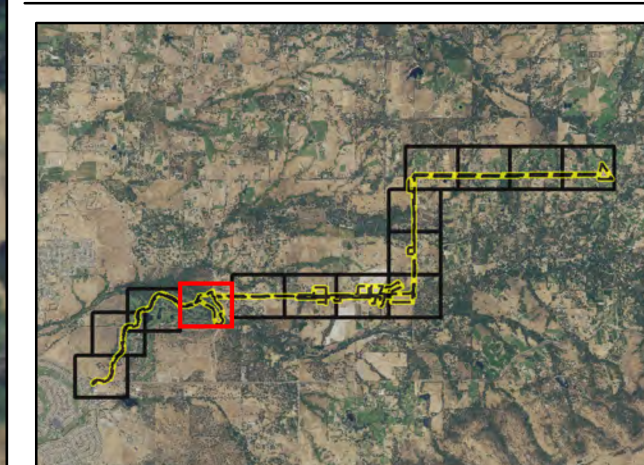

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Map Date: 10/20/2020

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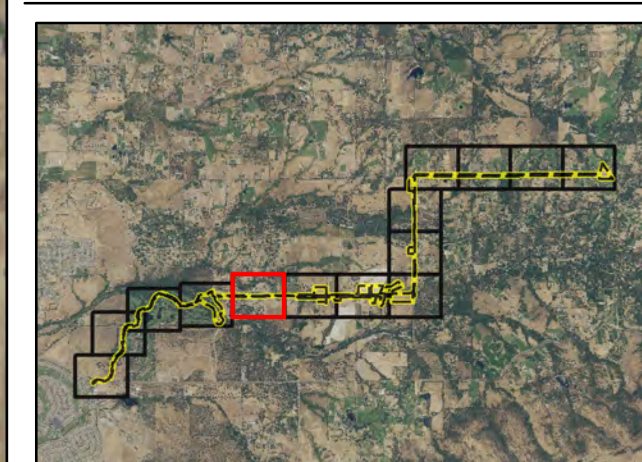

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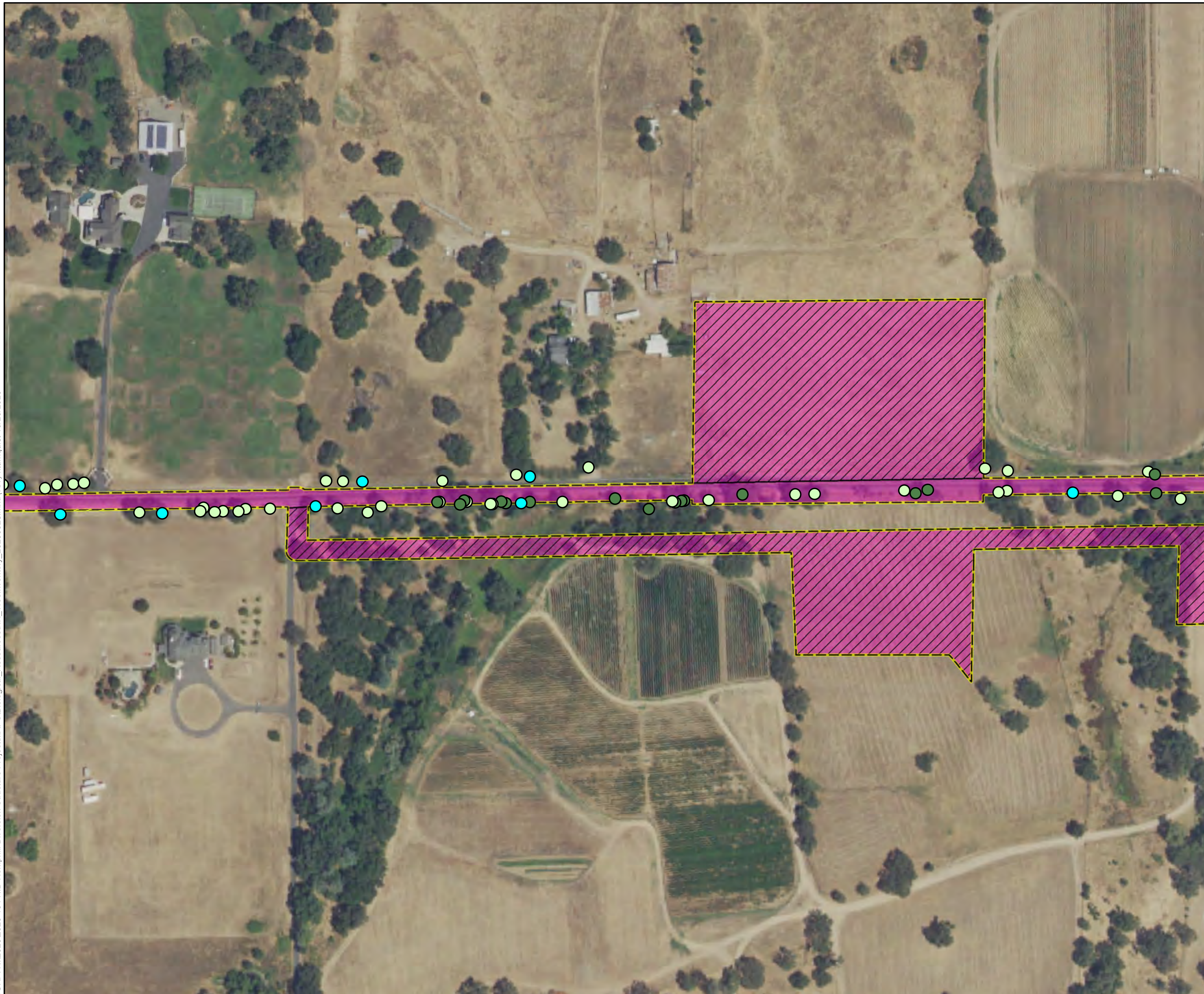
2020-104 NID-Hemphill Diversion Structure Project



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- Gooding's Black Willow - 16
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- Northern California Black Walnut - 163
- Oregon Ash - 14
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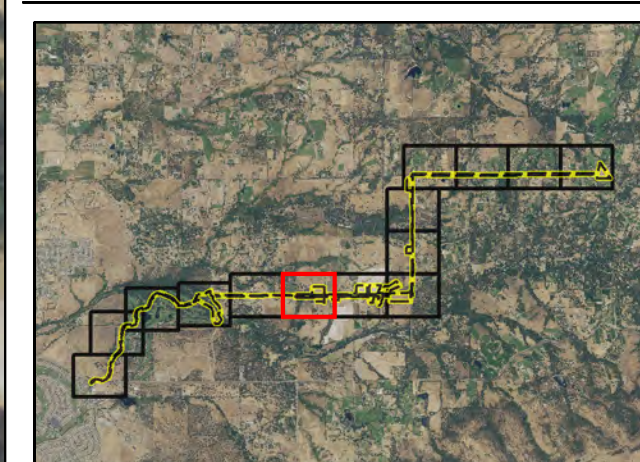
- Valley Oak - 395
- White Alder - 44

Sources: NAIP 2018



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Map Date: 10/20/2020

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Scale in Feet
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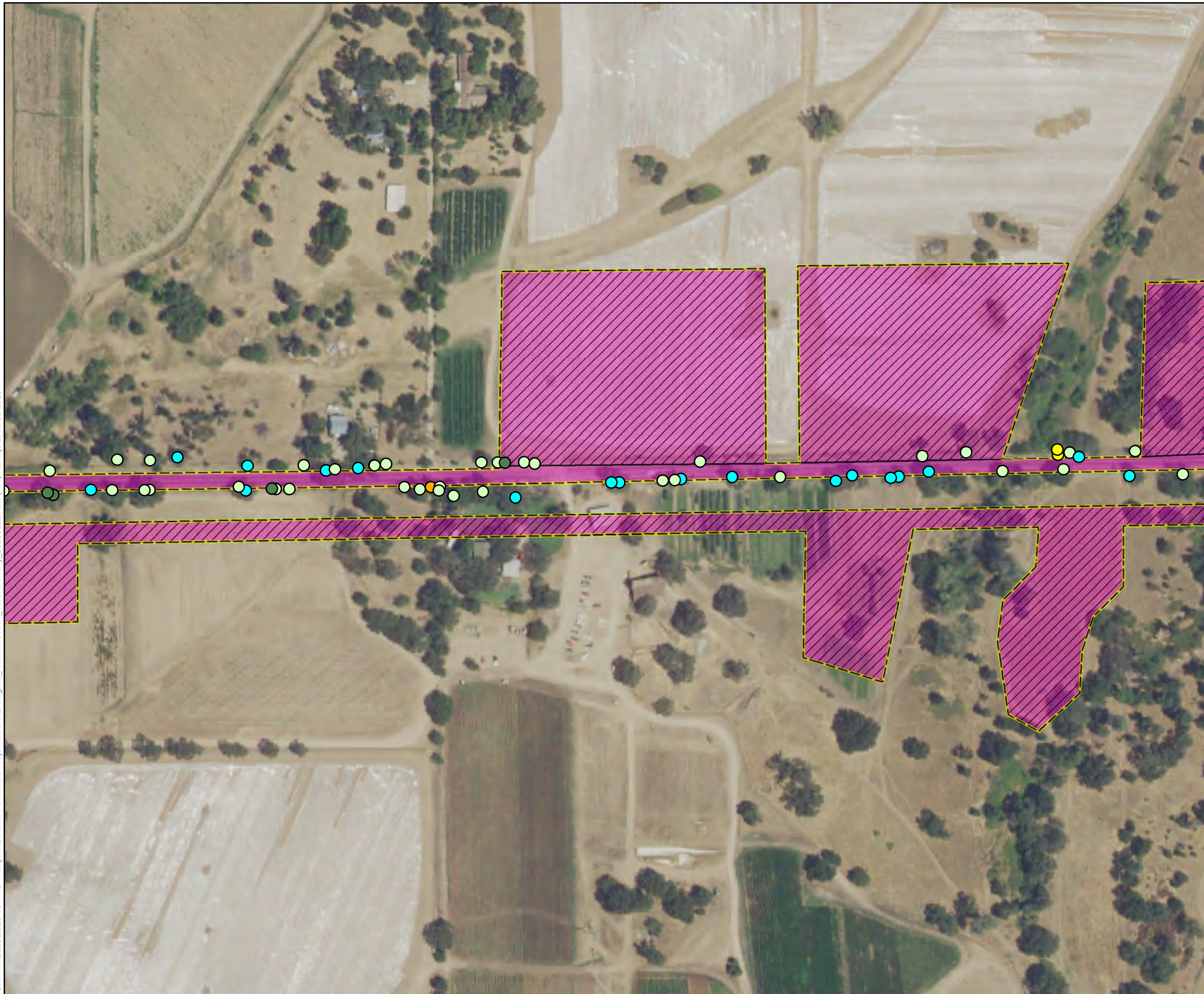
Attachment A. Tree Inventory of Hemphill Diversion Structure Removal Project

2020-104 NID-Hemphill Diversion Structure Project



Map Features

- Project Areas - 98.05 ac.
- Unable to access

Alternative Boundaries

- Alternative 4 - 9.9 ac.
- Alternative 3 - 73.3 ac.
- Alternatives 1 and 2 - 14.9 ac.

Tree Species

- American Sycamore - 2
- Arroyo Willow - 30
- Blue Oak - 216
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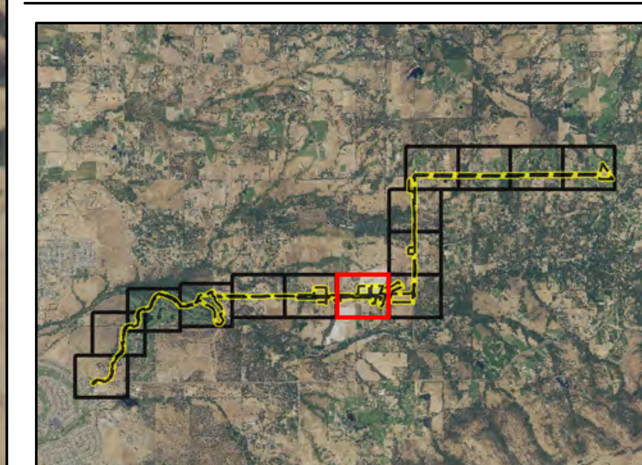

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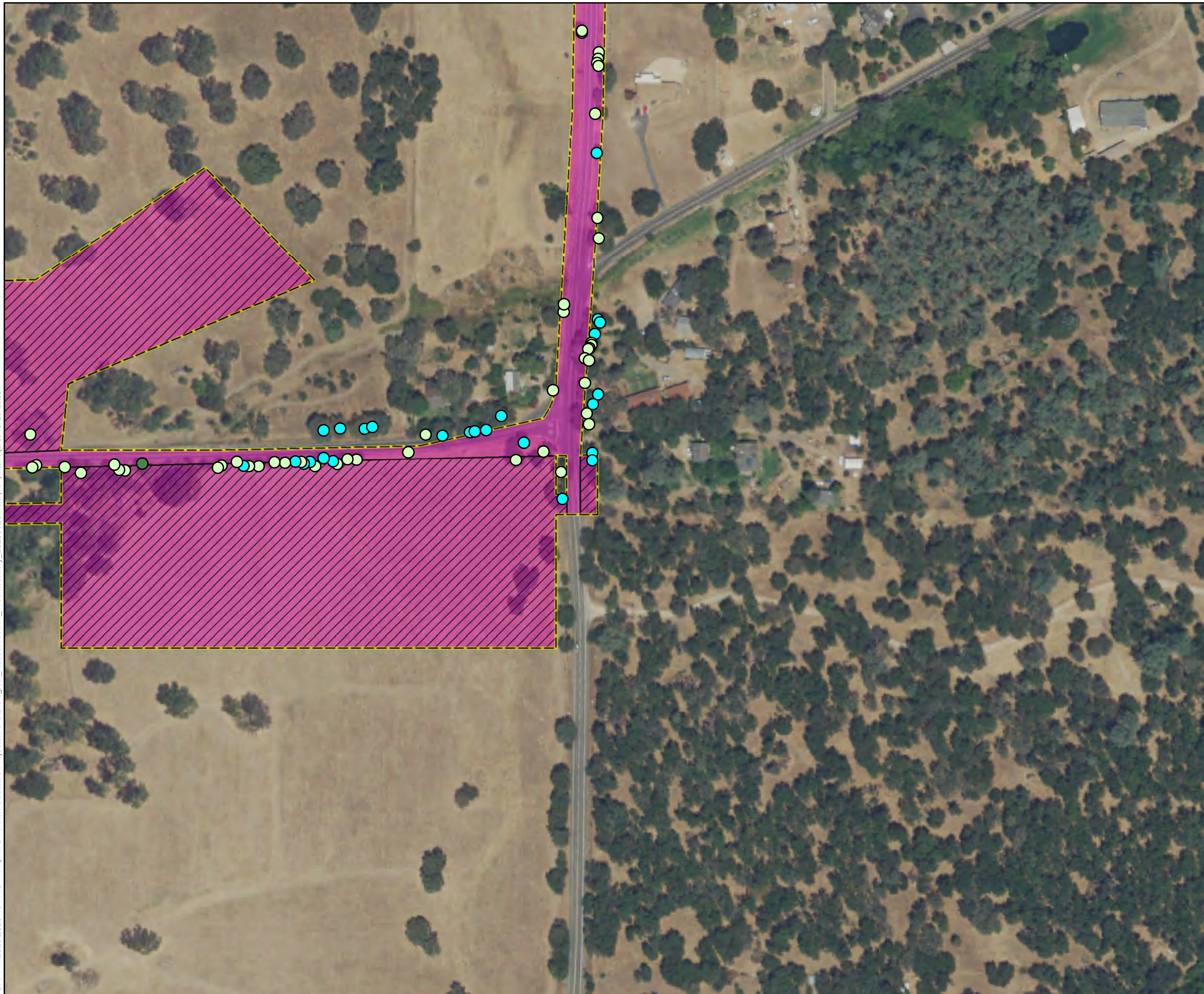

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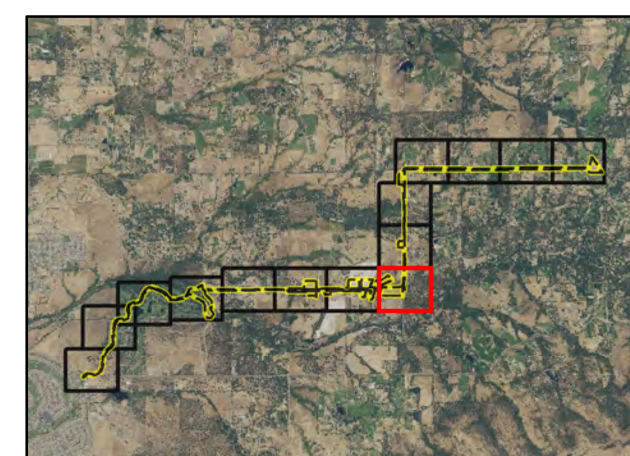

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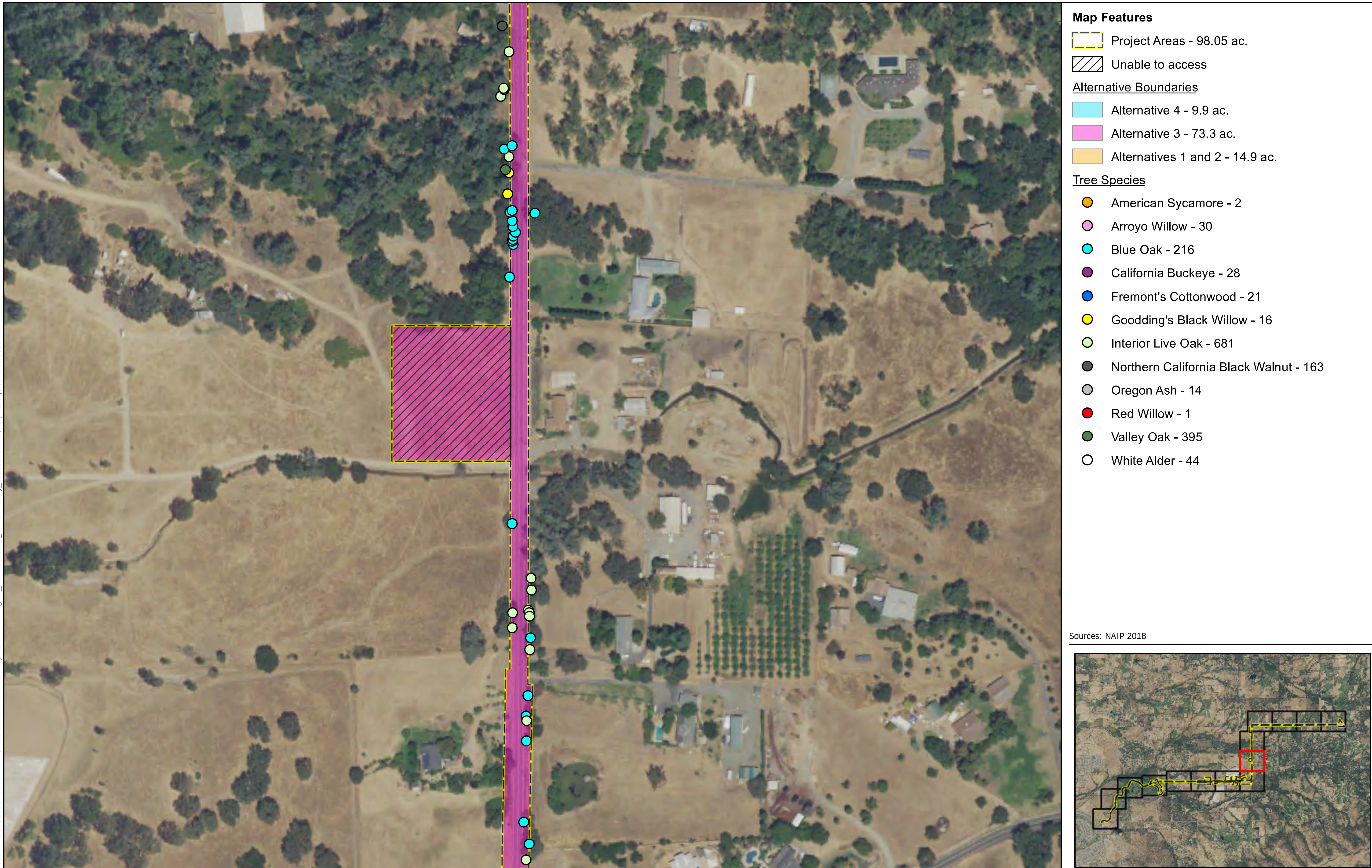

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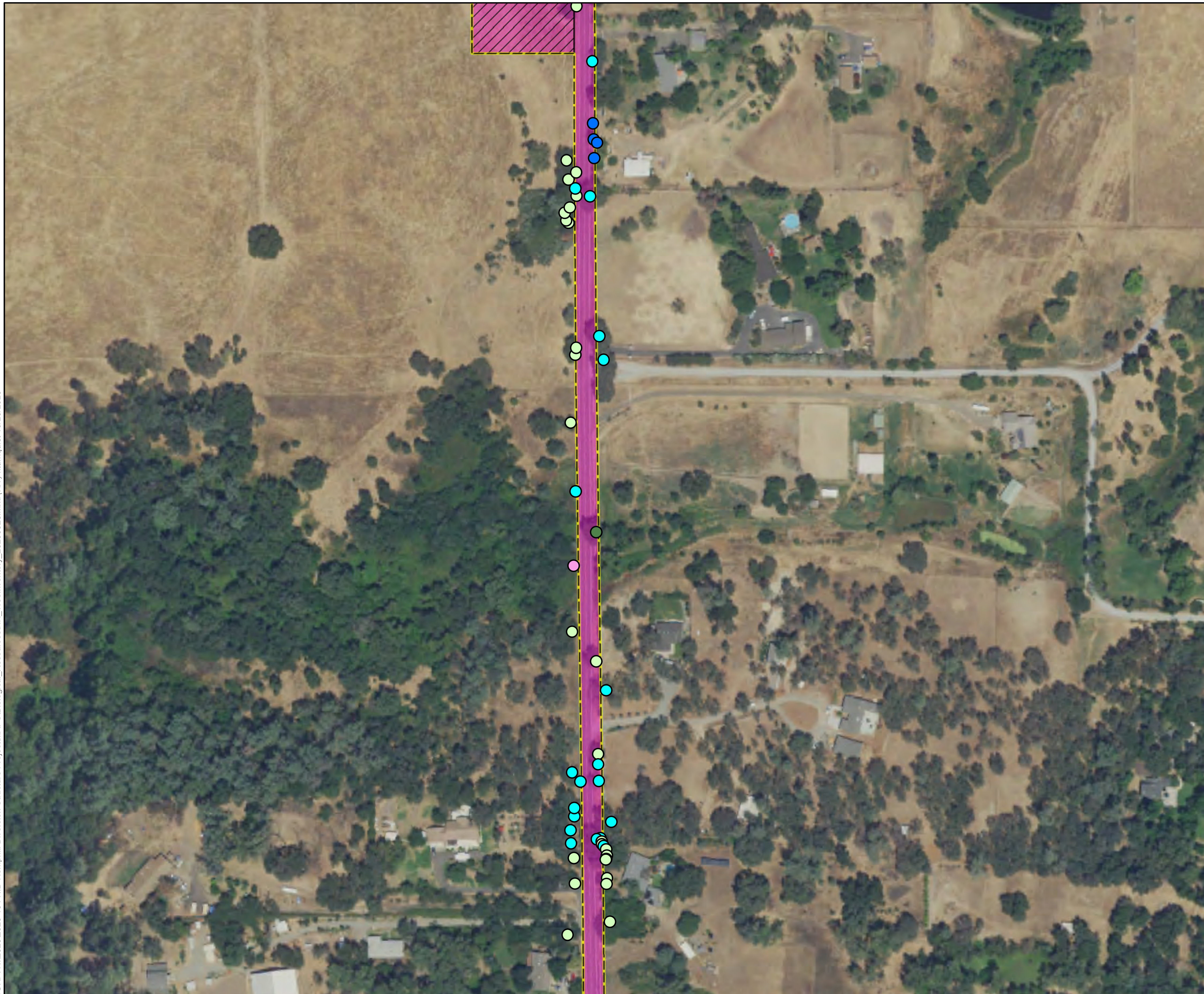

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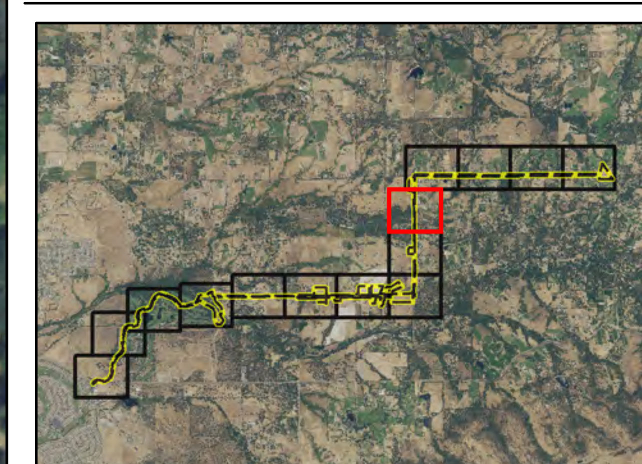

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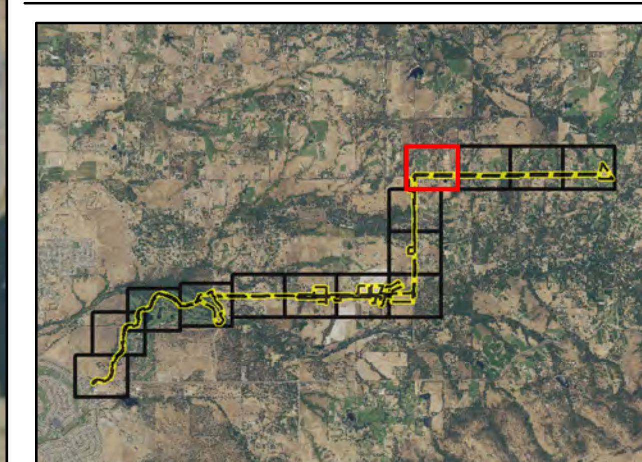

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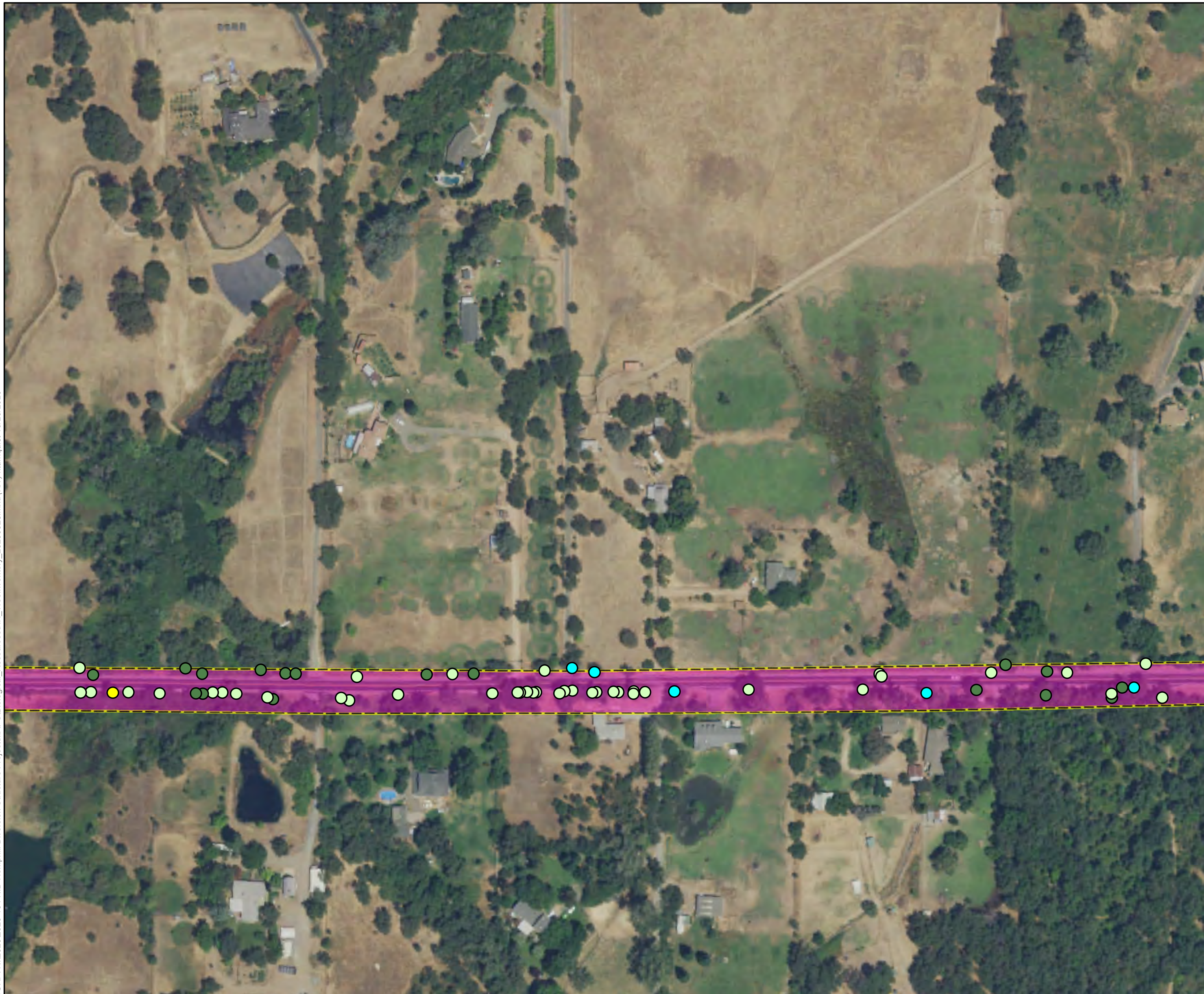

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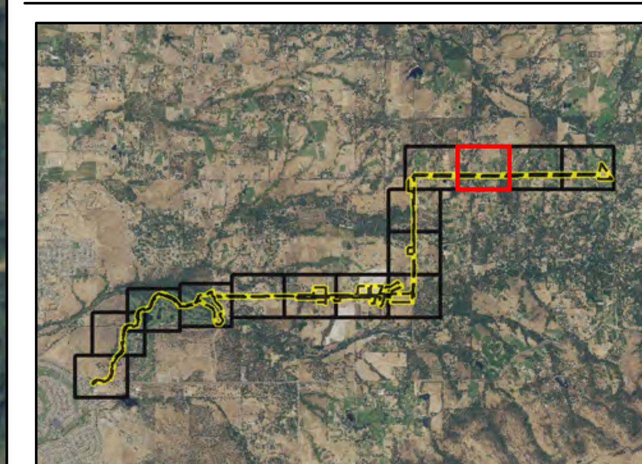

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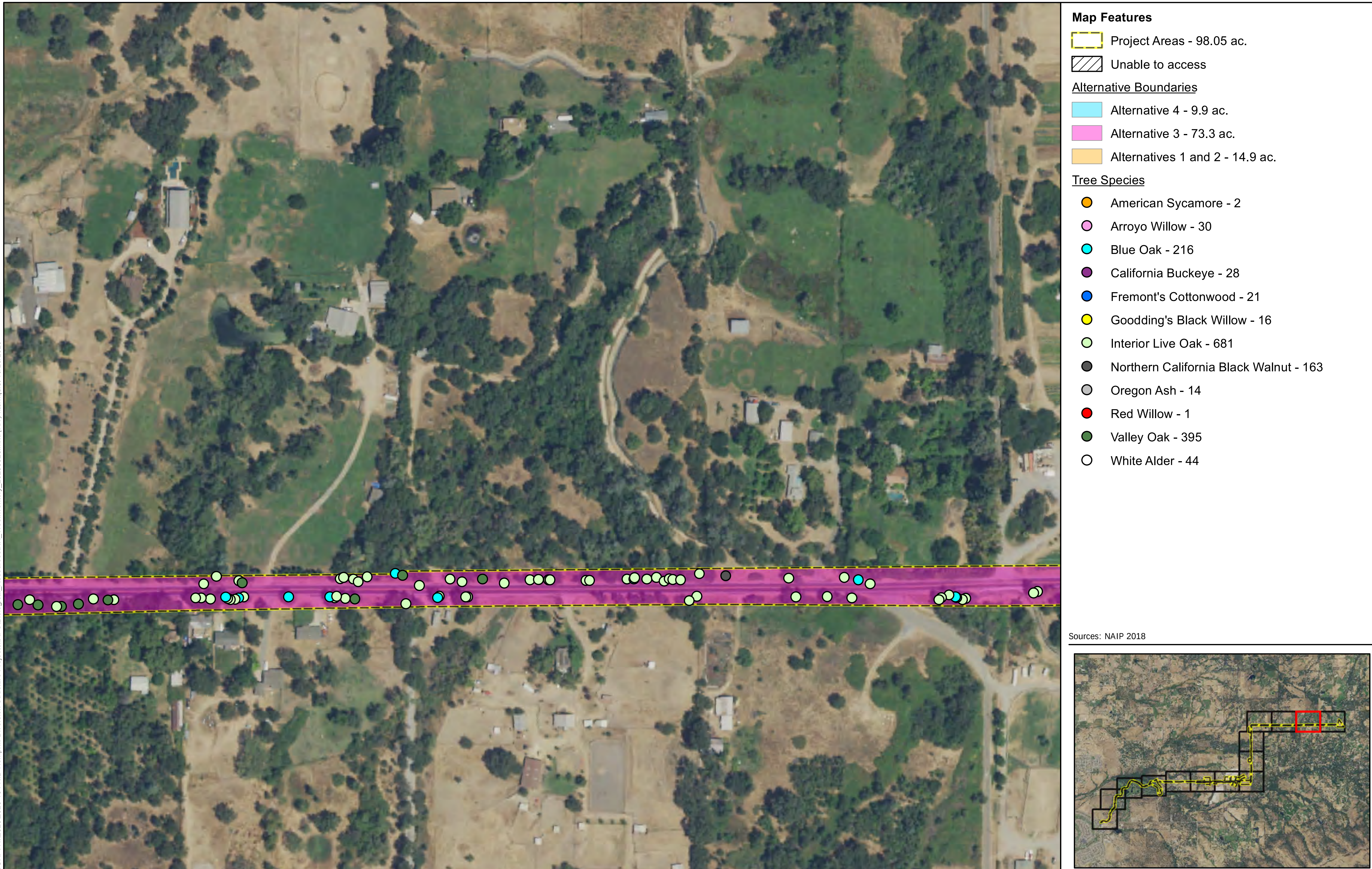

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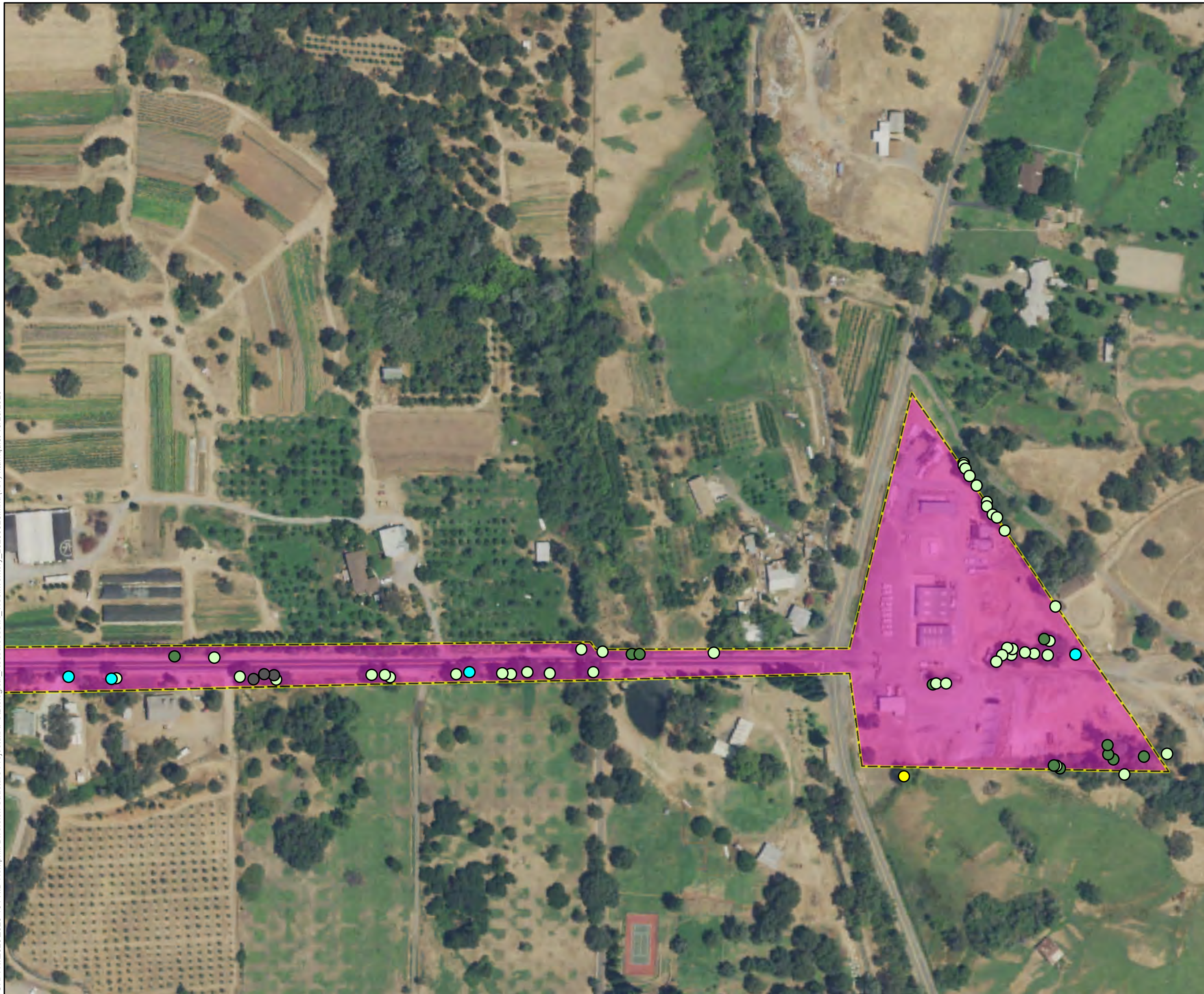
2020-104 NID-Hemphill Diversion Structure Project



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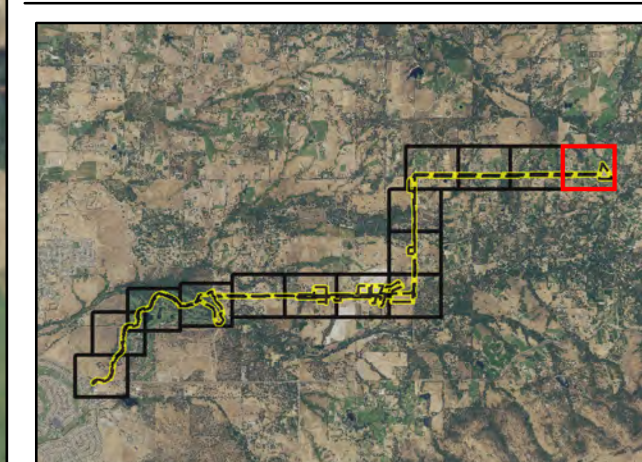

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Attachment A. Tree Inventory of Hemphill Diversion Structure Removal Project

2020-104 NID-Hemphill Diversion Structure Project

ATTACHMENT B

Representative Site Photographs

Photo 1. Hemphill Canal (view: northwest), August 18, 2020.

Photo 2. California buckeye overstory adjacent to Auburn Ravine (view: west), September 3, 2020.

Photo 3. Hemphill Canal (view: northwest), September 8, 2020.

Photo 4. Fowler Road (view: north), September 21, 2020.

ATTACHMENT C

Tree Survey Data (August and September 2020)

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Valley oak	*Quercus lobata*	557	24.5	1		21	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	1	15.5	2	7,8.5	19	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	558	21	1		25	Fair to Good	Fair to Poor		4
Valley oak	*Quercus lobata*	2	24.5	3	11,9,4.5	24	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	3	31.5	1		37	Fair	Fair		4
Blue oak	*Quercus douglasii*	4	16	1		24	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	5	7	1		6	Good	Fair to Good		4
Valley oak	*Quercus lobata*	6	16	1		20	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	7	14	1		20	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	8	13	1		20	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	9	12.5	1		28	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	10	21	1		24	Fair	Fair to Poor		4
Valley oak	*Quercus lobata*	11	11.5	1		17	Good	Fair to Good		4
Valley oak	*Quercus lobata*	12	12.5	1		20	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	13	61.5	3	18,20.5,23	40	Fair	Fair		4
Valley oak	*Quercus lobata*	475	23.5	1		30	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	16	15.5	1		27	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	322	22.5	1		21	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	321	24	2	12,12	30	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	320	14.5	1		35	Good	Fair		4
Blue oak	*Quercus douglasii*	319	18.5	1		21	Good	Fair		4
Blue oak	*Quercus douglasii*	314	18.5	1		27	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	313	27.5	1		32	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	312	11	1		21	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	17	12.5	2	6.5,6	13	Good	Fair to Good		4
Valley oak	*Quercus lobata*	18	70.5	4	26,13,12.5,19	35	Fair	Fair		4
Valley oak	*Quercus lobata*	273	42	2	21,21	33	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	19	36.5	3	14.5,8.5,13.5	43	Good	Fair to Good		4
Valley oak	*Quercus lobata*	270	12.5	1		37	Good	Fair to Good		4
Valley oak	*Quercus lobata*	267	45.5	3	23,6.5,16	30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	243	14	1		35	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	242	20.5	2	11,9.5	15	Fair to Poor	Fair to Good		4
Blue oak	*Quercus douglasii*	239	42	4	9.5,10,11.5,11	25	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	238	9	1		21	Fair	Fair		4
Valley oak	*Quercus lobata*	232	53.5	3	22.5,23.5,7.5	40	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	230	39	2	19.5,19.5	50	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	14	12	1		25	Poor	Fair		4
Valley oak	*Quercus lobata*	224	21	1		33	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	20	9	1		13	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	232	18.5	3	7,5.5,6	15	Good	Good		4
Valley oak	*Quercus lobata*	222	51	2	29,22	38	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	215	25.5	3	12.5,9.5,3.5	19	Good	Good		4
Blue oak	*Quercus douglasii*	21	24	1		35	Good	Fair		4
Blue oak	*Quercus douglasii*	213	19	1		25	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	196	28.5	2	17,11.5	25	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	195	9	1		20	Fair to Poor	Fair to Good		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Blue oak	*Quercus douglasii*	22	14	1		15	Fair to Good	Good		4
Blue oak	*Quercus douglasii*	193	9	1		15	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	23	9.5	1		12	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	24	9	1		12	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	25	35.5	3	15.5,9,11	28	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	190	36.5	3	14.5,12,10	33	Poor	Poor		4
Blue oak	*Quercus douglasii*	188	19.5	1		30	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	179	13.5	1		32	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	177	13	1		12	Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	26	23	2	13.5,9.5	30	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	27	11	1		12	Excellent	Fair to Good		4
Interior live oak	*Quercus wislizeni*	28	11.5	3	4,4,3.5	13	Fair	Good		4
Valley oak	*Quercus lobata*	173	30.5	1		45	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	171	22	1		32	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	168	23.5	1		37	Fair to Good	Fair		4
Blue oak	*Quercus douglasii*	167	28	1		35	Poor	Fair to Poor		4
Blue oak	*Quercus douglasii*	164	34	1		45	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	29	11.5	2	5.5,6	11	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	30	18.5	4	4.5,5,5,4	13	Fair to Good	Good		4
Valley oak	*Quercus lobata*	31	7	1		12	Fair	Good		4
Interior live oak	*Quercus wislizeni*	32	21	7	9,4.5,2.5,1.5,1,1,1.5	15	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	33	14	1		48	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	162	15	1		45	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	34	11	1		45	Fair to Poor	Fair to Good		4
Interior live oak	*Quercus wislizeni*	161	16	2	8,8	15	Poor	Fair		4
Blue oak	*Quercus douglasii*	160	34	2	20,14	45	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	156	16	1		27	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	35	16	1		40	Fair to Poor	Fair to Good		4
Valley oak	*Quercus lobata*	159	10	1		35	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	36	11	2	7,4	11	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	37	7	1		18	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	38	10	2	5,5	15	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	43	10	2	5.5,4.5	15	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	44	7.5	4	2.5,2.5,1.5,1	5	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	151	40.5	1		55	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	47	11.5	3	4.5,3.5,3.5	13	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	48	6.5	1		15	Fair	Fair to Poor		4
Blue oak	*Quercus douglasii*	149	17	1		35	Fair to Poor	Fair to Good		4
Interior live oak	*Quercus wislizeni*	628	16.5	1		45	Good	Fair to Good		4
Valley oak	*Quercus lobata*	630	24	1		50	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	148	23.5	1		40	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	52	20	3	7.5,5,7.5	15	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	53	9	1		25	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	54	16.5	1		25	Poor	Poor		4
Blue oak	*Quercus douglasii*	55	6	1		12	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	146	8	1		15	Good	Good		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Blue oak	*Quercus douglasii*	145	9	1		14	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	144	22.5	1		40	Fair to Good	Good		4
Blue oak	*Quercus douglasii*	56	7	1		8	Good	Good		4
Interior live oak	*Quercus wislizeni*	57	11	1		25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	58	9.5	1		25	Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	141	12	1		25	Good	Fair to Good		4
Valley oak	*Quercus lobata*	142	10	1		30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	143	18.5	2	6.5,12	25	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	59	19.5	2	14.5,5	33	Fair to Poor	Fair to Good		4
Valley oak	*Quercus lobata*	60	8	1		20	Fair to Good	Good		4
Valley oak	*Quercus lobata*	139	24	2	7,17	30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	137	13	1		25	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	136	21	1		45	Good	Good		4
Valley oak	*Quercus lobata*	61	7	1		15	Fair to Good	Good		4
Valley oak	*Quercus lobata*	182	10	1		50	Fair to Good	Good		4
Valley oak	*Quercus lobata*	133	20.5	2	14,6.5	40	Good	Good		4
Valley oak	*Quercus lobata*	62	6	1		25	Fair to Good	Good		4
Valley oak	*Quercus lobata*	134	8.5	1		15	Fair to Good	Good		4
Valley oak	*Quercus lobata*	130	13	1		40	Fair to Good	Good		4
Valley oak	*Quercus lobata*	63	10	1		40	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	64	6	1		16	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	129	21	1		45	Good	Fair to Good		4
Valley oak	*Quercus lobata*	126	10	1		30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	127	13	1		40	Good	Fair to Good		4
Valley oak	*Quercus lobata*	124	20.5	1		50	Good	Fair to Good		4
Valley oak	*Quercus lobata*	128	16.5	1		40	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	125	7	1		20	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	66	15	1		35	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	122	14	1		40	Poor	Fair to Poor		4
Blue oak	*Quercus douglasii*	121	38.5	2	10.5,28	45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	678	41	4	9,10,10,12	30	Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	67	10	1		30	Good	Fair to Good		4
Valley oak	*Quercus lobata*	118	44	1		50	Good	Fair		4
Valley oak	*Quercus lobata*	68	7	1		20	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	69	6.5	1		10	Good	Fair		4
Valley oak	*Quercus lobata*	70	6.5	1		12	Good	Good		4
Valley oak	*Quercus lobata*	71	13.5	1		45	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	72	36.5	3	7.5,17,12	45	Fair	Fair		4
Blue oak	*Quercus douglasii*	116	25.5	2	11.5,14	35	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	115	12	2	7,5	25	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	73	9.5	1		30	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	74	43.5	3	17,18.5,8	50	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	75	11.5	4	5.5,1,3,2	8	Fair	Fair to Poor		4
Blue oak	*Quercus douglasii*	No Tag	14	1		30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	76	40.5	4	8.5,6.5,9.5,16	45	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	6	1		20	Fair to Poor	Fair to Poor		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Valley oak	*Quercus lobata*	No Tag	34	1		40	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	77	9	1		15	Good	Good		4
Valley oak	*Quercus lobata*	78	7.5	1		13	Good	Good		4
Valley oak	*Quercus lobata*	106	26.5	1		35	Good	Good		4
Valley oak	*Quercus lobata*	107	22	1		30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	108	20	1		35	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	109	22.5	1		35	Fair	Fair		4
Valley oak	*Quercus lobata*	110	24.5	1		35	Fair	Fair		4
Valley oak	*Quercus lobata*	79	9.5	1		20	Fair to Good	Good		4
Valley oak	*Quercus lobata*	111	27	1		35	Fair	Fair		4
Valley oak	*Quercus lobata*	80	19	1		35	Fair	Fair		4
Valley oak	*Quercus lobata*	112	15.5	1		30	Fair	Fair		4
Blue oak	*Quercus douglasii*	113	29	1		30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	81	25	7	6,3.5,4,2.5,2,3.5,3.5	12	Good	Excellent		4
Valley oak	*Quercus lobata*	82	11	1		15	Fair to Good	Good		4
Valley oak	*Quercus lobata*	No Tag	7	1		13	Good	Good		4
Gooding's black willow	*Salix gooddingii*	No Tag	52	2	30,22	30	Fair to Poor	Fair		4
Gooding's black willow	*Salix gooddingii*	No Tag	7	1		15	Fair to Good	Fair to Good		4
Gooding's black willow	*Salix gooddingii*	No Tag	19	2	8,11	13	Poor	Fair to Poor		4
Gooding's black willow	*Salix gooddingii*	No Tag	8	1		9	Fair to Good	Good		4
Gooding's black willow	*Salix gooddingii*	No Tag	22	3	4,7,11	15	Fair	Fair to Good		4
Gooding's black willow	*Salix gooddingii*	No Tag	9	1		15	Fair	Fair		4
Gooding's black willow	*Salix gooddingii*	No Tag	33	4	10,6,10,7	18	Fair to Good	Good		4
Valley oak	*Quercus lobata*	83	67.5	1		44	Fair	Fair		4
Blue oak	*Quercus douglasii*	No Tag	15	1		22	Good	Good		4
Blue oak	*Quercus douglasii*	No Tag	16.5	1		16	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	8	1		14	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	8.5	1		22	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	18	1		28	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	28.5	1		30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	21	1		22	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	26.5	5	8,8,5,2.5,3	16	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		18	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	10	2	6,4	10	Fair to Good	Good		4
Valley oak	*Quercus lobata*	No Tag	26	1		20	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		30	Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	25	1		30	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	33	2	15,9,9	25	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	43.5	7	2,8,6.5,3,10,4.5,9.5	23	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11	3	5,3,3	23	Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	21.5	2	10,11.5	28	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	20	3	13,6,1	30	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	6	1		13	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10.6	1		20	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	15	1		28	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	13.5	3	4,6,3.5	10	Fair	Fair		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	15.5	3	7,5,3.5	12	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23	2	11.5,11.5	16	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	31	4	8.5,9,9,4.5	16	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23	1		25	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		25	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	2	6.5,1	6	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	20	1		24	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	30.5	4	4.5,4.5,19.5,2	30	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	3	5,4,3.5	7	Fair	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	9	1		10	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	19	1		25	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	No Tag	6	1		12	Fair to Poor	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		15	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	18	1		25	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13.5	1		13	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		16	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		18	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		10	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	16	1		18	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11	1		16	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	34.5	3	11.5,12.5,10.5	27	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	10	1		15	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	24.5	2	17.5,7	20	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	37.5	5	8.5,7,4,10,8	18	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	6	1		10	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	8	1		17	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	13	1		15	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	10.5	1		13	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	13	3	9,2,2	10	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	53.5	5	28.5,11,8,3,3	28	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16.5	2	12,4.5	13	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	14	1		18	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	7	2	6,1	8	Good	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	2	4.5,5.5	12	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	6	1		15	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	10	1		22	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		22	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	3	5,3,2	12	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	14	1		15	Good	Good		4
Valley oak	*Quercus lobata*	No Tag	38.5	3	18,10.5,10	28	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	8.5	1		28	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	45	4	11,3.5,7.5,23	30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	16	2	6,10	12	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	7	1		12	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	8	1		20	Poor	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	33	3	13,11,9	30	Fair	Fair		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	12	1		30	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	28.5	2	11.5,17	28	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	39	3	8.5,21,9.5	22	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	29	2	15.5,13.5	18	Fair to Good	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	10	1		22	Fair	Fair		4
Blue oak	*Quercus douglasii*	No Tag	19.5	1		20	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	34.5	3	12.5,16.5,5.5	25	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	42.5	1		41	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	52.5	2	27,25.5	38	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	11	4	5,3,2,1	12	Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	25.5	2	12.5,13	22	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	9	1		11	Fair to Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	10.5	1		15	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	9	1		12	Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	8	1		12	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	21	1		32	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	12	1		35	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	6.5	1		10	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	8.5	1		14	Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	15	1		17	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	15.5	1		38	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	17	1		25	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13	1		35	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	9	1		18	Fair	Fair		4
Blue oak	*Quercus douglasii*	No Tag	9	1		12	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		20	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		20	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	49	3	19,14,16	25	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	25.5	2	12,13.5	20	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		28	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	22	9	4,2,1,2,3.5,4,1,1.5,3	15	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	16	3	3,2,11	18	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	9	2	5,4	15	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	24	2	10,14	27	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		22	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	21	1		30	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	11	1		13	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	17.5	1		35	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	24	1		22	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	7	1		12	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		20	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	18.5	1		15	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	23	9	3,4,4,6,1,1,2,1,1	15	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	2	3,7	18	Fair to Good	Fair to Good		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	18	3	10.5,6,1.5	12	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	24.5	6	4,6.5,7,1,1,5	18	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	45.5	14	2,1,7,3,6,2,2,3,3,7.5,2,2.5,1, 3.5	18	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	8	1		18	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	24.5	7	5.5,4,8.5,1.5,1,3,1	15	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	18.5	1		25	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23.5	1		8	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	9	1		30	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	16	6	9,3,1,1,1,1	25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	31	2	17,14	45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		20	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	9	2	6.5,2.5	18	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	2	6,1.5	12	Fair to Poor	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	6	1		10	Fair to Poor	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	2	6.5,1	15	Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	10	1		18	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	32	2	14,18	35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11	1		25	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	11	1		22	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	16	2	7,9	20	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	16.5	1		30	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12	2	5,7	30	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	14	3	6,4,4	25	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	21	2	11,10	35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10.5	1		18	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	40.5	3	9,15,16.5	28	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	25.5	2	16,9.5	30	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	30.5	4	11.5,6,5.5,7.5	30	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		25	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	25.5	2	17.5,8	38	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	42	4	10,11,13,8	33	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		23	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	23	1		15	Poor	Poor		4
Blue oak	*Quercus douglasii*	No Tag	23	2	14,9	40	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	29	2	16,13	40	Fair to Poor	Fair		4
Blue oak	*Quercus douglasii*	No Tag	13	1		35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	23.5	3	14,7.5,2	40	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	23.5	1		40	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	36.5	2	22,14.5	40	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	25	1		32	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	28.5	4	10.5,14.5,2.5,1	22	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	42	4	21.5,2.5,3,15	38	Fair to Good	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	32.5	2	14,8.5	40	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11	2	5.5,5.5	22	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	20	3	6,7,7	26	Fair to Poor	Fair		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	102	13	9.5,6,12,14,3.5,8.5,3.5,5,14, 9.5,5,6,5.5	50	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	11	1		43	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	29	4	9,7.5,7,5.5	25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	21	4	5,5.5,7,3.5	30	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	6	1		15	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	14.5	2	7.5,7	40	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	47.5	5	9,5.5,13,6,14	40	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	6	1		10	Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	13	1		33	Fair to Poor	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	29	4	7.5,7.5,9.5,4.5	40	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	15	1		35	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	1		20	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	59.5	8	8.5,11,9.5,6.5,5.5,5.5,5,8	35	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	18	2	10,8	25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	22	2	12,10	40	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	1		35	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	19	3	8,5,6	30	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	32	6	2.5,9,3.5,5.5,8,3.5	28	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		32	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	11	2	6.5,4.5	15	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12	2	4,8	35	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16.5	1		20	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	39	7	2.5,5,5,8.5,9.5,7,1.5	35	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	17	7	2,2,1,2,3,6,1	12	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	16.5	5	6,4,1,3,2.5	12	Fair to Poor	Good		4
Valley oak	*Quercus lobata*	No Tag	35	1		45	Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	55	10	5.5,4.5,3,6.5,4,4.5,6,8,6,7	30	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	8	1		40	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	6	1		35	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	39.5	5	6,3,12.5,5,13	30	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	15	1		35	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		25	Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	49	4	9,10,14,16	45	Fair	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	25.5	2	11.5,14	35	Fair	Excellent		4
Northern California black walnut	*Juglans hindsii*	No Tag	16	1		35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		30	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	13.5	1		25	Fair to Poor	Fair to Poor		4
Northern California black walnut	*Juglans hindsii*	No Tag	14.5	2	8,6.5	25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	37	3	13.5,16,7.5	40	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	20	2	9.5,10.5	10	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		40	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		10	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	27	1		12	Good	Fair to Poor		4
Northern California black walnut	*Juglans hindsii*	No Tag	14	1		45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	29	3	11,13.5,4.5	40	Fair	Fair		4

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Interior live oak	*Quercus wislizeni*	No Tag	6	1		30	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	6.5	1		30	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	10.5	1		30	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	11	1		50	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	16.5	2	7,9.5	40	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		40	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	7	1		35	Fair to Poor	Fair		4
Northern California black walnut	*Juglans hindsii*	No Tag	28.5	2	7.5,11	25	Poor	Fair to Poor		4
Northern California black walnut	*Juglans hindsii*	No Tag	19.5	2	11,8.5	25	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	27.5	3	12.5,7.5,7.5	45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	25	2	13,12	40	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	40.5	3	13.5,15,12	50	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	10	1		50	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	33.5	3	11,8,14.5	50	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	39.5	2	12.5,27	55	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	40	3	13,18.5,8.5	40	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16	2	10,6	45	Fair to Poor	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	27	2	12,15	45	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		35	Fair to Poor	Fair		4
Northern California black walnut	*Juglans hindsii*	No Tag	13	3	6,3,4	20	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	12	1		25	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	22	1		45	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	21	1		40	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	32	1		50	Fair to Good	Fair		4
Northern California black walnut	*Juglans hindsii*	No Tag	18	4	6,2.5,5.5,4	20	Fair to Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	25	1		45	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	24.5	1		45	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	20.5	1		50	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	24	1		60	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	15.5	1		45	Fair	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	12	2	5,7	15	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	8	1		10	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	26	1		55	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	21.5	1		60	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	13	1		40	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	25.5	1		50	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	26	1		50	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	26	1		55	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	22.5	1		45	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	15	1		32	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	19	1		50	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	22	1		40	Fair to Good	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	16	1		50	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	15	1		40	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	15	1		50	Fair	Fair		4

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Valley oak	*Quercus lobata*	No Tag	6	1		25	Fair to Good	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	18	1		53	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	17.5	1		50	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	23	1		55	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	12	1		10	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	15	1		50	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13.5	2	6.5,7	22	Fair	Fair to Poor		4
Northern California black walnut	*Juglans hindsii*	No Tag	7	1		13	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	10	1		55	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	18	1		50	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	3002	49.5	6	21.5,8,6,3.5,5,5.5	33	Good	Good		1 and 2, 4
Interior live oak	*Quercus wislizeni*	3003	10	1		25	Fair to Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3004	17.5	1		12	Poor	Fair to Poor	Broken top 12 ft from ground	1 and 2
Interior live oak	*Quercus wislizeni*	3005	12	1		25	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3006	16	2	14,2	35	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3007	19.5	1		45	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3008	38	2	22.5,15.5	45	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3009	28	1		35	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3010	18	1		40	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3011	15	1		30	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3012	36.5	2	20,16.5	35	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3013	13.5	1		26	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3014	12.5	1		40	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3015	28	1		27	Fair to Poor	Fair to Poor	Canopy die back & large broken leaders	1 and 2
Valley oak	*Quercus lobata*	3016	21	1		40	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3017	6	1		15	Fair	Fair	Sucker sprouts, thin canopy	1 and 2
California buckeye	*Aesculus californica*	3018	26.5	5	7,1,13,1.5,4	23	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3018	40	1		52	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3020	16	1		30	Fair	Fair to Poor	Multiple rotting stems	1 and 2
Interior live oak	*Quercus wislizeni*	3021	11	1		40	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3022	17	1		40	Fair to Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3023	27	2	14.5,12.5	20	Fair	Fair	1 stem broken @ 18 ft	1 and 2
Valley oak	*Quercus lobata*	3024	35	1		35	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3025	6	1		15	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	9.5	1		15	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3026	14	1		30	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3027	31	1		35	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3028	27	5	5,5,5,6,6	25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3029	24	1		40	Fair	Fair to Good	Soil washed out from most roots	1 and 2
California buckeye	*Aesculus californica*	3030	13.5	2	8,5.5	15	Good	Good		1 and 2
California buckeye	*Aesculus californica*	3031	11.5	2	5,6.5	20	Poor	Fair	Strong lean	1 and 2
Valley oak	*Quercus lobata*	3032	11	1		35	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3033	43.5	2	30,13.5	45	Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3034	18	5	3.5,4,3,3,4.5	16	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3035	35	1		40	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3036	26	1		35	Good	Fair to Good		1 and 2

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Valley oak	*Quercus lobata*	3037	21	1		32	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3038	22.5	1		55	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3039	15.5	4	4,4.5,4,3	12	Fair to Good	Good		1 and 2
California buckeye	*Aesculus californica*	3040	6.5	1		30	Fair to Good	Fair	Strong lean	1 and 2
Northern California black walnut	*Juglans hindsii*	3041	8	1		18	Fair	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3042	78	8	9.5,3.5,15.5,15.5,17.5,6,1,9.5	25	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3043	20	1		40	Fair	Fair		1 and 2
California buckeye	*Aesculus californica*	3044	20	3	11,3.5,5.5	22	Fair to Poor	Fair		1 and 2
California buckeye	*Aesculus californica*	3045	19	4	3.5,6.5,6,3	18	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3046	27	1		45	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3047	32	1		35	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3048	13.5	2	6.5,7	12	Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3049	7.5	1		16	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3050	10	2	5,5	13	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3051	7	1		13	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3052	10	1		25	Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	3053	21	2	10,11	25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3054	15.5	1		15	Fair to Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3055	11	1		30	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3056	16	1		40	Fair	Fair		1 and 2
California buckeye	*Aesculus californica*	3057	11	2	8.5,2.5	17	Fair	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3058	13	4	6.5,4.5,1,1	15	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3059	21.5	1		45	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3060	16	1		30	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3061	21	1		35	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3062	15.5	5	4,3.5,3.5,1.5,3	13	Good	Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3063	19.5	1		15	Poor	Poor	Rotten, leaning, broken top 14 ft from ground	1 and 2
Valley oak	*Quercus lobata*	3064	13	1		25	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3065	11	1		24	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	18	1		45	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3067	11.5	1		28	Fair	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3068	17	5	10,3.5,1.5,1,1	18	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3039	15.5	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3070	33	2	13,20	30	Fair	Fair to Poor	Larger stem rotten 27 ft up with cavity	1 and 2
Interior live oak	*Quercus wislizeni*	3071	6.5	1		10	Fair	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3072	21.5	2	10,11.5	25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3073	14	1		28	Good	Fair	Sucker sprouts	1 and 2
Valley oak	*Quercus lobata*	3074	42.5	3	17.5,8,17	50	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3075	20.5	1		23	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3076	12.5	2	7,5.5	16	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3077	11	1		27	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3078	10.5	2	5,5.5	15	Fair	Fair		1 and 2
California buckeye	*Aesculus californica*	3079	9	1		12	Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3080	16.5	1		35	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3080	27.5	1		30	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3082	6.5	1		12	Fair	Fair		1 and 2

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California buckeye	*Aesculus californica*	3083	34.5	4	11,12,9.5,2	22	Good	Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3084	29	3	17.5,7,4.5	25	Fair to Good	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	3085	30	17	3,1.5,4,1,1.5,1,3,1,2,3,1,1,3,1, 1,1,1	13	Poor	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	18	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3086	31.5	1		40	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3087	25.5	1		20	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3088	31.5	8	11,9,4,1.5,2.5,1,1.5,1	20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3089	10.5	1		14	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3090	14	1		22	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3091	9.5	1		11	Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3092	26.5	1		33	Fair to Poor	Fair to Poor	Sucker sprouts, large broken limbs	1 and 2
California buckeye	*Aesculus californica*	3093	25	4	7,1,8.5,8.5	15	Fair to Good	Fair to Poor		1 and 2
California buckeye	*Aesculus californica*	3094	30.5	4	12.5,4,5.5,8.5	16	Fair to Good	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3095	12	2	10.5,1.5	26	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3096	12.5	2	7.5,5	13	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3097	6.5	1		12	Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3098	6	1		12	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3101	9.5	1		14	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3102	25	3	12.5,6.5,6	16	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3103	19.5	1		30	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3104	11	1		20	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3105	12	1		20	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3106	10	1		20	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3107	15.5	1		25	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3108	10	1		15	Fair	Fair		1 and 2
California buckeye	*Aesculus californica*	3109	15	7	2.5,2,3,2.5,1.5,2,1.5	15	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3110	27	1		30	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	4406	37	1		35	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3111	15.5	1		36	Fair	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	3112	47.5	1		35	Fair to Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3113	22	1		37	Poor	Fair to Poor	Above dbh as tree is laying on ground	1 and 2
Interior live oak	*Quercus wislizeni*	3114	16.5	1		35	Fair	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3115	25	1		28	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3116	31	2	23.5,7.5	17	Fair	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3117	32.5	1		30	Fair to Poor	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3118	22	1		20	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3119	17.5	2	8.5,9	23	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3120	10.5	1		25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3121	26.5	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	7.5	1		10	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3122	6.5	1		8	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3123	13	1		18	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	8.5	1		12	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	14	1		15	Fair	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	13.5	5	3,3,3,2.5,2	15	Good	Good		1 and 2

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Arroyo willow	*Salix lasiolepis*	No Tag	6	1		20	Poor	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	15	4	4,4,3,4	13	Fair	Fair to Good		1 and 2
Red willow	*Salix lasiolepis*	No Tag	17	2	9,8	23	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	10	1		14	Fair to Good	Fair to Good		1 and 2
Gooding's black willow	*Salix gooddingii*	No Tag	10	1		15	Good	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	7	1		17	Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	No Tag	9	1		20	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	No Tag	8	1		23	Poor	Fair	Strong lean	1 and 2
Northern California black walnut	*Juglans hindsii*	3124	25	1		28	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3125	6	1		18	Fair	Fair		1 and 2
Gooding's black willow	*Salix gooddingii*	No Tag	11	1		20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	7.5	1		20	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	9	1		20	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3126	35	8	7,3,4.5,2.5,4,4.5,3,6.5	22	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3128	25	1		18	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3129	11.5	1		26	Fair to Poor	Fair to Poor	Strong lean	1 and 2
Northern California black walnut	*Juglans hindsii*	3130	40.5	2	21.5,19	20	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	17	2	7,10	16	Fair to Good	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	10	1		12	Fair to Good	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	14	2	7,7	10	Fair	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	22	3	8,6,8	10	Fair	Fair		1 and 2
Gooding's black willow	*Salix gooddingii*	No Tag	16	2	10,6	15	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3131	24	1		22	Fair to Good	Fair to Good		1 and 2
Freemont's cottonwood	*Populus fremontii*	3132	77.5	3	50,9.5,18	45	Fair	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	3133	61.5	3	45.5,3,13	35	Fair	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	No Tag	50	1		20	Poor	Fair to Poor	Broken top	1 and 2
White alder	*Alnus rhombifolia*	No Tag	6.5	1		12	Fair to Good	Good		1 and 2
Valley oak	*Quercus lobata*	3134	22	2	10.5,11.5	18	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3135	55	1		30	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3136	51.5	2	23,28.5	30	Fair to Good	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	25	2	15,10	14	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3137	33.5	2	32,11.5	50	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3138	29	1		45	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	21	1		40	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3139	27.5	1		40	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	9	1		30	Fair to Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3140	20.5	4	5.5,3,5,7	15	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3141	14.5	2	9.5,5	17	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3142	26	1		23	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3143	22	1		25	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3144	18.5	1		35	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3145	28.5	1		28	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3146	13.5	1		32	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3147	35	2	17,18	30	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3148	37	1		30	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3149	32	1		25	Fair	Fair to Poor		1 and 2

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Interior live oak	*Quercus wislizeni*	3150	21.5	5	9,1.5,7,1,3	17	Fair	Fair to Good		1 and 2, 4
Northern California black walnut	*Juglans hindsii*	3151	19	2	8.5,10.5	20	Fair to Good	Fair to Good		1 and 2, 4
Northern California black walnut	*Juglans hindsii*	3152	16.5	1		12	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3153	37	3	12.5,12,12.5	22	Fair to Poor	Fair to Poor		1 and 2, 4
Interior live oak	*Quercus wislizeni*	3154	18	1		24	Fair	Fair to Good		1 and 2, 4
Interior live oak	*Quercus wislizeni*	3155	24.5	4	11,5,5.5,3	12	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3156	51.5	4	16,12,4.5,19	30	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3157	13	1		18	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3158	22.5	2	15,7.5	33	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3159	8.5	1		20	Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3160	11.5	1		33	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3161	14	1		35	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3162	15.5	1		40	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3163	16	1		25	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3164	15.5	1		20	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3165	23	2	11,12	23	Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3166	28.5	3	5.5,12.5,10.5	30	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3165	9.5	1		20	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3168	15.5	1		20	Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3169	50	3	28,5,17	30	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3170	47	3	9.5,28.5,9	30	Fair to Poor	Fair to Poor		1 and 2
Oregon ash	*Fraxinus latifolia*	3171	6	1		10	Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3172	48.5	4	18.5,6.5,8.5,15	25	Fair	Fair		1 and 2
California buckeye	*Aesculus californica*	3173	11	2	5,6	15	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3173	7	1		25	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3175	22.5	1		35	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3176	26	1		35	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3177	19.5	2	15,4.5	15	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3178	12	1		25	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3179	13.5	2	1.5,12	25	Poor	Poor		1 and 2
Oregon ash	*Fraxinus latifolia*	3180	7	1		20	Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3181	15.5	2	8,7.5	15	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3182	23.5	1		20	Fair	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3183	22	2	12,10	20	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3184	7.5	1		15	Fair	Good		1 and 2
White alder	*Alnus rhombifolia*	3185	7.5	1		10	Good	Good		1 and 2
White alder	*Alnus rhombifolia*	3186	16.5	2	9.5,7	15	Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3187	15	2	12,3	15	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3188	19	4	4,2.5,6,6.5	20	Fair to Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3189	26.5	2	16,10.5	25	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3190	57.5	7	16,4,5.5,7.5,4.5,11,9	35	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3191	8	1		20	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3192	16	1		40	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3193	28.5	3	14,8,6.5	25	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3194	43	1		32	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	15.5	2	11.5,4	25	Fair	Fair to Good		1 and 2

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Valley oak	*Quercus lobata*	3196	15.5	1		25	Fair	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3197	12.5	2	8.5,4	15	Fair	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3198	22	1		20	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3199	32.5	3	13,10.5,9	30	Fair to Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	3200	8.5	1		11	Good	Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3201	14	2	7.5,6.5	15	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3202	11.5	1		32	Poor	Fair to Poor	Laying across creek	1 and 2
Arroyo willow	*Salix lasiolepis*	3203	16	2	9.5,6.5	18	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	22	2	14,8	30	Fair to Good	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	13.5	2	9,4.5	15	Fair	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	3204	8	1		18	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3205	8.5	1		10	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3206	15	3	6,4,5	15	Good	Good		1 and 2
White alder	*Alnus rhombifolia*	3207	8	1		10	Good	Good		1 and 2
White alder	*Alnus rhombifolia*	3208	24	3	2,10,12	20	Fair to Good	Good		1 and 2
White alder	*Alnus rhombifolia*	3209	8.5	1		10	Fair	Good		1 and 2
Valley oak	*Quercus lobata*	3210	17	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3211	8	1		15	Fair to Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3212	33	1		45	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3213	35	1		35	Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3214	13	1		15	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3215	8.5	1		25	Fair to Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	3216	23	1		30	Fair to Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3217	6.5	1		5	Fair to Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3218	8	1		16	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3219	6.5	1		10	Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3220	8.5	1		10	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3221	12	1		12	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3222	22.5	3	4.5,8,10	18	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3223	23	1		22	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3224	16	2	12,4	25	Fair to Good	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3225	26	3	13,5,8	25	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3226	14	1		20	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3227	24.5	2	12.5,12	25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3228	22	1		42	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3229	6	1		10	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3230	19	1		35	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3231	29.5	1		35	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3232	7	1		10	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3233	8	1		5	Fair to Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3234	25.5	2	16.5,9	25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3235	24	1		25	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3236	34	1		40	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3237	17.5	1		15	Fair	Fair to Good		1 and 2
Freemont's cottonwood	*Populus fremontii*	3238	42	1		30	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3239	8	1		20	Good	Good		1 and 2

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White alder	*Alnus rhombifolia*	3240	15	1		20	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	20	1		20	Fair to Poor	Fair		1 and 2
White alder	*Alnus rhombifolia*	3241	25	3	5,12,8	20	Fair to Poor	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	8	1		10	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3242	28	1		30	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3243	24.5	1		35	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3244	15	1		20	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3245	18	1		25	Fair	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	6	1		15	Good	Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	12	1		16	Fair	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	3246	25	1		5	Poor	Poor	Broken top 15 ft from ground	1 and 2
Freemont's cottonwood	*Populus fremontii*	3247	27.5	1		25	Fair to Good	Fair to Good		1 and 2
Freemont's cottonwood	*Populus fremontii*	3248	27	1		20	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	12	2	8,4	10	Good	Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3249	17.5	1		20	Fair	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3250	46	1		40	Fair to Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3251	41	3	16.5,14,10.5	20	Poor	Poor	Broken top 18 ft from ground	1 and 2
Freemont's cottonwood	*Populus fremontii*	No Tag	24	1		25	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	8	1		8	Fair to Poor	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	26	3	6,8,12	20	Fair to Poor	Fair		1 and 2
White alder	*Alnus rhombifolia*	No Tag	8	1		10	Fair	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	10	1		15	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	10	1		15	Fair to Good	Fair to Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3252	13	3	5,3,5	15	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3253	51.5	6	11.5,7,4.5,6,8.5,14	32	Fair to Good	Fair to Good		1 and 2, 3
California buckeye	*Aesculus californica*	3254	13.5	10	2.5,1,1,1,1,2.5,1.5,1,1,1	10	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3255	7	1		20	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3256	8	1		18	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3257	14.5	2	8.5,6	20	Fair	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3258	25.5	3	5.5,8,12	25	Fair to Good	Fair to Good		1 and 2, 3
Interior live oak	*Quercus wislizeni*	3259	8.5	1		18	Fair to Good	Fair to Good		1 and 2, 3
Interior live oak	*Quercus wislizeni*	3260	15	1		25	Fair	Fair		1 and 2, 3
Interior live oak	*Quercus wislizeni*	3261	62.5	5	15.5,15.5,8.5,13.5,9.5	30	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3262	27.5	3	7,12,8.5	20	Fair to Poor	Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3263	23	2	16.5,6.5	18	Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3264	43.5	6	9.5,6.5,6,7.5,5,9	18	Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3265	23	2	16,7	30	Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3266	15.5	1		20	Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3267	13	2	5.5,7.5	15	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3268	46.5	4	19,9.5,11.5,6.5	25	Fair to Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3269	20.5	1		20	Poor	Poor	Split in half and laying on the ground	1 and 2
Blue oak	*Quercus douglasii*	3270	7	1		8	Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3271	13.5	1		22	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3272	28.5	2	12.5,16	17	Poor	Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3273	21.5	1		22	Fair to Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3274	10	1		15	Poor	Poor		1 and 2

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	3275	11	2	8,3	15	Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3276	24	2	15,9	20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3277	16	1		18	Fair to Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	3278	25	2	13,12	20	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3279	30.5	2	20,10.5	25	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3280	8	1		10	Fair to Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3281	13.5	3	6,5,2.5	15	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3282	8.5	1		18	Poor	Poor	Strong lean	1 and 2
Valley oak	*Quercus lobata*	3283	19	1		20	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3284	14.5	2	6.5,8	20	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3285	77	5	22,10.5,19,10,15.5	30	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3286	14	1		20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3287	29.5	1		37	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3288	8.5	1		13	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3289	15	1		25	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3290	10	1		15	Fair to Poor	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3291	12	1		22	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3292	12	1		17	Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3293	36.5	1		35	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3294	8.5	1		12	Fair to Good	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	3295	63	1		42	Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3296	22.5	2	11,11.5	18	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3297	23	1		32	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3298	10	1		12	Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3299	9	1		18	Fair to Poor	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3300	7.5	1		22	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3400	7.5	1		12	Good	Good		1 and 2
Freemont's cottonwood	*Populus fremontii*	3401	31	2	22,9	20	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3402	11	1		15	Fair	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	3403	6.5	1		10	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3404	13	1		15	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3405	20.5	5	4,6,3,3.5,4	10	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3406	12.5	1		22	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3407	13	1		22	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3408	22	2	10,12	20	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3409	24	2	14,10	20	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3410	13	2	9,4	15	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3411	8	1		12	Fair	Fair		1 and 2
Freemont's cottonwood	*Populus fremontii*	3412	51.5	1		30	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3413	20	2	13,7	23	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3414	8	1		25	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3415	11	2	7.5,3.5	10	Fair to Good	Good		1 and 2
White alder	*Alnus rhombifolia*	3416	7	1		15	Fair	Good		1 and 2
White alder	*Alnus rhombifolia*	3417	20	1		18	Good	Good		1 and 2
Freemont's cottonwood	*Populus fremontii*	3518	13.5	1		30	Fair	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3419	15	1		22	Fair to Good	Fair		1 and 2

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Freemont's cottonwood	*Populus fremontii*	3420	67	1		50	Fair to Poor	Fair to Poor		1 and 2
Freemont's cottonwood	*Populus fremontii*	3421	39.5	3	21.5,8,10	32	Fair	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	No Tag	14	2	8,6	20	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	6.5	1		15	Fair	Fair to Poor		1 and 2
Arroyo willow	*Salix lasiolepis*	3422	38	2	21,17	40	Fair	Fair		1 and 2
White alder	*Alnus rhombifolia*	3423	21.5	3	6.5,8,7	25	Fair	Good		1 and 2
White alder	*Alnus rhombifolia*	3424	25	2	12,13	18	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3425	18	1		27	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3426	8	1		15	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3427	14	1		18	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3428	6.5	1		8	Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3429	16.5	1		25	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3430	10.5	1		12	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3431	21.5	1		35	Good	Good		1 and 2
Oregon ash	*Fraxinus latifolia*	3422	40	3	18,13,21	45	Poor	Fair to Poor	One branch on ground	1 and 2
Northern California black walnut	*Juglans hindsii*	3433	25	1		30	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3434	16	2	9.5,6.5	18	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3435	7	1		15	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3436	12.5	2	6,6.5	15	Fair to Good	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3437	14.5	1		15	Poor	Fair to Poor		1 and 2
White alder	*Alnus rhombifolia*	No Tag	12	1		12	Good	Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3438	31.5	5	6,4,4.5,8,9	20	Poor	Fair to Poor		1 and 2
Arroyo willow	*Salix lasiolepis*	No Tag	22	5	4,5,4,6,3	22	Fair	Fair to Good		1 and 2
White alder	*Alnus rhombifolia*	3439	16	1		15	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3440	7	1		10	Fair	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3441	14	1		22	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3442	22	1		25	Fair	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3443	21	1		25	Good	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3444	28.5	2	12,16.5	25	Fair	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3445	26	1		33	Fair to Good	Good		1 and 2
Valley oak	*Quercus lobata*	3446	10	1		25	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3447	6	1		10	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3448	19	1		20	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3449	26	1		30	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3450	24.5	4	4.5,10.5,3.5,6	20	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3451	28.5	1		37	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3452	12	1		30	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3453	29.5	1		45	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3454	22	2	9.5,12.5	30	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3455	8.5	1		15	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3456	36.5	1		50	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3457	9.5	1		22	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3458	32.5	3	14.5,10.5,7.5	25	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3459	31.5	2	18,13.5	28	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3460	10.5	1		10	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3461	7	1		18	Fair	Fair		1 and 2

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Northern California black walnut	*Juglans hindsii*	3462	9.5	2	2.5,7	15	Poor	Poor	Part of tree on ground	1 and 2
Interior live oak	*Quercus wislizeni*	3463	62	5	18.5,13,9.5,9.5,11.5	22	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3464	15.5	1		30	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3465	8.5	1		15	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3466	18	6	4,3,2.5,3.5,3.5,1.5	8	Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3467	28	2	2.5,25.5	25	Fair to Good	Fair to Good		1 and 2, 3
Valley oak	*Quercus lobata*	3468	58	2	26,32	32	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3469	25	4	6,5.5,8,5.5	18	Fair to Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3470	6.5	1		15	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3471	11	2	6.5,4.5	18	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3472	16	1		20	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3473	7.5	1		12	Fair to Poor	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3474	21.5	4	9,3.5,5,4	25	Fair	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3475	20	4	4,3,6.5,6.5	15	Poor	Fair to Poor		1 and 2
Interior live oak	*Quercus wislizeni*	3476	9.5	2	1.5,8	18	Fair	Fair		1 and 2
Arroyo willow	*Salix lasiolepis*	3477	29	2	20,9	30	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3478	9	1		20	Fair to Good	Good		1 and 2
Interior live oak	*Quercus wislizeni*	3479	14.5	2	9,5.5	15	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3480	25	4	10,3.5,7,4.5	22	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3481	30	1		30	Fair to Good	Fair to Poor		1 and 2
Arroyo willow	*Salix lasiolepis*	3482	54	5	12.5,10.5,11,4,16	25	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3483	39	4	2.5,15,17,4.5	20	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3484	16	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3485	13.5	1		18	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3486	30.5	3	11.5,12,7	30	Fair	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3487	18.5	7	1,1,6,4.5,4,1,1	10	Fair to Poor	Fair to Poor		1 and 2
California buckeye	*Aesculus californica*	3488	47.5	8	3,5,8.5,3.5,10,5,5.5,7	18	Fair to Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	14	1		23	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	22	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	24	1		22	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3489	16.5	1		25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3490	16	1		30	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3491	16.5	1		32	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	45	2	31,14	28	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3492	33	2	13,20	30	Poor	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	22	1		25	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	32	1		30	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	26	1		30	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	38	1		45	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	26	1		30	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	10	1		20	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	21	1		25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	No Tag	28	1		25	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	21	1		25	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3493	23	2	14,9	22	Fair to Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3494	6	1		10	Fair to Good	Fair to Poor		1 and 2

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Northern California black walnut	*Juglans hindsii*	No Tag	8	1		25	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	13	1		15	Fair to Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	10.5	1		30	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	16	1		15	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	24	1		20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3495	15	1		30	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3496	14	1		20	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	No Tag	11	1		15	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	10	1		10	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	No Tag	8	1		20	Fair to Good	Good		1 and 2
Valley oak	*Quercus lobata*	3497	8.5	1		10	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3498	6	1		10	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3499	40	1		35	Good	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3500	6.5	1		12	Fair to Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3301	13.5	1		20	Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3302	20	1		36	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3303	29	1		25	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3304	10	1		20	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3305	6.5	1		15	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3306	17	1		25	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3307	16	2	9,7	18	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3308	18.5	1		40	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3309	12	1		25	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3310	12	1		12	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3311	8.5	1		18	Fair	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3312	17.5	1		22	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3313	18	2	9.5,8.5	20	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3314	20	1		30	Fair to Good	Fair to Good		1 and 2
Valley oak	*Quercus lobata*	3315	25.5	1		35	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3316	18.5	1		30	Good	Good		1 and 2
Valley oak	*Quercus lobata*	3317	8	1		25	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3318	8.5	1		25	Fair to Good	Fair		1 and 2
Valley oak	*Quercus lobata*	3319	17	1		30	Fair	Fair		1 and 2
Valley oak	*Quercus lobata*	3320	12.5	1		30	Fair	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3321	22	1		22	Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3322	6	1		15	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3323	17.5	1		20	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3324	6	1		15	Fair to Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3325	16	1		20	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3326	10	1		15	Poor	Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3327	11.5	1		25	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3328	6	1		12	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3329	12	1		20	Fair to Good	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3330	14	1		22	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3331	13	1		30	Fair to Poor	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3332	10.5	1		15	Fair	Fair		1 and 2

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Northern California black walnut	*Juglans hindsii*	3333	7	1		12	Fair to Poor	Fair to Poor		1 and 2
Northern California black walnut	*Juglans hindsii*	3334	8	1		15	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3335	11.5	1		20	Fair to Good	Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3336	17.5	1		30	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3337	15.5	1		30	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3338	39.5	3	31.5,4.5,3.5	30	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3339	57	4	14.5,21,14,7.5	40	Fair to Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3340	28	2	10.5,7.5	20	Fair	Fair		1 and 2
Northern California black walnut	*Juglans hindsii*	3341	10	1		18	Fair	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3342	27.5	2	16,11.5	18	Fair to Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3343	18	1		30	Fair to Good	Fair to Good		1 and 2
Arroyo willow	*Salix lasiolepis*	3344	42	2	20,22	32	Poor	Fair to Poor		1 and 2
Valley oak	*Quercus lobata*	3345	23	1		30	Fair to Good	Good		1 and 2
Valley oak	*Quercus lobata*	3346	21.5	1		30	Fair to Good	Good		1 and 2
Valley oak	*Quercus lobata*	3347	28.5	1		35	Fair	Fair to Good		1 and 2
California buckeye	*Aesculus californica*	3348	22	5	7.5,3,2,2.5,7	15	Fair to Good	Fair		1 and 2
Interior live oak	*Quercus wislizeni*	3349	37	9	8.5,3,3.5,3,7,3,3,2.5,3.5	18	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3350	15	5	3.5,5,2.5,2.5,1.5	15	Fair to Good	Fair to Good		1 and 2
Interior live oak	*Quercus wislizeni*	3351	26.5	4	9,2.5,2.5,12.5	22	Fair to Good	Fair to Good		1 and 2
Blue oak	*Quercus douglasii*	3352	24	1		25	Good	Fair to Good		1 and 2
Northern California black walnut	*Juglans hindsii*	3353	7	1		18	Fair to Good	Fair to Good		3
Northern California black walnut	*Juglans hindsii*	3354	15.5	1		25	Fair to Good	Fair to Good		3
Northern California black walnut	*Juglans hindsii*	3355	19	9	2.5,1,3,1,1.5,3.5,1.5,3,2	18	Fair to Poor	Fair		3
Northern California black walnut	*Juglans hindsii*	3356	9.5	1		18	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3357	13.5	8	2.5,1,2.5,1,1.5,2,1,2	10	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	20	1		35	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	16	2	7,9	15	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	14	1		15	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	32	1		25	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3358	20	8	2,3.5,2.5,3,3.5,1,3,1.5	10	Fair	Good		3
Blue oak	*Quercus douglasii*	3358	43.5	2	23,20.5	30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3360	17	1		25	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3361	19.5	1		25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21	1		32	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	3362	19	1		22	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3363	16	1		25	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3364	40.5	2	24.5,16	28	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21	2	13,8	15	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	26	2	13,13	20	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3365	19.5	1		25	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3366	29	1		30	Fair to Poor	Fair to Poor		3
American sycamore	*Platanus racemosa*	No Tag	17.5	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	58.5	10	3,5,2,2,32,1,1,2.5,2,8	23	Poor	Fair to Poor		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	12	2	2,10	18	Fair to Poor	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	17	2	9,8	12	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11	1		10	Fair to Good	Good		3
Valley oak	*Quercus lobata*	No Tag	8	1		10	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3367	32	1		27	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		22	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	56.5	4	15,16.5,12,13	30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	26	1		30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	29	1		32	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	20	1		22	Good	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	21	1		28	Fair to Good	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	33	2	16,17	35	Fair to Good	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	15	7	1.5,2.5,2,2.5,1.5,2,3	10	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	17	1		22	Fair to Good	Good		3
Valley oak	*Quercus lobata*	3368	27	1		28	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	47	7	26,15,1,1,1,2,1	30	Fair	Fair		3
Blue oak	*Quercus douglasii*	3369	14	1		20	Fair to Good	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	59	3	22,26,11	28	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	32.5	2	21,11.5	30	Fair to Poor	Fair		3
Valley oak	*Quercus lobata*	3370	33	2	19,14	23	Fair	Fair to Poor		3
Valley oak	*Quercus lobata*	3371	19.5	1		25	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3372	14.5	9	2.5,2,2,1.5,2.5,1,1,1,1	10	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3373	29	1		30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3374	30.5	1		30	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	3375	36.5	1		35	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	19	2	17.5,1.5	25	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	3376	40	1		40	Fair to Poor	Poor		3
Valley oak	*Quercus lobata*	3377	8	1		12	Fair	Fair		3
Valley oak	*Quercus lobata*	3378	11	1		23	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3379	15	5	7,1,2,2.5,2.5	15	Fair to Poor	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	22	1		25	Poor	Poor		3
Valley oak	*Quercus lobata*	3380	13.5	1		22	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3381	20.5	2	11.5,9	17	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	3382	19	1		18	Fair to Good	Poor		3
Blue oak	*Quercus douglasii*	3383	19	1		25	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	24	1		28	Fair	Fair		3
Valley oak	*Quercus lobata*	3384	21	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3385	15.5	1		25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3386	21.5	1		28	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3387	17	1		22	Poor	Fair to Poor		3
Valley oak	*Quercus lobata*	3388	32.5	1		25	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	3389	26.5	1		30	Good	Poor		3
Interior live oak	*Quercus wislizeni*	3390	9.5	1		22	Fair	Poor		3
Valley oak	*Quercus lobata*	3391	25	2	8,17	22	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3392	31.5	2	16.5,15	22	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	63	7	7,3,4,15,13,11,10	28	Fair to Poor	Fair		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	14	1		22	Fair	Fair		3
Blue oak	*Quercus douglasii*	3393	18.5	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3394	7	1		12	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3395	10	1		20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3396	35	1		33	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3397	25.5	2	8.5,17	22	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	3398	34.5	4	7.5,7,12,8	20	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3399	16	2	9.5,6.5	17	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3400	25	3	10.5,5,9.5	25	Fair	Fair		3
Blue oak	*Quercus douglasii*	3501	40	2	18.5,21.5	35	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3502	32	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3503	35	1		30	Fair to Good	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3504	27.5	1		40	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	14.5	1		15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	37.5	8	23,5,2,3,1,1,1.5,1	40	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	23.5	2	5,18.5	25	Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	3505	38	1		40	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	43	2	27,16	35	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	15	1		25	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	21	1		28	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	36.5	18	2,2.5,1,1,1.5,2,2,2,3.5,3.5,1.5, 2,2,1,3.5,1.5,1.5,2.5	12	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3506	21.5	1		30	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	3507	17	1		27	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	57	4	23,17,8,9	25	Fair to Poor	Poor		3
Blue oak	*Quercus douglasii*	No Tag	27	1		30	Fair to Good	Good		3
Blue oak	*Quercus douglasii*	No Tag	23	1		28	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	55	5	4,26,20,3,2	30	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	15	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	27	1		35	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	20	1		25	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	3508	14.5	1		25	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	22	1		32	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11	1		18	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	29.5	3	15,8,6.5	20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	62	5	15,21,7,14,5	28	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	15	1		22	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	68	5	16,8,15,14,15	38	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	3509	25.5	1		40	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	34	1		42	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		18	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	3510	15	2	7,8	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3511	12.5	1		18	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3512	25.5	2	12.5,13	16	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	3513	9	1		13	Fair to Good	Fair to Poor		3

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Interior live oak	*Quercus wislizeni*	3514	8	1		15	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	3515	29	1		30	Fair to Poor	Poor		3
Interior live oak	*Quercus wislizeni*	3516	15	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	38	3	15,12,11	22	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	44	4	15,12,7,10	35	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3517	11.5	1		15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3518	35	2	18.5,16.5	30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3519	22.5	1		22	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3520	22	2	14.5,7.5	30	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3521	18.5	2	10,8.5	20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3522	22	1		25	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3523	9.5	1		15	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3524	6	1		12	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	22	1		30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	19	7	2,1,4.5,1,1,2.5,7	12	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	9	2	6,3	10	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	4	4.5,2.5,2.5,2	8	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3525	19.5	2	18.5,1	32	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18	1		25	Fair	Fair		3
Blue oak	*Quercus douglasii*	3526	24	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3527	19.5	8	2.5,1,1,1,4.5,3,4,2.5	10	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3528	45.5	6	19,1,1,1,1,22.5	23	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	3529	23.5	1		25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3530	24.5	1		20	Poor	Poor		3
Blue oak	*Quercus douglasii*	3531	25	1		28	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	20	1		22	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	24	1		25	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	20	1		22	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		20	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	7	1		12	Fair	Fair		3
Blue oak	*Quercus douglasii*	3532	27.5	2	15.5,12	20	Fair	Fair		3
Blue oak	*Quercus douglasii*	3533	12	1		15	Fair	Fair		3
Blue oak	*Quercus douglasii*	3534	25.5	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3535	21.5	1		18	Fair	Fair		3
Blue oak	*Quercus douglasii*	3536	20.5	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3537	23.5	1		25	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	27	1		35	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	23	13	1,1,1.5,1.5,1.5,2,1.5,1.5,1.5,1, 5,2,2	10	Fair	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14	10	1,2,1.5,1.5,2,1,1.5,1.5,1,1	8	Fair to Good	Good		3
Blue oak	*Quercus douglasii*	3538	21	1		28	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3539	27.5	1		15	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	3540	24	1		25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3541	17	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3542	24.5	1		25	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3543	14.5	3	10.5,1,3	20	Fair	Good		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	3544	13.5	3	1,1.5,11	18	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	3545	11	6	1,1,2.5,4,1.5,1	8	Fair to Poor	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		20	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	14	1		20	Fair to Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	28	1		23	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	27	1		25	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	16.5	4	8,6.5,1,1	15	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3546	20	10	3.5,2.5,2.5,2,2,2,1,2,1.5,1	10	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	3547	18	1		18	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	33	10	6,1,1,7,2,4,4,3,3,2	17	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	40	3	12,14,14	23	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	43	3	13,16,14	25	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	15	1		25	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	35	1		25	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	16.5	8	1.5,1,1,3,1.5,2,2,4.5	10	Fair to Good	Good		3
Blue oak	*Quercus douglasii*	3548	31.5	1		35	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3549	19	1		25	Fair	Fair		3
Blue oak	*Quercus douglasii*	3550	38	1		40	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3551	24	1		20	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	8	1		15	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	7.5	1		15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3552	13	1		25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3553	15.5	8	3.5,1.5,3,2.5,1,1,1,2	10	Fair	Fair		3
Valley oak	*Quercus lobata*	3554	10	1		15	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11	7	1,1,1.5,2,2,2,1.5	8.5	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	28	12	3,2,1,4,3.5,1,2,3,3,2,1.5,2	12	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3555	24	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	15	8	1,1.5,2,2,3,1.5,3,1	8	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3556	27.5	2	13,14.5	18	Fair	Fair to Good		3
Goodding's black willow	*Salix gooddingii*	No Tag	15	2	7,8	15	Fair to Good	Fair to Good		3
Goodding's black willow	*Salix gooddingii*	No Tag	10	2	7,3	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8	1		20	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	3557	27	1		15	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3558	25.5	1		25	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	56	3	16,18,22	40	Poor	Poor		3
Blue oak	*Quercus douglasii*	No Tag	21	1		30	Fair to Good	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	20	1		28	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	22	1		35	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	28	2	15,13	30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	16	2	13,3	20	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	42	1		40	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	28	1		25	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	11	1		22	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	15.5	1		28	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	27	1		35	Fair to Good	Fair to Good		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Blue oak	*Quercus douglasii*	No Tag	14	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	36	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3559	12	4	3,3,3,3	10	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	42	3	16,12,14	20	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	52.5	6	5,9,6.5,15,16,1	15	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	10.5	2	6.5,4	15	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	22	2	13,9	15	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	3560	11.5	1		15	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	31	3	17,13,1	20	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	16.5	2	8.5,8	12	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	37.5	4	6.5,12,8,11	13	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13	2	8,5	15	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	6	1		10	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18	1		20	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	36	2	19,17	20	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	44	4	14,10,7,13	18	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	24	2	13,11	18	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	11	1		15	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	31	3	14,8,9	15	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	42	4	8,9,15,10	18	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	19	2	13,6	17	Poor	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	20.5	1		30	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	6	1		22	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	3	10,7.5,1	23	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	3561	16	1		15	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	53	4	13,8,10,22	25	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	18	5	9.5,1,1,1.5,5	15	Fair to Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	30	2	17,13	20	Fair to Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	41	3	14,12,15	20	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	52	2	22,30	28	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	16	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3562	62.5	4	21.5,20,15,6	35	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3563	17	1		25	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	24	1		35	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	14	1		22	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	16	1		18	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	27	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	21	1		28	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	34	2	33,1	35	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	27	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3564	10.5	1		18	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3565	22.5	2	12,10.5	22	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3566	13	1		20	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	27	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3567	21	1		30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	27	1		35	Fair to Good	Fair to Good		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	37	1		40	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	34	1		40	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	2	7.5,5	20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	2	7.5,5	18	Fair	Fair		3
Blue oak	*Quercus douglasii*	3568	15	1		16	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3539	17.5	1		17	Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	3570	12	1		17	Fair to Good	Good		3
Blue oak	*Quercus douglasii*	3571	33.5	2	17.5,16	25	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	30	1		25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8	2	6,2	8	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	21.5	4	9,4,5,3.5	14	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	3	6,2,4.5	10	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	15.5	7	3.5,3.5,2.5,2,1.5,2,1	7	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	7	3.5,1,2,1,1,2,1	7	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3572	17	1		21	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	3573	16.5	1		16	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	46	4	15,10.5,9.5,11	26	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	24	2	10.5,13.5	22	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	12.5	1		23	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	12	1		25	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	16	1		25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3574	15	3	6.5,5.5,3	16	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3575	28.5	2	12.5,16	28	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3576	18	3	7.5,6,4.5	16	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3577	8	1		9	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3578	6	1		20	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3579	44.5	5	12,11.5,6,6,9	27	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3580	18	11	1,1.5,1,1,1.5,2,2.5,2,3,1.5,1	11	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	12.5	1		26	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	7	1		20	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3581	39	6	4,11.5,5,3.5,9.5,5.5	22	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3582	22	2	11,11	28	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	18.5	1		30	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	23	1		23	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	30.5	2	17,13.5	32	Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	26	1		35	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	36	1		23	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18	2	11,7	16	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3583	11	5	2,4,2,2,1	12	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16	4	3,3,4.5,5.5	13	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	23.5	6	7,5.5,6,2,2,1	16	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16.5	4	7.5,4,4,1	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	9	1		23	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	56	5	16,13,6.5,8,12.5	27	Fair to Good	Good		3
Blue oak	*Quercus douglasii*	No Tag	17	1		20	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	28	4	7,8,9.5,3.5	23	Fair to Good	Fair to Good		3

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Blue oak	*Quercus douglasii*	No Tag	19	1		25	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	7	1		10	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	24	3	6,8,10	30	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	22	1		25	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	10	1		10	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	14.5	1		27	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	19	2	6,13	28	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	13	1		30	Fair	Good		3
Blue oak	*Quercus douglasii*	No Tag	18	1		27	Fair	Fair		3
Goodding's black willow	*Salix gooddingii*	No Tag	26	2	13,13	11	Poor	Poor		3
Goodding's black willow	*Salix gooddingii*	No Tag	14	1		18	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	11	1		23	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	12	1		21	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	13	1		28	Good	Good		3
Blue oak	*Quercus douglasii*	No Tag	14	1		25	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	24	2	9,15	30	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14	1		35	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	24	2	15,9	28	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	33	2	15,18	24	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14	3	2.5,7,4.5	16	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		22	Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	18	1		32	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	19	1		24	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	20	2	15,5	20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	22.5	12	1.5,2,1,2.5,2,3,1.5,2,1.5,2,2.5,1	8	Good	Good		3
Blue oak	*Quercus douglasii*	3597	21.5	5	9.5,3,1.5,6,1.5	18	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3598	29.5	2	16,13.5	28	Fair	Fair		3
Valley oak	*Quercus lobata*	3599	13.5	2	7.5,6	20	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3600	48.5	4	13.5,18,14,3	38	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3601	12	1		17	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	3602	40	5	11,9.5,3.5,3.5,12.5	22	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3603	40.5	5	8,4,7.5,13,8	25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3604	22.5	11	1.5,2.5,1.5,1,2.5,2,3.5,2.5,1.5, 2,2	12	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3605	10	3	4,2,4	12	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3606	20	2	10,10	22	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3607	45	7	9.5,3,3,2,9.5,13,5	23	Fair to Poor	Fair to Good		3
Valley oak	*Quercus lobata*	3608	13	1		40	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3609	25.5	2	11.5,14	30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3610	13	1		23	Fair to Good	Fair to Poor		3
Valley oak	*Quercus lobata*	3611	12	1		22	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	3612	8	1		15	Fair	Fair to Poor		3
Valley oak	*Quercus lobata*	3613	8.5	1		21	Fair to Poor	Fair to Poor	Mechanical damage to bark	3
Valley oak	*Quercus lobata*	3614	12	1		18	Fair to Good	Fair to Good		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	3615	6.5	1		16	Fair	Fair		3
Valley oak	*Quercus lobata*	3616	11.5	1		22	Fair to Good	Fair		3
Gooding's black willow	*Salix gooddingii*	3617	46	3	17,14,15	30	Fair to Good	Fair to Poor		3
Valley oak	*Quercus lobata*	3618	10	1		15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3619	9	1		20	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3620	14	3	5,3.5,5.5	21	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	52.5	2	20,32.5	32	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3621	23.5	1		27	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3622	23	1		33	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3623	30.5	2	17.5,13	35	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3624	28	1		35	Fair	Fair		3
Blue oak	*Quercus douglasii*	3625	16.5	1		25	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	2	5.5,6	28	Fair	Good		3
Blue oak	*Quercus douglasii*	No Tag	12.5	1		23	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13	4	4.5,3.5,2.5,2.5	18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	2	6,5.5	20	Fair to Good	Fair		3
Northern California black walnut	*Juglans hindsii*	No Tag	16	1		21	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	45.5	4	24.5,9.5,7,4.5	35	Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	19	2	12,7	20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	36	3	13,10,13	25	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	40.5	3	12,14,14.5	33	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	36	2	18,18	28	Good	Good		3
Blue oak	*Quercus douglasii*	No Tag	23.5	2	12,11.5	25	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	12.5	1		20	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	20	1		25	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	56.5	5	13,7,12,12,12.5	23	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	17	1		22	Fair to Good	Fair to Good		3
Arroyo willow	*Salix lasiolepis*	No Tag	16	4	6,5,3.5,1.5	13	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	6	1		10	Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	37.5	7	15,9,5,5,1,1,1.5	12	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	50.5	9	12.5,5,7,12,3,1.5,4.5,3,2	21	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	39	8	13.5,6,4,2,2,6,2,3.5	23	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21	4	6,9,4,2	20	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	26	3	6.5,13,6.5	20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	9	1		15	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	44	3	10,16,18	23	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	8	1		15	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	17.5	2	12,5.5	20	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	48	4	17,14,15,2	30	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	33	3	7,4,22	20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	24	1		28	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	20	1		27	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	56.5	3	20,15,21.5	26	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	43.5	5	8,4.5,10,11,10	23	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	13	1		25	Fair	Fair to Poor		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	15	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		25	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		22	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	30	4	26,2,1,1	18	Poor	Poor		3
Blue oak	*Quercus douglasii*	No Tag	14	1		20	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	13	1		18	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	10	4	5.5,1.5,2,1	12	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	24.5	1		30	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	26	1		27	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	12.5	1		22	Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	25	1		33	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	28	1		30	Fair to Good	Fair to Good		3
White alder	*Alnus rhombifolia*	No Tag	24	4	5.5,5.5,5.5,7.5	18	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	51	2	24,27	30	Good	Good		3
Blue oak	*Quercus douglasii*	No Tag	30	1		35	Fair	Fair		3
Freemont's cottonwood	*Populus fremontii*	No Tag	7.5	1		12	Fair to Good	Fair to Good		3
Freemont's cottonwood	*Populus fremontii*	No Tag	11	1		17	Fair	Fair		3
Freemont's cottonwood	*Populus fremontii*	No Tag	9.5	1		15	Fair	Fair		3
Freemont's cottonwood	*Populus fremontii*	No Tag	9.5	1		13	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	29.5	1		30	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	30	1		30	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	50.5	2	21,29.5	27	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	24	1		30	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	23.5	1		28	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	25	1		25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3584	24	2	9.5,14.5	23	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	3585	11.5	1		12	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3586	20.5	1		23	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	23	1		33	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	11	1		30	Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	14	1		40	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	14	1		38	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13.5	2	12,1.5	30	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	11.5	1		40	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	34	3	12,11,11	23	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	28	1		40	Fair to Poor	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	7	1		23	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	14	1		40	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	10	2	5,5	21	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	7	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	31	3	12,7,12	32	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	23	1		23	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	3	8,9,1.5	25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8	2	7,1	11	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	1		21	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	20.5	4	6,12,1,1.5	18	Poor	Poor		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	13	1		16	Fair to Poor	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	24	1		28	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3587	25.5	2	11.5,14.5	23	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	3588	17	1		25	Fair	Fair to Good		3
Freemont's cottonwood	*Populus fremontii*	No Tag	24	1		37	Good	Fair to Good		3
Freemont's cottonwood	*Populus fremontii*	No Tag	21.5	4	6,7.5,3,5	13	Good	Fair to Good		3
Blue oak	*Quercus douglasii*	3589	26	1		25	Fair	Fair		3
Blue oak	*Quercus douglasii*	3590	16	1		20	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	3591	33.5	1		33	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	43.5	3	12.5,15,16	25	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3592	49.5	2	24.5,25	30	Fair	Fair		3
American sycamore	*Platanus racemosa*	3593	35	1		35	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	14	2	6.5,7.5	15	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	26	4	6,7,5,8	25	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	10	1		12	Fair to Poor	Fair		3
Valley oak	*Quercus lobata*	No Tag	22	1		35	Fair to Good	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	18	1		23	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	14	1		30	Fair to Poor	Fair		3
Valley oak	*Quercus lobata*	No Tag	15.5	1		23	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	29	2	9,20	30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	10	4	3,2.5,3,1.5	13	Fair to Good	Good		3
Valley oak	*Quercus lobata*	No Tag	19.5	4	9,3,3.5,4	17	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	12.5	3	7,4.5,1	10	Fair to Good	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	14	1		30	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16.5	1		27	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	19	1		30	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	3594	16	1		20	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	6	1		13	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		18	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8.5	1		16	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21.5	1		18	Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	8.5	1		23	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3595	11.5	1		18	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	28	3	6,10,12	20	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		25	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	35	2	19,16	25	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	9	1		32	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3596	9.5	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	33.5	3	14.5,13.5,5.5	32	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	46.5	2	27,19.5	35	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	42	3	12,16,14	35	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	17	1		37	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	15.5	1		25	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	17	1		30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	16	3	4,5.5,6.5	15	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	7.5	1		18	Fair	Fair		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Valley oak	*Quercus lobata*	No Tag	8	1		18	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	21	1		28	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		20	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	8	1		12	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	No Tag	9	1		13	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	11.5	1		20	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		32	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	6	1		15	Fair	Fair		3
Goodding's black willow	*Salix gooddingii*	No Tag	48	6	9,13,12,10.5,2.5,1	22	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14.5	1		28	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	8	1		8	Poor	Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	38	1		38	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3626	26.5	1		30	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	3627	35	2	19,16	25	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3628	32	3	11,11,10	33	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3629	25	1		25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3630	41	6	9,4,14,3,3,8	35	Fair	Fair to Good		3
Northern California black walnut	*Juglans hindsii*	3631	16.5	1		25	Fair to Poor	Fair		3
Northern California black walnut	*Juglans hindsii*	3632	24	2	16,8	24	Fair	Fair		3
Northern California black walnut	*Juglans hindsii*	3633	9.5	1		18	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	3634	46.5	3	14,14.5,18	30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13.5	1		20	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	15	1		25	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	23	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	9	1		16	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	9.5	1		16	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	18	3	6.5,6,5.5	16	Fair to Poor	Fair		3
Blue oak	*Quercus douglasii*	No Tag	10.5	1		15	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	10	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	9.5	1		20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	20	3	5.5,6.5,8	20	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	23.5	2	11.5,12	28	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	2	9,9.5	16	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	19	1		22	Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	32.5	2	17.5,15	32	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	12	3	9,2,1	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	28	8	14,1,1.5,2,1.5,3,2,3	25	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	20.5	1		27	Fair to Poor	Poor	Girdled by fence	3
Interior live oak	*Quercus wislizeni*	No Tag	36.5	3	13,13.5,10	32	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21	2	9.5,11.5	23	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	13	1		18	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		22	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	13	1		15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	26.5	4	15,4,2.5,5	12	Fair to Good	Good		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	42	6	12,5,6.5,8,4,6.5	25	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	14	1		20	Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	10.5	2	3,7.5	17	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	21	1		23	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		18	Fair	Good		3
Blue oak	*Quercus douglasii*	No Tag	8	1		13	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	6	1		10	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	6.5	1		20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14.5	2	5,9.5	24	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	10	1		22	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	15.5	1		18	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	36.5	4	12.5,4,11,9	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	31.5	3	14.5,11,6	18	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	17	3	8,6.5,2.5	18	Fair to Poor	Fair		3
Valley oak	*Quercus lobata*	No Tag	12	1		28	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	25.5	3	10,8.5,7	28	Fair to Good	Good		3
Valley oak	*Quercus lobata*	No Tag	11.5	1		13	Good	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	13.5	1		16	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	19	1		32	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	No Tag	8.5	1		12	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	1		18	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	No Tag	18	1		26	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	10	1		28	Fair	Fair		3
Blue oak	*Quercus douglasii*	No Tag	19	1		28	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	No Tag	17	1		20	Fair	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	7.5	1		25	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	No Tag	7	1		25	Fair to Good	Fair		3
Valley oak	*Quercus lobata*	No Tag	16	1		22	Fair	Fair to Poor	Overgrown by wild grape	3
Valley oak	*Quercus lobata*	No Tag	18	1		18	Fair to Good	Fair		3
Blue oak	*Quercus douglasii*	No Tag	15	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18	1		20	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	25	1		28	Fair to Good	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	18	1		16	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	17.5	3	9,4.5,4	17	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11	2	7,4	16	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	3635	8.5	1		15	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	14	1		20	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	18.5	3	7.5,9.5,1.5	17	Fair to Good	Good		3
Interior live oak	*Quercus wislizeni*	3636	29	1		20	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	14.5	2	7,7.5	16	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	3637	35	3	15,11,9	25	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	22	1		26	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	4	5,11,1,1.5	15	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	23	1		22	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	14	2	11,3	12	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		15	Fair to Good	Fair		3

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Interior live oak	*Quercus wislizeni*	No Tag	6	1		15	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		15	Fair to Good	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		22	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	12	1		30	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	13	1		35	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	21	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	30	2	13,17	18	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	18.5	1		35	Fair	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	13.5	2	7.5,6	16	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	14	1		20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		18	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	16	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		22	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	33	2	13.5,19.5	28	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		30	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	12	1		25	Fair	Fair to Poor		3
Blue oak	*Quercus douglasii*	No Tag	10.5	1		18	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	9.5	1		15	Fair	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	22.5	2	12,10.5	18	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	8	2	6,2	15	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	10.5	1		20	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	13.5	2	8.5,5	15	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	11.5	1		25	Fair to Poor	Fair to Poor		3
Interior live oak	*Quercus wislizeni*	No Tag	26	2	15,11	28	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	36.5	2	31,5.5	32	Fair	Fair to Good		3
Northern California black walnut	*Juglans hindsii*	No Tag	19	2	9.5,9.5	20	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	24	1		30	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	24	1		21	Fair	Fair to Good		3
Blue oak	*Quercus douglasii*	No Tag	6	1		10	Fair to Poor	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	9	1		12	Fair	Fair		3
Valley oak	*Quercus lobata*	No Tag	14	1		18	Fair	Fair		3
Interior live oak	*Quercus wislizeni*	No Tag	15	1		22	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	28	2	16,12	24	Fair to Good	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13	1		20	Fair to Good	Good		3
Valley oak	*Quercus lobata*	No Tag	21	2	11,10	15	Fair to Poor	Fair to Poor		3
Valley oak	*Quercus lobata*	No Tag	14	1		24	Fair	Fair to Good		3
Interior live oak	*Quercus wislizeni*	No Tag	13.5	1		15	Fair	Fair to Good		3
Valley oak	*Quercus lobata*	No Tag	37.5	4	26,3,3,5.5	45	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	19	2	8,11	48	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	25.5	2	10,15.5	35	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	18.5	1		30	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	15	1		35	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	19	1		30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		35	Fair to Poor	Fair		4
Valley oak	*Quercus lobata*	No Tag	24.5	1		38	Fair to Good	Fair to Good		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Valley oak	*Quercus lobata*	No Tag	18	1		30	Fair to Good	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	12.5	1		40	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	24.5	2	11,13.5	42	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	11	1		35	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	13	1		45	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	14	1		50	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	8	1		28	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	49	4	15,11,14,9	32	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	19	3	3,10,6	25	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	22	2	12,10	30	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	31	1		40	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	42	1		40	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13	1		30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	41	4	11.5,13,12,4.5	30	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	16.5	2	9.5,7	30	Fair	Fair		4
Northern California black walnut	*Juglans hindsii*	No Tag	10	1		25	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	25	1		35	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13.5	1		23	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		17	Poor	Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	7.5	1		22	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		30	Fair	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	10	1		47	Poor	Fair to Poor		4
Valley oak	*Quercus lobata*	No Tag	39	2	19,20	25	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	16	1		25	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	18	1		28	Good	Fair to Good		4
Blue oak	*Quercus douglasii*	No Tag	12.5	1		35	Fair	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	24	2	11,13	25	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	12	1		20	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	15	1		40	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	12	1		20	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	14	1		22	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	21.5	1		32	Fair	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	9	1		25	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	11.5	2	6,5.5	18	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	74.5	7	10.5,12.5,6.5,11,10,11,13	30	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	14.5	1		40	Fair to Poor	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23	2	16,7	35	Fair	Fair to Good		4
Northern California black walnut	*Juglans hindsii*	No Tag	18	3	5.5,4.5,8	24	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		20	Fair	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23.5	6	4,4.5,4.5,1.5,6,3	18	Fair to Good	Good		4
Interior live oak	*Quercus wislizeni*	No Tag	12.5	2	6,6.5	20	Fair to Good	Good		4
Valley oak	*Quercus lobata*	No Tag	39	1		45	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	38	2	19,19	38	Fair to Good	Fair		4
Valley oak	*Quercus lobata*	No Tag	30.5	1		36	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	23	5	8,3.5,7,2.5,2	18	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	14.5	1		35	Fair	Fair to Good		4

Common Name	Latin Name	Tree Tag #	DBH	# of Stems	Stem Description	Dripline	Structure	Health	Field Notes	Tree Location Alternative(s)
Valley oak	*Quercus lobata*	No Tag	16	1		40	Fair to Good	Fair		4
Interior live oak	*Quercus wislizeni*	No Tag	12	1		30	Fair	Fair to Poor		4
Interior live oak	*Quercus wislizeni*	No Tag	25	1		35	Fair	Fair		4
Arroyo willow	*Salix lasiolepis*	No Tag	18	1		25	Poor	Poor		4
Valley oak	*Quercus lobata*	No Tag	16	1		35	Fair to Good	Fair to Good		4
Interior live oak	*Quercus wislizeni*	No Tag	13.5	1		30	Fair	Fair		4
Valley oak	*Quercus lobata*	No Tag	19	1		22	Fair to Good	Fair to Good		4
Valley oak	*Quercus lobata*	No Tag	32	1		35	Fair	Fair to Good		4

APPENDIX 3.3 C

Special Status Plant Survey Hemphill Diversion Project
(ECORP Consulting, Inc.)

2020 Special-Status Plant Survey

Hemphill Diversion Structure Project

Placer County, California

Prepared For:

Nevada Irrigation District

January 2021

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

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Attachment A – Potentially Occurring Special-Status Plant Species
Attachment B – Target Species Reference Source
Attachment C – Statement of Qualifications
Attachment D – Plant Species Observed (June 28 and June 29, 2020)

LIST OF ACRONYMS AND ABBREVIATIONS

CDFW	California Department of Fish and Wildlife
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CRPR	California Rare Plant Rank
ESA	Endangered Species Act

LIST OF ACRONYMS AND ABBREVIATIONS

MCV	A Manual of California Vegetation
MSL	Mean sea level
NID	Nevada Irrigation District
NOAA	National Oceanic and Atmospheric Administration
NPPA	Native Plant Protection Act
NRCS	Natural Resources Conservation Service
PCCP	Placer County Conservation Plan
Study Area	Hemphill Diversion Structure Project
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey

1.0 INTRODUCTION

On behalf of the Nevada Irrigation District, ECORP Consulting, Inc. conducted a special-status plant survey for a portion of the proposed approximately 98.05-acre Hemphill Diversion Structure Project (Study Area) located in Placer County, California. The Study Area includes private properties that were not accessible during the survey. The survey was only conducted within accessible areas, collectively referred to as the Survey Area. The inaccessible areas are collectively referred to as the Assessment Area. These areas are described in detail in the following section.

The purpose of the plant survey was to identify and map the locations of special-status plant species observed within the Survey Area. Due to differences in phenology, only a subset of the special-status species with potential to occur were identifiable at the time of the survey. These species are identified in Section 2.3. An additional survey is required to ensure complete survey coverage for the remaining target species.

1.1 Study Area Location

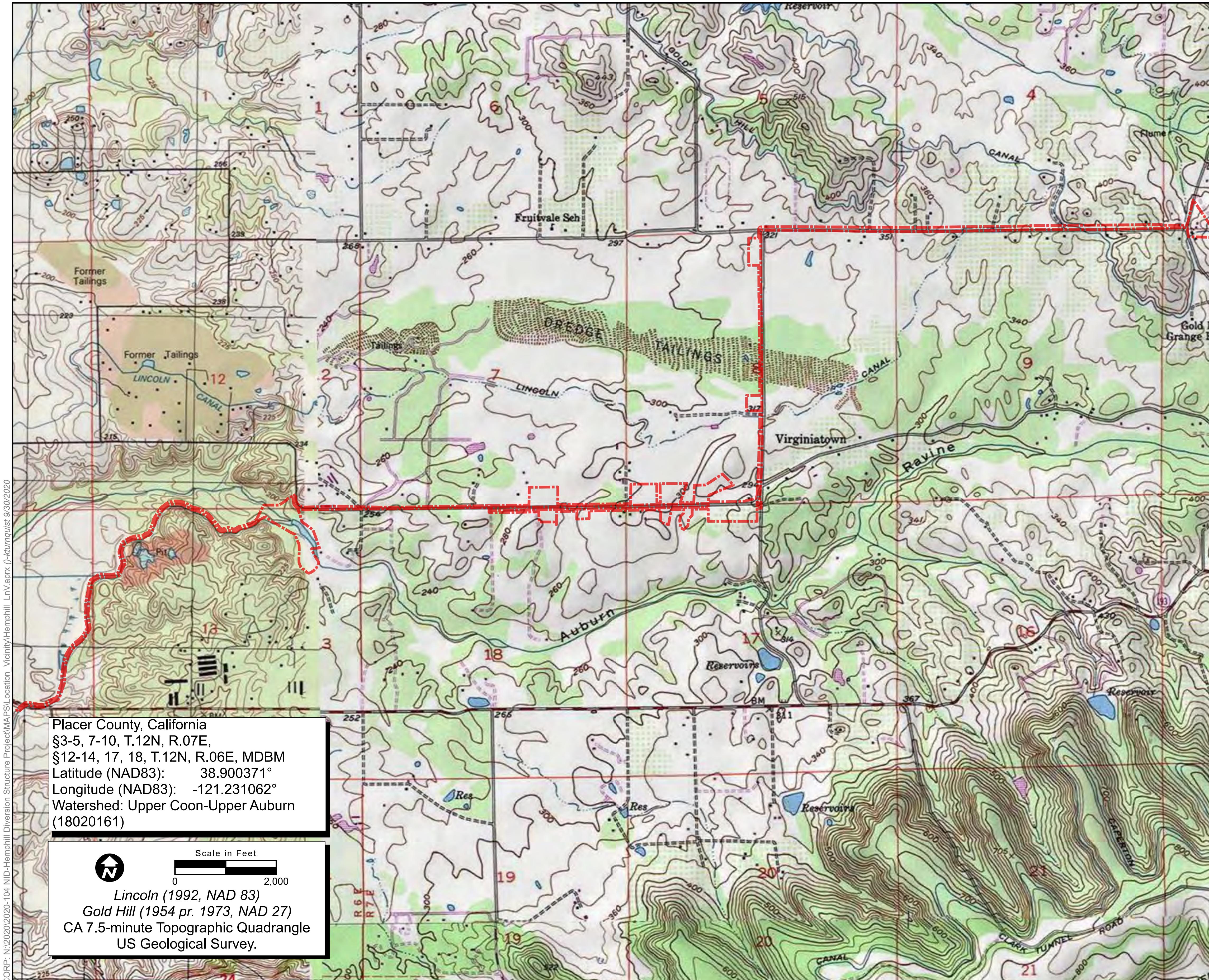
The Study Area is a linear corridor located along the extent of the Hemphill Canal from State Highway 193 just west of Oak Tree Lane near the city of Lincoln to Auburn Ravine and the Hemphill Diversion Structure. From the Diversion Structure, the Study Area continues along the Virginiatown Road east to Fowler Road, north on Fowler Road to Fruitvale Road, and east on Fruitvale Road to the Nevada Irrigation District (NID) maintenance yard at 1900 Gold Hill Road (Figure 1. *Project Location and Vicinity*). The previously described portions of the Study Area are collectively referred to as the Survey Area (depicted as Survey Area on Figure 2. *Survey Area*). The Study Area also includes portions of residential and agricultural parcels adjacent to the Virginiatown Road and Fowler Road rights-of-way, which are collectively referred to as the Assessment Area (depicted as Assessment Area in Figure 2).

The Study Area corresponds to portions of Sections 3-5 and 7-10, Township 12 North, and Range 7 East; and Sections 12-14, 17, and 18, Township 12 North, and Range 6 East within the "Gold Hill, California" and "Lincoln, California" 7.5-minute quadrangles (U.S. Geological Survey [USGS] 1954 photorevised 1973 and 1992, respectively). The approximate center of the Study Area is located at latitude 38.900371° and longitude -121.231062° (NAD83) within the Upper Coon-Upper Auburn Watershed (Hydrologic Unit Code #18020161; Natural Resources Conservation Service [NRCS], et al. 2019).

1.2 Definition of Special-Status Plant Species

For the purposes of this report, "special-status plants" are defined as vascular plants that meet one or more of the following:

- Plants listed, proposed for listing, or candidates for future listing as threatened or endangered under the federal Endangered Species Act (ESA).
- Plants listed, proposed for listing, or candidates for future listing as threatened or endangered under the California ESA.



Placer County, California
§3-5, 7-10, T.12N, R.07E,
§12-14, 17, 18, T.12N, R.06E, MDBM
Latitude (NAD83): 38.900371°
Longitude (NAD83): -121.231062°
Watershed: Upper Coon-Upper Auburn (18020161)

Scale in Feet
0 2,000

Lincoln (1992, NAD 83)
Gold Hill (1954 pr. 1973, NAD 27)
CA 7.5-minute Topographic Quadrangle
US Geological Survey.

Map Contents

Project Boundary - 98.05 ac.

Sources: Esri, USGS

ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Location_Vicinity\Hemphill_LnV.aprx (l-klumquist 9/30/2020)

Map Date: 9/30/2020

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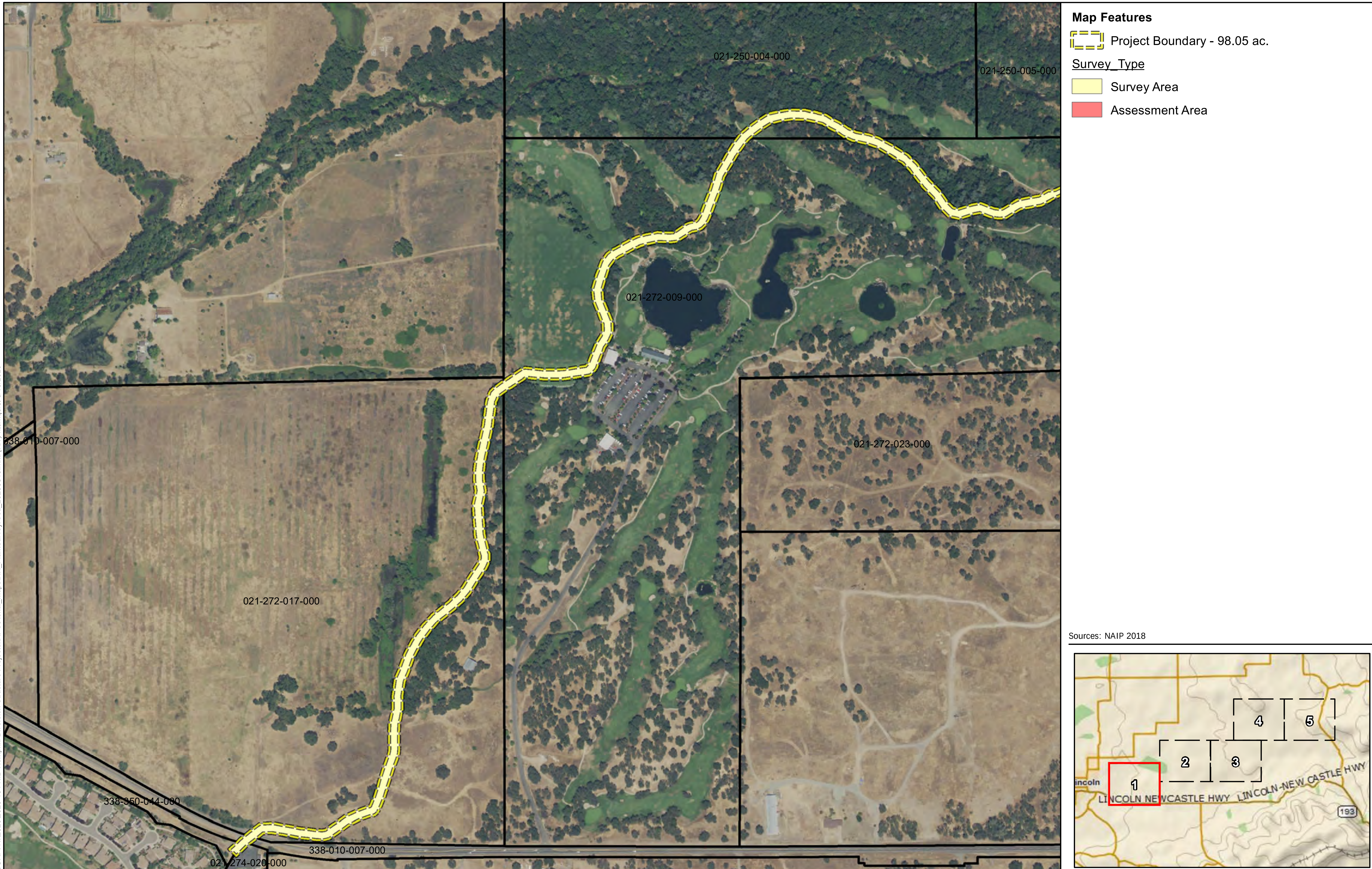
Figure 1. Project Location and Vicinity

2020-104 NID Hemphill Diversion Structure



Map Date: 8/19/2020

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Figure 2. Survey Area

2020-104 NID-Hemphill Diversion Structure Project

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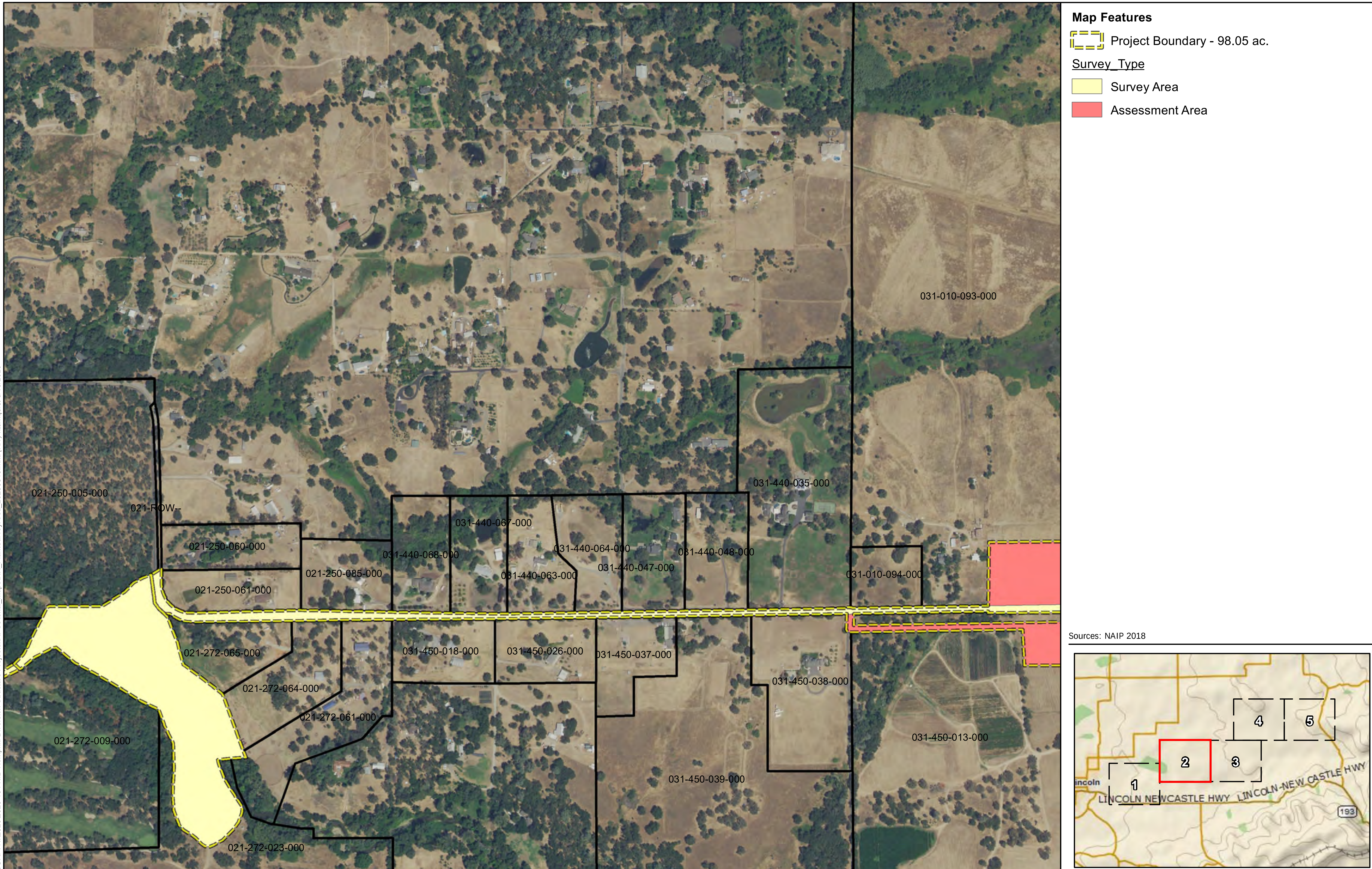

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Map Date: 8/19/2020

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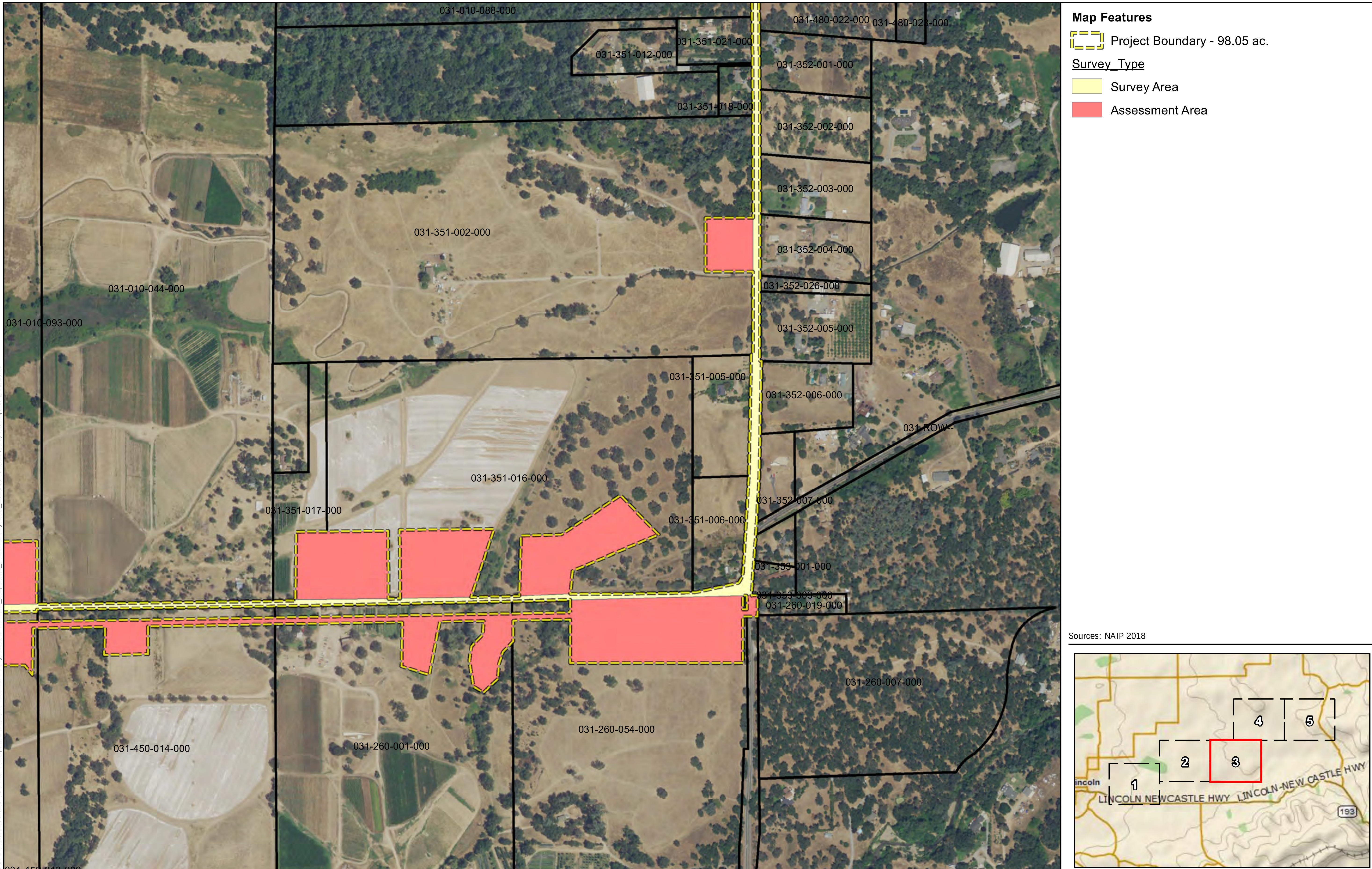
Figure 2. Survey Area

2020-104 NID-Hemphill Diversion Structure Project



Map Date: 8/19/2020

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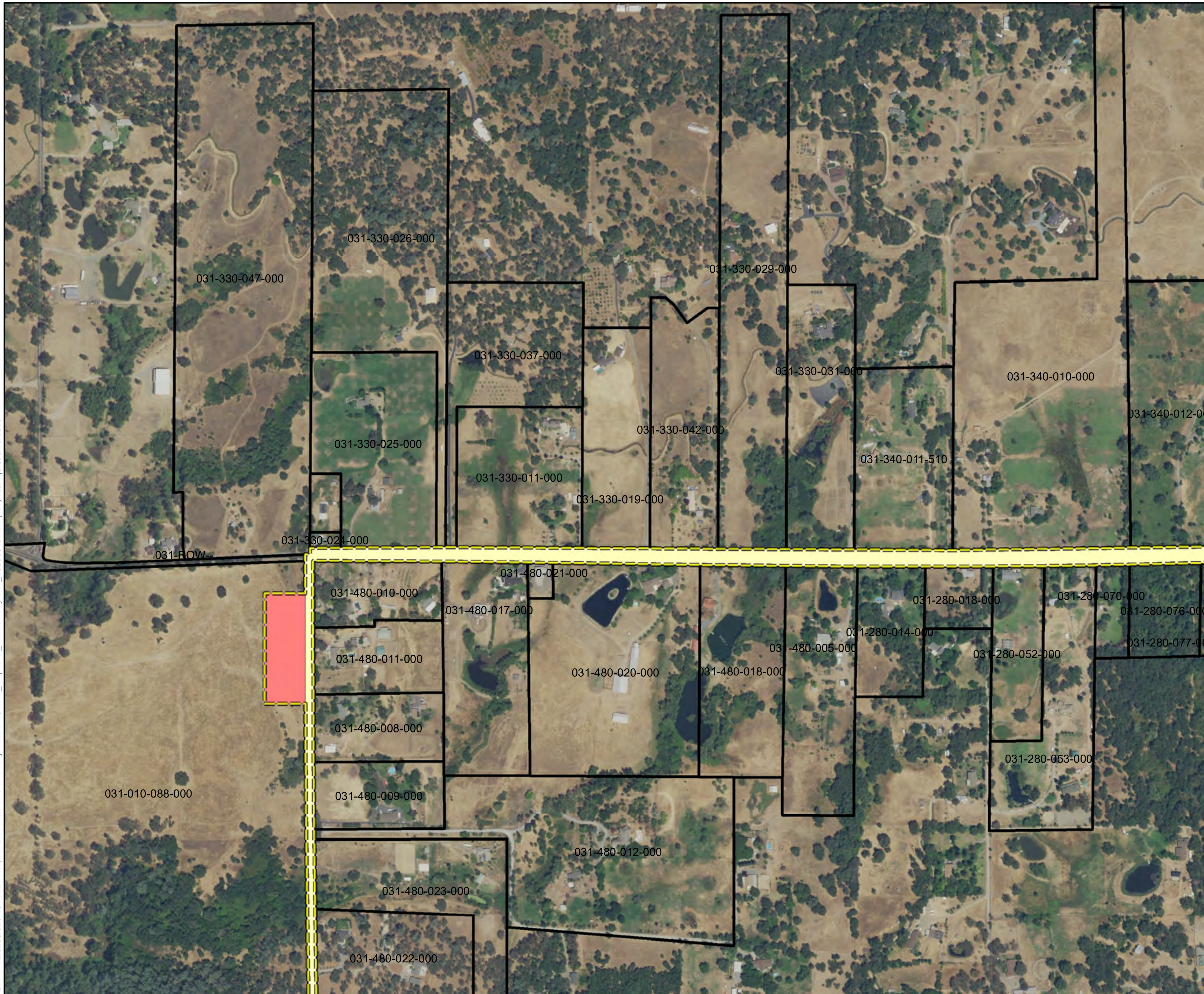
Scale in Feet
0 500

Figure 2. Survey Area

2020-104 NID-Hemphill Diversion Structure Project



Map Features

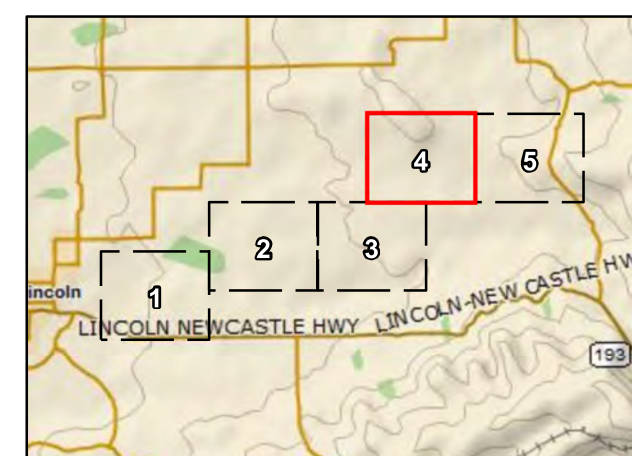
Project Boundary - 98.05 ac.

Survey_Type

Survey Area

Assessment Area

Sources: NAIP 2018



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Map Date: 8/19/2020

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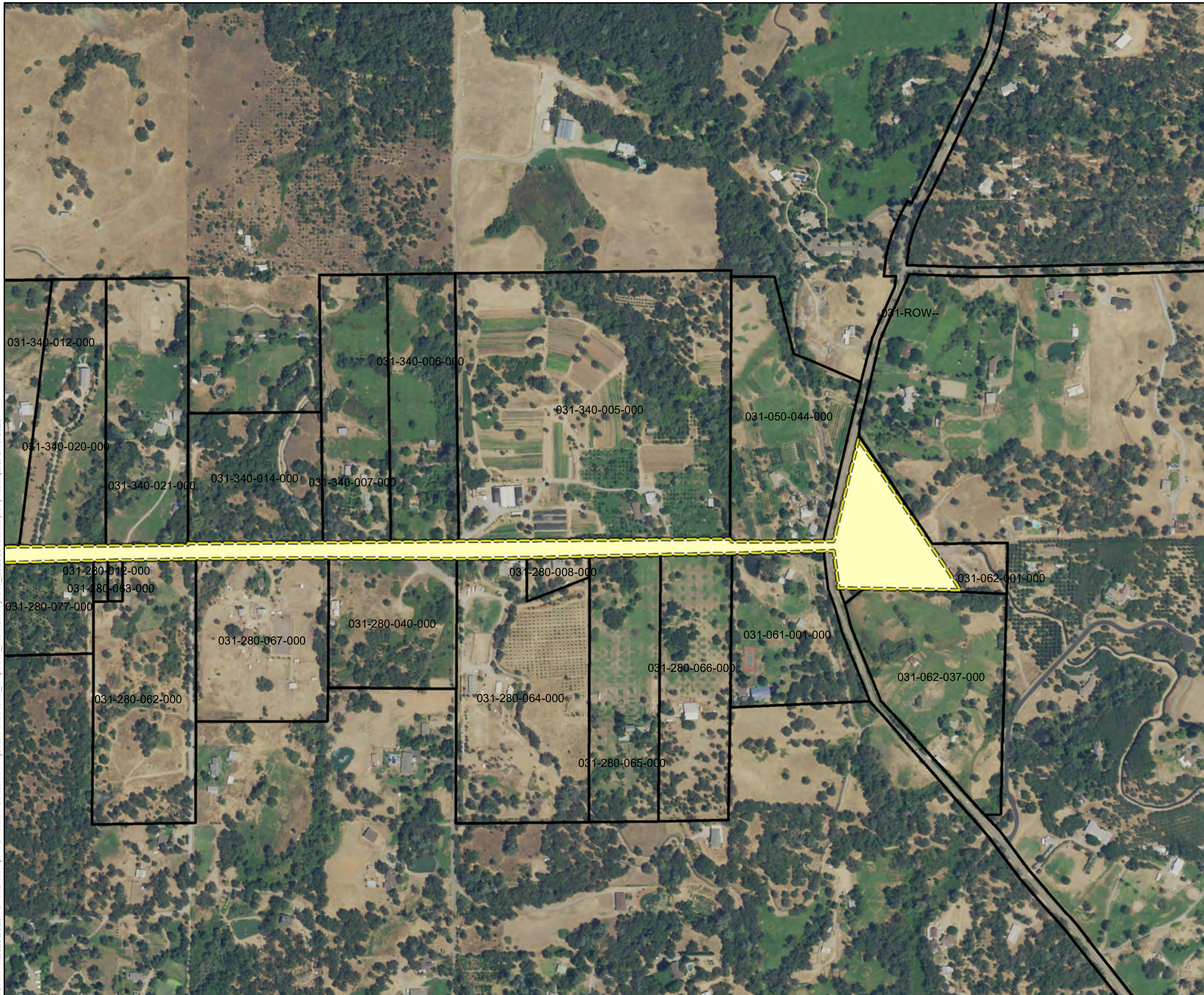
Scale in Feet
0 500

Figure 2. Survey Area

2020-104 NID-Hemphill Diversion Structure Project



Map Features

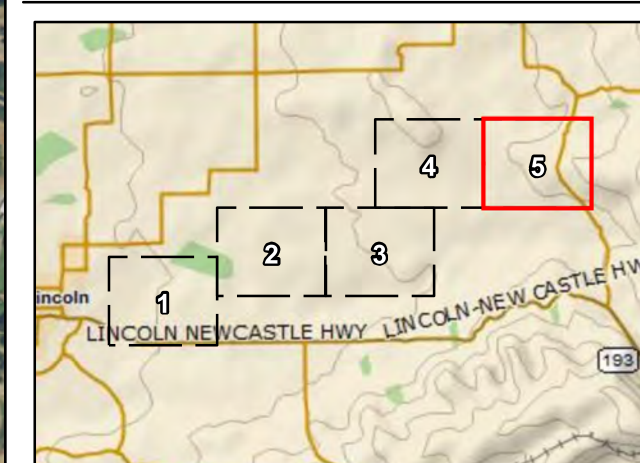
Project Boundary - 98.05 ac.

Survey_Type

Survey Area

Assessment Area

Sources: NAIP 2018



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Map Date: 8/19/2020

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Scale in Feet
0 500

Figure 2. Survey Area

2020-104 NID-Hemphill Diversion Structure Project

- Plants that meet the definitions of endangered or rare under Section 15380 of the State California Environmental Quality Act (CEQA) Guidelines.
- Plants listed as rare under the California Native Plant Protection Act (NPPA) (California Department of Fish and Game Code of California, Section 1900 et seq.).
- Plants considered by the California Native Plant Society (CNPS) to be "rare, threatened, or endangered in California" (California Rare Plant Rank [CRPR] 1B and 2] (see Section 1.3).
- Plants listed by CNPS as species about which more information is needed to determine their status (CRPR 3), and plants of limited distribution (CRPR 4).

1.3 California Rare Plant Ranks

The CNPS maintains the Inventory of Rare and Endangered Plants of California (CNPS 2020), which provides a list of plant species native to California that are threatened with extinction, have limited distributions, and/or low populations. Plant species meeting one of these criteria are assigned to one of six ranks (i.e., CRPR).

The rank system was developed in collaboration with government, academia, non-governmental organizations, and private sector botanists, and is jointly managed by the California Department of Fish and Wildlife (CDFW) and the CNPS. The ranks are currently recognized in the California Natural Diversity Database (CNDDB). The following are definitions of the CNPS CRPRs:

- CRPR 1A – presumed extirpated in California and either rare or extinct elsewhere.
- CRPR 1B – rare, threatened, or endangered in California and elsewhere.
- CRPR 2A – presumed extirpated in California, but more common elsewhere.
- CRPR 2B – rare, threatened, or endangered in California but more common elsewhere.
- CRPR 3 – a review list of plants about which more information is needed.
- CRPR 4 – a watch list of plants of limited distribution.

Additionally, the CNPS has defined Threat Ranks that are added to the CRPR as an extension. Threat Ranks designate the level of threat on a scale of 0.1 through 0.3, with 0.1 being the most threatened and 0.3 being the least threatened. Threat Ranks are generally assigned for all plants ranked 1B, 2B, or 4, and for the majority of plants ranked 3. Plant species ranked 1A and 2A (presumed extirpated in California), and some species ranked 3, which lack threat information, do not typically have a Threat Rank extension. The following are definitions of the CNPS Threat Ranks:

- Threat Rank 0.1 – Seriously threatened in California (over 80 percent of occurrences threatened/high degree and immediacy of threat).
- Threat Rank 0.2 – Moderately threatened in California (20-80 percent occurrences threatened/moderate degree and immediacy of threat).

- Threat Rank 0.3 – Not very threatened in California (<20 percent of occurrences threatened/low degree and immediacy of threat or no current threats known).

Factors, such as habitat vulnerability and specificity, distribution, and condition of occurrences, are considered in assigning the Threat Rank, and differences in Threat Ranks do not constitute additional or different protection (CNPS 2020). Depending on the policy of the lead agency, substantial impacts to plants listed as CRPR 1A, 1B, 2, and 3 (regardless of threat rank) are typically considered significant under CEQA Guidelines Section 15380. For CRPR 4 species (regardless of threat rank), significance under CEQA is typically evaluated if the lead agency has determined those plants to be of local significance or regional importance. Such plants may be identified in local Habitat Conservation Plans or City or County General Plans.

1.4 Sensitive Natural Communities

The CDFW maintains the *California Natural Community List* (CDFW 2020), which provides a list of vegetation alliances, associations, and special stands as defined in the *Manual of California Vegetation* (MCV) (Sawyer et al. 2009), along with their respective State and global rarity ranks. Natural communities with a State rarity rank of S1, S2, or S3 are considered sensitive natural communities. Depending on the policy of the lead agency, impacts to sensitive natural communities may be considered significant under CEQA.

2.0 METHODS

2.1 Literature Review

Prior to conducting field surveys, background information was collected on the potential presence of special-status plants within or near the Study Area from a variety of sources. This included a review of resource agency species lists, literature review, online database query, voucher specimen review, and reference population review. The following resources were used as part of the literature review:

- CDFW CNDDB record search for the “Gold Hill, California” and “Lincoln, California” 7.5-minute quadrangles and the 10 surrounding USGS quadrangles (CDFW 2020);
- USFWS Information, Planning, and Consultation System Resource Report List for the Study Area (USFWS 2020); and
- CNPS’ electronic Inventory of Rare and Endangered Plants of California for the “Gold Hill, California” and “Lincoln, California” 7.5-minute quadrangles and the 10 surrounding USGS quadrangles (CNPS 2020).

2.2 Special-Status Plants Considered for the Study Area

Based on species occurrence information from the CNDDB, the literature review, and general site knowledge, a list of special-status plant species requiring evaluation to determine their potential to occur within the Study Area was generated (Attachment A). Only special-status plants as defined in Section 1.2

were included in this analysis. Each of these species' potential to occur within the Study Area was assessed based on the following criteria:

- **Present** - Species was previously observed during field surveys or is known to occur within the Study Area based on documented occurrences within the CNDDB or other literature.
- **Potential to Occur** - Habitat (including soils and elevation requirements) for the species occurs within the Study Area based on site assessment or the literature research.
- **Low Potential to Occur** - Marginal or limited amounts of habitat occur, and/or the species is not known to occur within the vicinity of the Study Area based on CNDDB records and other available documentation.
- **Absent** - No suitable habitat (including soils and elevation requirements) and/or the species is not known to occur within the vicinity of the Study Area based on CNDDB records and other documentation.

2.3 Target Species

All of the species presented in Attachment A were evaluated for their potential to occur within the Study Area, and a target list of species was generated (Table 1). The target list includes all species determined to be present, have potential to occur, or have low potential to occur within the Study Area. Table 1 includes the listing status, a brief habitat description, the flowering period, and a determination on the potential to occur within the Study Area for each target species.

Table 1. Target Species for Special-Status Plant Surveys

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Mexican mosquito fern (*Azolla microphylla*)	–	–	4.2	Marshes and swamps, ponds or slow-moving bodies of water (98'–328').	August	Potential to occur. Suitable habitat present onsite.
Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	–	–	1B.2	Chaparral, cismontane woodland, and valley and foothill grassland, sometimes on serpentinite soils (148'–5,102').	March–June	Potential to occur. Suitable habitat present onsite.
Valley brodiaea (*Brodiaea rosea* ssp. *vallicola*)	–	–	4.2	Occurs in old alluvial terraces and silty, sandy, or gravelly soils in vernal pools and swales within valley and foothill grassland (33'–1,100').	April–May	Potential to occur. Suitable habitat present onsite.
Hispid bird's-beak (*Chloropyron molle* ssp. *hispidum*)	–	–	1B.1	Alkaline soils in meadows and seeps, playas, and valley and foothill grasslands (3'–509').	June–September	Low potential to occur. While no suitable habitat was observed within the Survey Area, marginal habitat may be present within the Assessment Area.

Table 1. Target Species for Special-Status Plant Surveys

Common Name (Scientific Name)	Status ESA	Status CESA	Status Other	Habitat Description	Survey Period	Potential to Occur On-site
Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeeae*)	–	–	4.2	Chaparral, cismontane woodlands, and lower montane coniferous forest often along roadcuts (246'–3,002').	May–July	Low potential to occur. Marginal habitat present onsite.
Dwarf downingia (*Downingia pusilla*)	–	–	2B.2	Mesic areas in valley and foothill grassland, and vernal pools. Species appears to have an affinity for slight disturbance (i.e., scraped depressions, ditches) (Baldwin et al. 2012, CDFW 2020) (3'–1,460').	March–May	Potential to occur. Suitable habitat present onsite.
Stinkbells (*Fritillaria agrestis*)	–	–	4.2	Clay and sometimes serpentinite soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (33'–5,102').	March–June	Low potential to occur. Marginal habitat present onsite.
Butte County fritillary *(Fritillaria eastwoodiae)*	–	–	3.2	Chaparral, cismontane woodland, and openings in lower montane coniferous forest and occasionally is found on serpentinite soils (164'–4,921').	March–June	Low potential to occur. Marginal habitat present onsite.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	–	CE	1B.2	Marshes, swamps, lake margins, and vernal pools (33'–7,792').	April–August	Potential to occur. Suitable habitat present onsite.
Ahart's dwarf rush *(Juncus leiospermus* var. *ahartii*)	–	–	1B.2	Mesic areas in valley and foothill grassland. Species has an affinity for slight disturbance such as farmed fields (USFWS 2005) (98'–751').	March–May	Potential to occur. Suitable habitat present onsite.
Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*)	–	–	1B.1	Vernally mesic areas in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools (115'–4,101').	March–June	Potential to occur. Suitable habitat present onsite.
Dubious pea (*Lathyrus sulphureus* var. *argillaceus*)	–	–	3	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest (492'–3,051').	April–May	Low potential to occur. Marginal habitat present onsite.

Table 1. Target Species for Special-Status Plant Surveys

Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Legenere (*Legenere limosa*)	–	–	1B.1	Various seasonally inundated areas including wetlands, wetland swales, marshes, vernal pools, artificial ponds, and floodplains of intermittent drainages (USFWS 2005) (3'–2,887').	April–June	Potential to occur. Suitable habitat present onsite.
Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*)	–	–	4.2	Occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest (295'–4,199').	May–August	Low potential to occur. Marginal habitat present onsite.
Pincushion navarretia (*Navarretia myersii* ssp. *myersii*)	–	–	1B.1	Often acidic soils in vernal pools (66'–1,083').	April–May	Potential to occur. While no suitable habitat was observed within the Survey Area, suitable habitat may be present within the Assessment Area.
Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)	–	–	4.2	Clay and sometimes serpentinite soils in vernally mesic valley and foothill grasslands and sometimes in vernal pools (328'–3,281').	April–June	Potential to occur. Suitable habitat present onsite.
Sacramento Orcutt grass (*Orcuttia viscida*)	FE	CE	1B.1	Vernal pools (98'–328').	April–July	Low potential to occur. While no suitable habitat was observed within the Survey Area, marginal habitat may be present within the Assessment Area.
Sanford's arrowhead (*Sagittaria sanfordii*)	–	–	1B.2	Shallow marshes and freshwater swamps (0'–2,133').	May–October	Potential to occur. Suitable habitat present onsite.

Table 1. Target Species for Special-Status Plant Surveys

Common Name (Scientific Name)	Status ESA	Status CESA	Status Other	Habitat Description	Survey Period	Potential to Occur On-site
Brazilian watermeal (*Wolffia brasiliensis*)	–	–	2B.3	Assorted shallow freshwater marshes and swamps (66'–328').	April–December	Potential to occur. Suitable habitat present onsite.

[1] Habitat descriptions for plant species are from the CNPS Inventory of Rare and Endangered Plants (CNPS 2020).

Status Codes:
ESA Endangered Species Act
CESA California Endangered Species Act
FE FESA listed, Endangered.
FT FESA listed, Threatened.
CE CESA or NPPA listed, Endangered.
1A CRPR/Presumed extinct.
1B CRPRs/Rare or Endangered in California and elsewhere.
2B CRPR /Rare or Endangered in California, more common elsewhere.
0.1 Threat Rank/Seriously threatened in California (over 80 percent of occurrences threatened/high degree and immediacy of threat)
0.2 Threat Rank/Moderately threatened in California (20-80 percent occurrences threatened/moderate degree and immediacy of threat)

As discussed in Section 1.0, only a subset of the target species were identifiable at the time of the survey. These species include:

- Mexican mosquito fern (*Azolla microphylla*)
- Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)
- Hispid bird's-beak (*Chloropyron molle* ssp. *hispidum*)
- Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeeae*)
- Stinkbells (*Fritillaria agrestis*)
- Butte County fritillary (*Fritillaria eastwoodiae*)
- Boggs Lake hedge-hyssop (*Gratiola heterosepala*)
- Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*)
- Legenere (*Legenere limosa*)
- Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*)
- Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*)
- Sacramento Orcutt grass (*Orcuttia viscida*)
- Sanford's arrowhead (*Sagittaria sanfordii*)
- Brazilian watermeal (*Wolffia brasiliensis*)

An additional survey is required to ensure complete survey coverage for the remaining target species.

2.4 Reference Site Visits

Reference populations, where available, were visited to assess phenology and to observe morphology for target species. When reference populations were not available, herbarium specimens, photographs from Calflora (Calflora 2020) and Calphotos (Calphotos 2020), and *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin et al. 2012) were used as a reference. Attachment B identifies the reference source for each of the target species including the location of the population, dates of visits, and phenological stage of the species at the time of the field visits.

2.5 Field Surveys

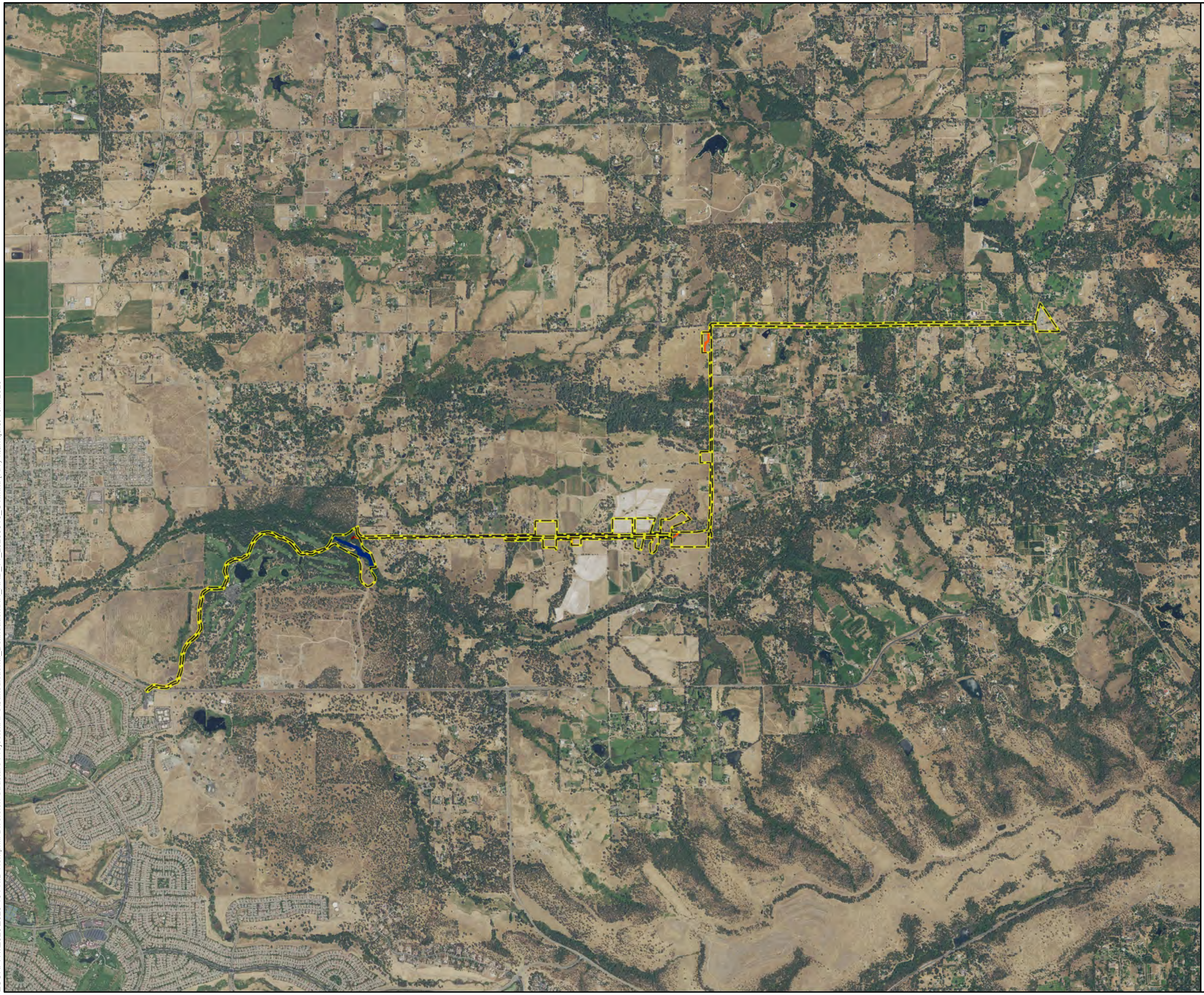
A determinate-level field survey was conducted mostly in accordance with guidelines promulgated by USFWS (USFWS 2000), CDFW (CDFW 2018), and CNPS (CNPS 2001); however, only a subset of the target species were identifiable at the time of the survey. Those species are listed in Section 2.3. The survey was conducted on June 28 and June 29, 2020 by ECORP botanists Hannah Kang and Hannah Stone. A list of field personnel qualifications is included as Attachment C. The biologists walked meandering transects throughout the Survey Area to ensure complete coverage of all suitable habitat for all target species. The Assessment Area was not included in the field survey (Figure 2).

A complete list of all plants observed within the Survey Area was generated (Attachment D). All species were identified to the lowest possible taxonomic level required to assess rarity. Plant species identification, nomenclature, and taxonomy followed *The Jepson Manual: Vascular Plants of California, Second Edition* (Baldwin et al. 2012). Vegetation community classification was based on the classification systems presented in the MCV (Sawyer et al. 2009).

3.0 EXISTING SITE CONDITIONS

The Study Area is located within flat to gently rolling terrain situated in the Sierra Nevada Foothills Subregion of the California Floristic Province (Baldwin et al. 2012). Elevations within the Study Area range from approximately 180 to 430 feet above mean sea level (MSL). Based on information gathered from the closest weather station, the average annual precipitation for the vicinity of the Study Area is approximately 20.3 inches (with the wettest period November-March), and average daily temperatures range from 41.5 degrees Fahrenheit (˚F) in winter to 91.2˚F in summer (National Oceanic and Atmospheric Administration [NOAA] 2020).

The Study Area is largely composed of developed areas including the Hemphill Canal, the Hemphill Diversion Structure, and associated dirt and gravel access roads; paved two-lane roads, portions of the Turkey Creek Golf Course, residential yards, agricultural fields, and the NID maintenance yard. Vegetation within undeveloped portions of the Study Area is primarily oak woodland, although annual grassland occurs on portions of rural residential parcels adjacent to the roadways; and patches of riparian, wetland, or ruderal vegetation is associated with aquatic features or disturbed areas. The Hemphill Canal and Auburn Ravine make up most of the aquatic resources within the Study Area, although there are multiple other aquatic resources along the roadways and within the Assessment Area (Figure 3. *Aquatic Resources Delineation*). A description for each vegetation community and aquatic resource type within the Study Area is presented in the following sections.



Map Features

- Project Areas - 98.05 ac.

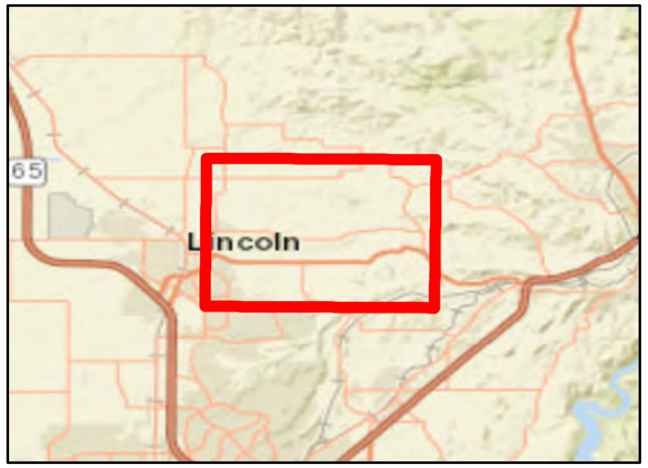
Aquatic Features - 5.387 Total Acres[1]*

- Creek - 2.779 ac.
- Ditch - 1.384 ac.
- Ephemeral Drainage - 0.014 ac.
- Pond - 0.001 ac.
- Riparian Wetland - 0.310 ac.
- Seasonal Wetland - 0.074 ac.
- Seasonal Wetland Swale - 0.826 ac.

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

[1] Subject to U.S. Army Corps of Engineers verification. This exhibit depicts information and data produced in accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 as well as the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program as amended on February 10, 2016, and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required.

** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



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Map Date: 10/1/2020

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Miles
0 0.5 1

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Ditch

Ephemeral Drainage

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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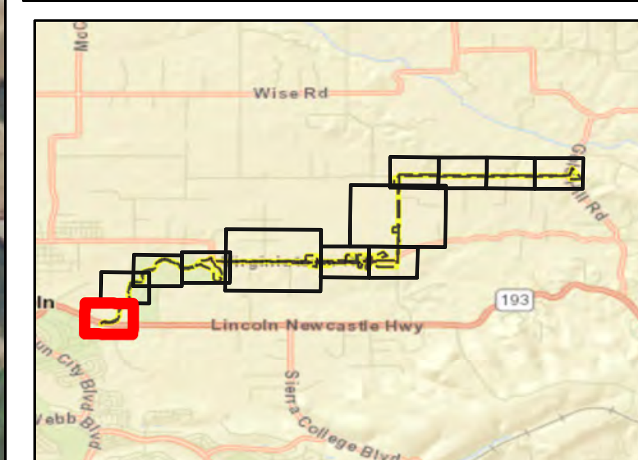

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Ditch

Ephemeral Drainage

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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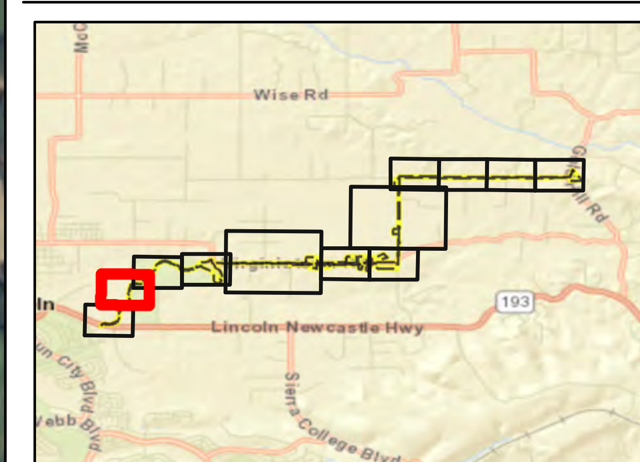

Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

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Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Ditch

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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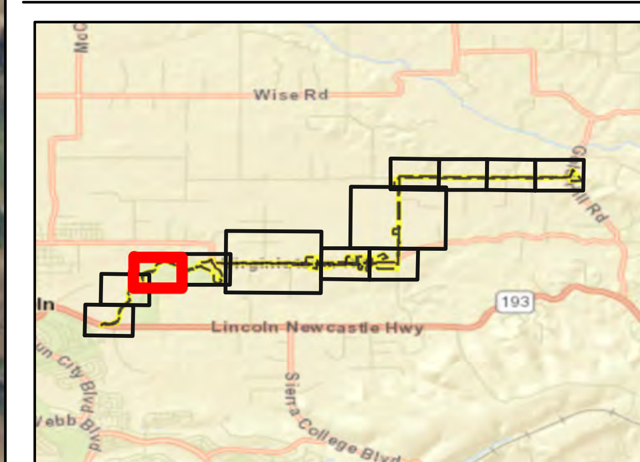

Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

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Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Feature Type

Upland

Waters

Aquatic Features[1]*

Creek

Ditch

Seasonal Wetland

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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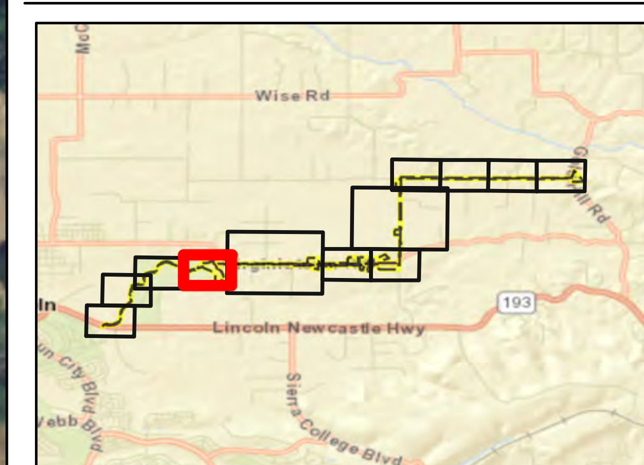

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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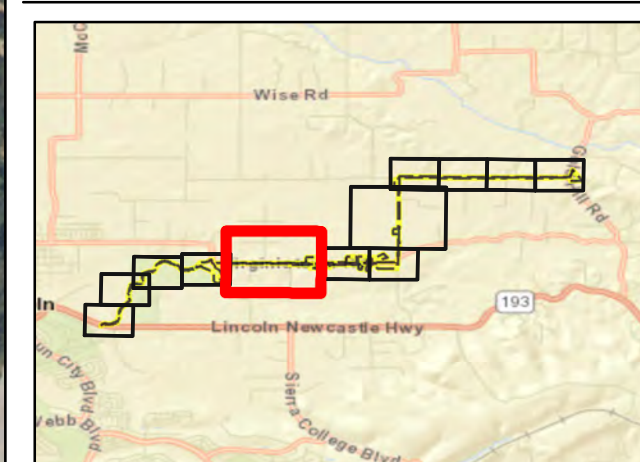

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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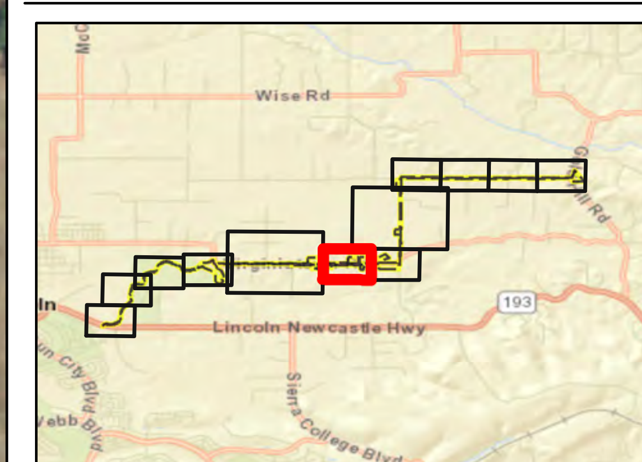

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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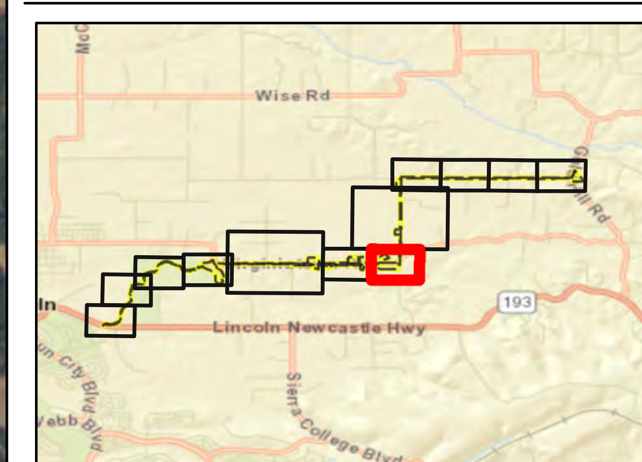

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Existing Culvert

Aquatic Features[1]*

Ditch

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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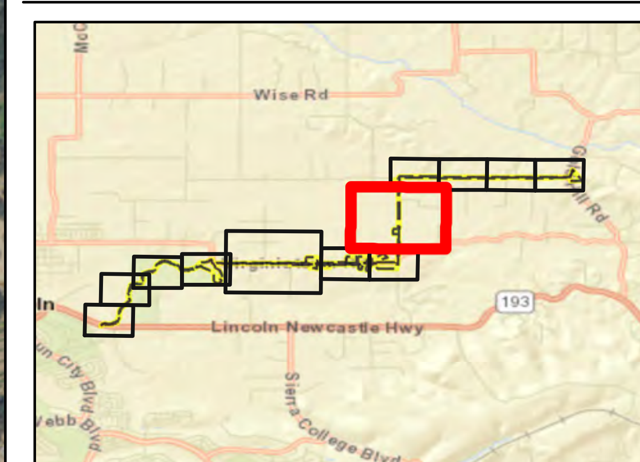

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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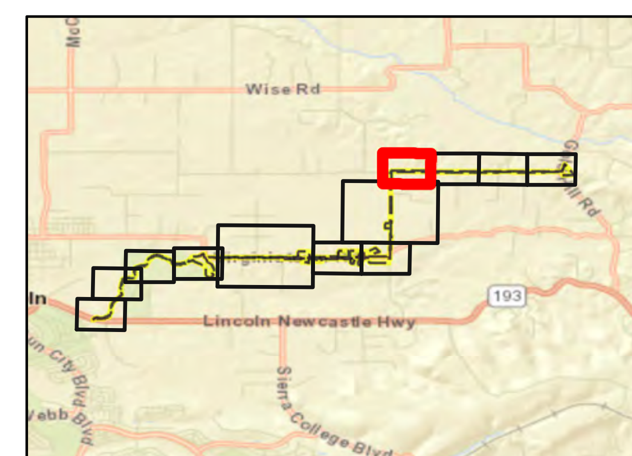

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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

Riparian Wetland

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

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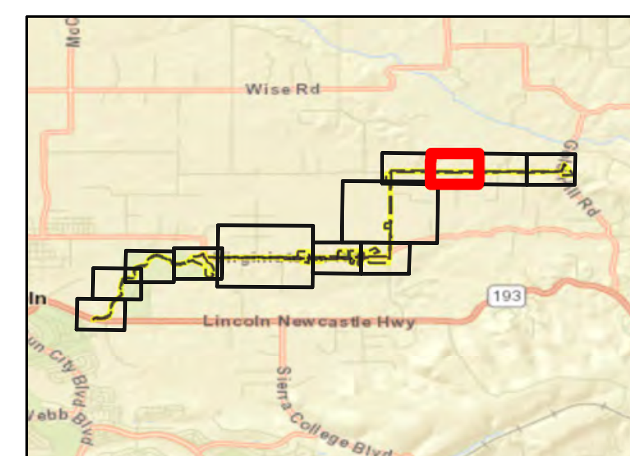
** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

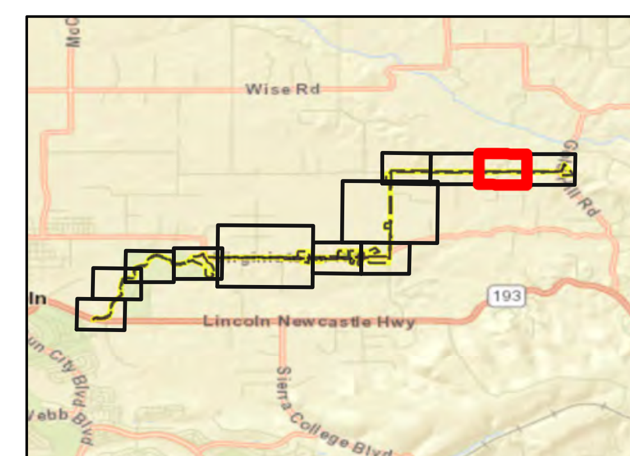
Ditch

Seasonal Wetland Swale

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

[1] Subject to U.S. Army Corps of Engineers verification. This exhibit depicts information and data produced in accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 as well as the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program as amended on February 10, 2016, and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required.

** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

ECORP: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Jurisdictional_Delineation\HH_ARD_v1_20200910.mxd *(KIT)-kturnquist 10/1/2020*

Map Features

Project Areas - 98.05 ac.

Reference Coordinate (NAD83)

Aquatic Features[1]*

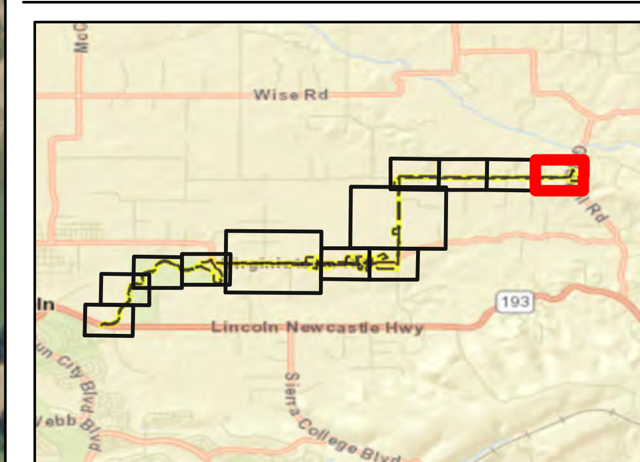
Ditch

Pond

Photo Source: NAIP 2018
Boundary Source: NID/ECORP
Delineator(s): Keith Kwan & Hannah Stone
Coordinate System: NAD 1983 StatePlane California II FIPS 0402 Feet

[1] Subject to U.S. Army Corps of Engineers verification. This exhibit depicts information and data produced in accord with the wetland delineation methods described in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region Version 2.0 as well as the Updated Map and Drawing Standards for the South Pacific Division Regulatory Program as amended on February 10, 2016, and conforms to Sacramento District specifications. However, feature boundaries have not been legally surveyed and may be subject to minor adjustments if more accurate locations are required.

** The acreage value for each feature has been rounded to the nearest 1/1000 decimal. Summation of these values may not equal the total potential Waters of the U.S. acreage reported.*



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Map Date: 10/1/2020

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Scale in Feet
0 200 400

Figure 3. Aquatic Resources Delineation

2020-104 NID-Hemphill Diversion Structure Project

3.1 Vegetation Communities

The Study Area is located within the Placer County Conservation Program (PCCP) future growth area (Placer County et al. 2020). Large-scale mapping of PCCP land cover types has occurred within the PCCP area. As per survey protocol, vegetation communities within the Survey Area were identified at the vegetation alliance level according to the MCV (Sawyer et al. 2009). Vegetation communities based on the MCV are of finer scale and classification, which may align with PCCP land cover types on a macrogroup level. Each vegetation community is described below, as observed during the survey.

3.1.1 Interior Live Oak Woodland

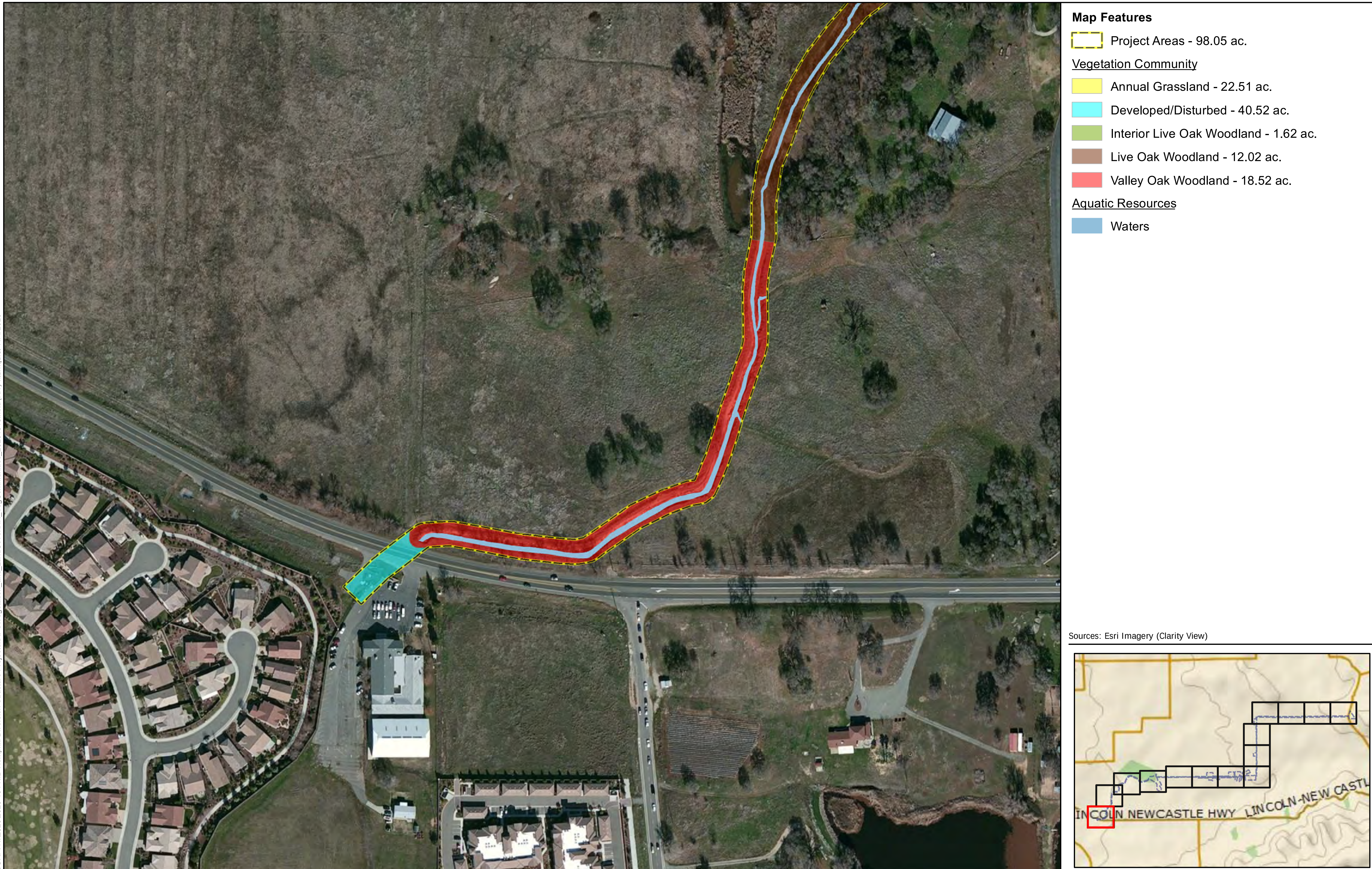
Interior live oak (*Quercus wislizeni*) woodland occurs in drier habitats adjacent to the canal, in a remnant strip between the roads and residential properties, within the Assessment Area, and within the NID facility (Figure 4: *Vegetation Communities*). Interior live oak woodland within the Study Area is consistent with the *Quercus wislizeni* - Forest & Woodland Alliance (Sawyer et al. 2009) and includes several predominant oak species. Interior live oaks are dominant or codominant with blue oak (*Quercus douglasii*), and valley oaks (*Quercus lobata*) are scattered or clumped throughout. Dominant understory vegetation includes poison oak (*Toxicodendron diversilobum*), hedgehog dog-tail grass (*Cynosurus echinatus*), and field hedge parsley (*Torilis arvensis*).

3.1.2 Valley Oak Woodland

Valley oak woodland occurs in more mesic areas along the canal, and between the creek and interior live oak woodlands. Valley oak woodland within the Study Area is consistent with the *Quercus lobata* Forest & Woodland Alliance (Sawyer et al. 2009). Valley oak is the dominant tree species, or co-dominant with interior live oak and/or blue oak. The valley oak woodland near the diversion dam includes a stand of mature California buckeye (*Aesculus californica*) and a stand of black walnuts (*Juglans hindsii*) within the subcanopy.

The valley oak woodland also includes a narrow riparian strip on both sides of Auburn Ravine. Within the riparian strip, white alder is the dominant tree species, although several other tree species are scattered or clumped throughout, including valley oaks, Fremont's cottonwoods (*Populus fremontii*), Oregon ash (*Fraxinus latifolia*), multiple willow species (sandbar willow [*Salix exigua*], arroyo willow [*Salix lasiolepis*], and Goodding's black willow [*Salix gooddingii*]), and black walnut. Dominant understory vegetation within upland areas includes poison-oak, hedgehog dog-tail grass, and field hedge parsley. Dominant understory vegetation within the narrow riparian strip includes Himalayan blackberry (*Rubus armeniacus*) and rice cutgrass (*Leersia oryzoides*).

Valley oak woodland has a State rarity ranking of S1.1.



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Map Date: 11/4/2020

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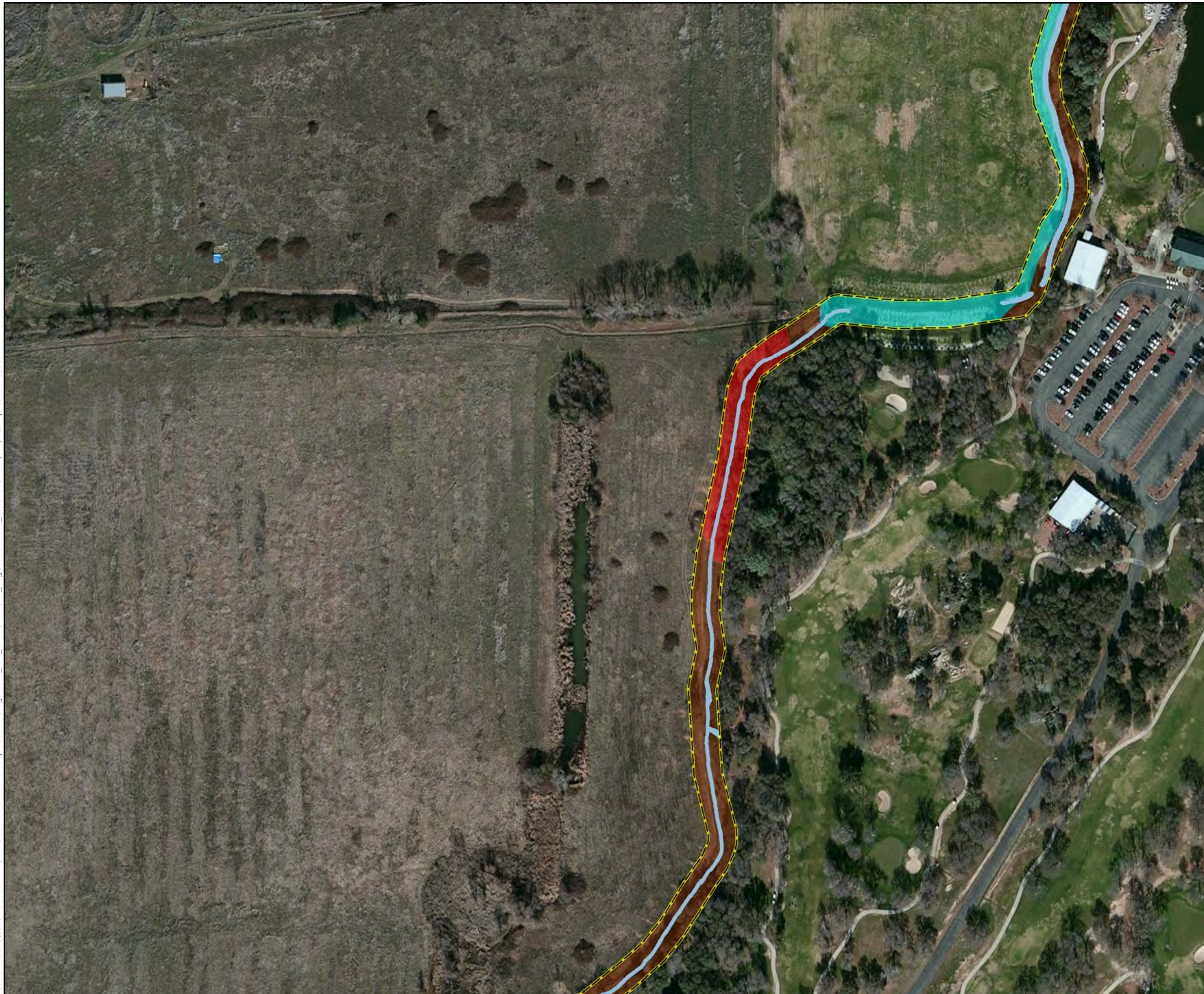
Figure 4. Vegetation Communities
Sheet 1 of 14
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

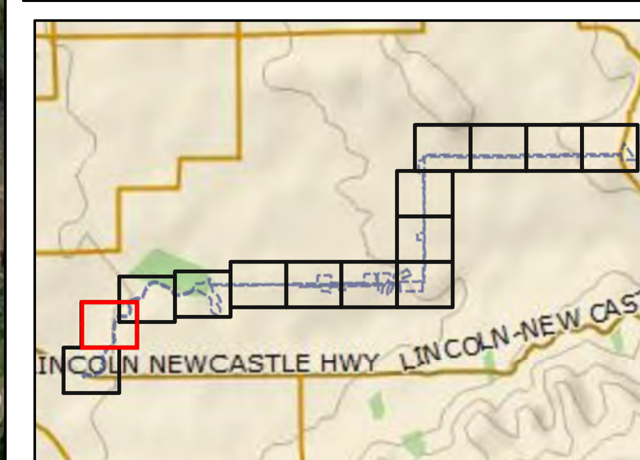
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 2 of 14
2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

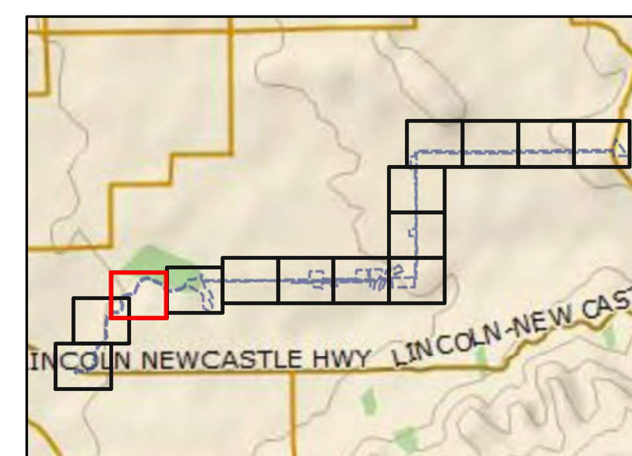
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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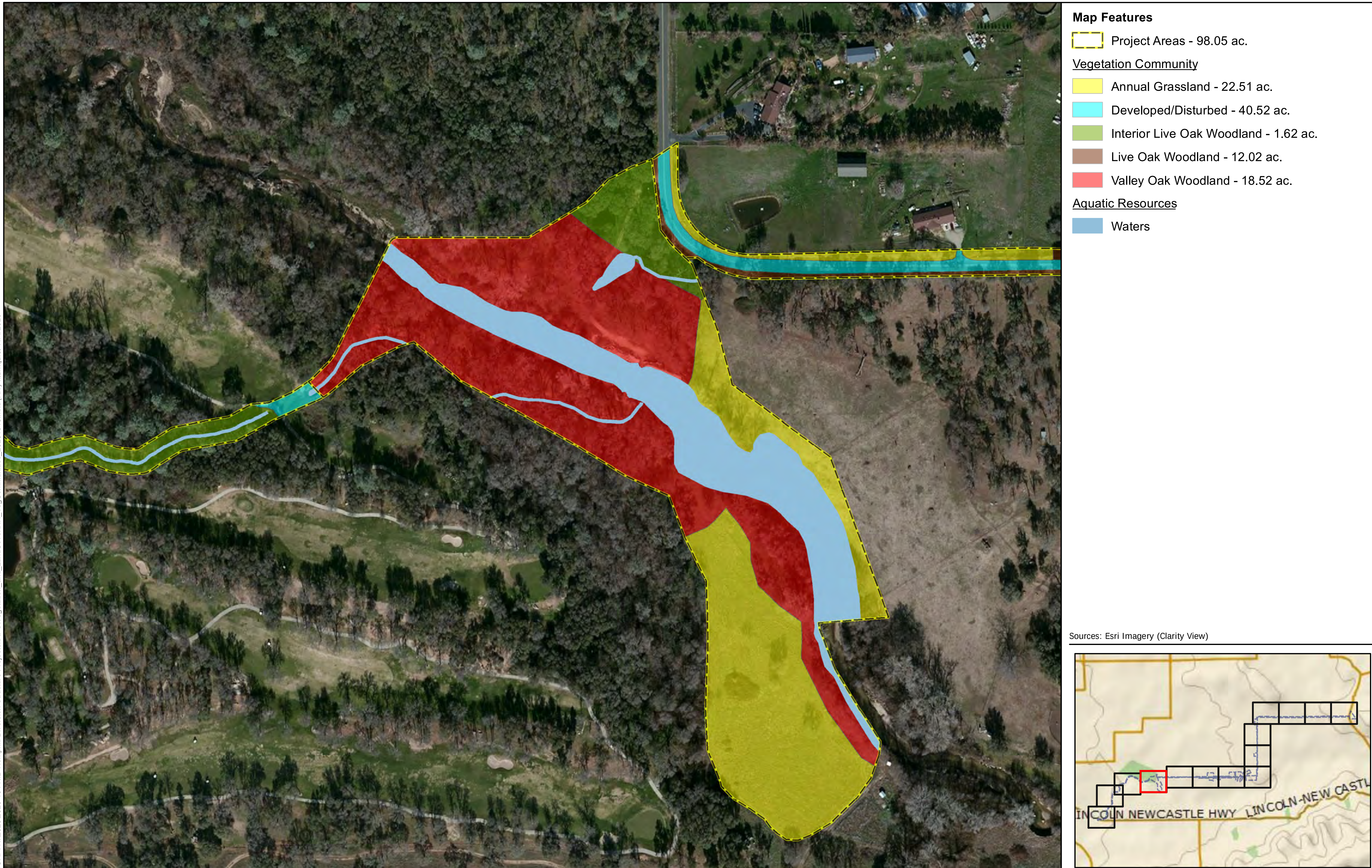
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 3 of 14
2020-104 NID-Hemphill Diversion Structure Project



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Map Date: 11/4/2020

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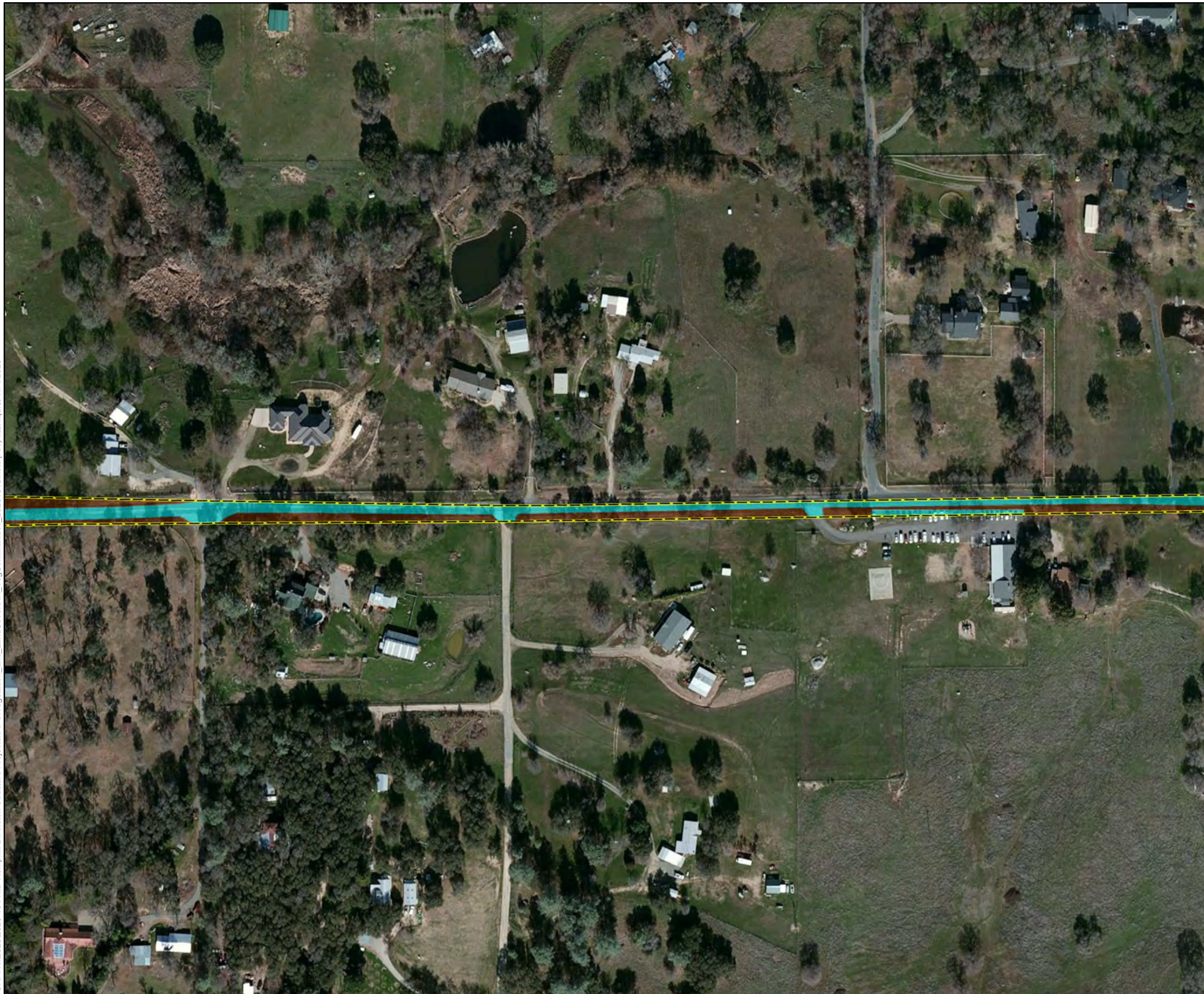
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 4 of 14
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

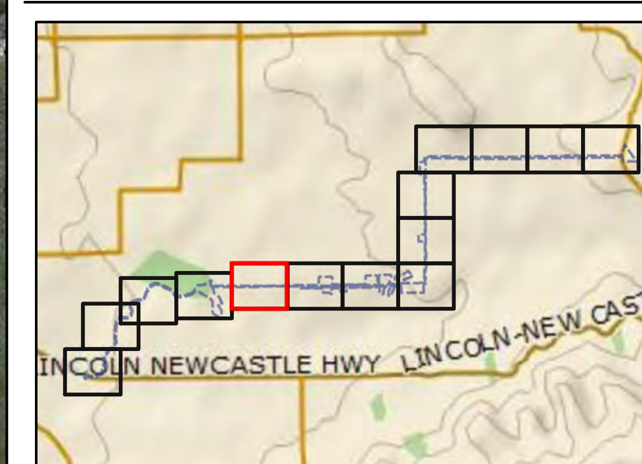
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 5 of 14
2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

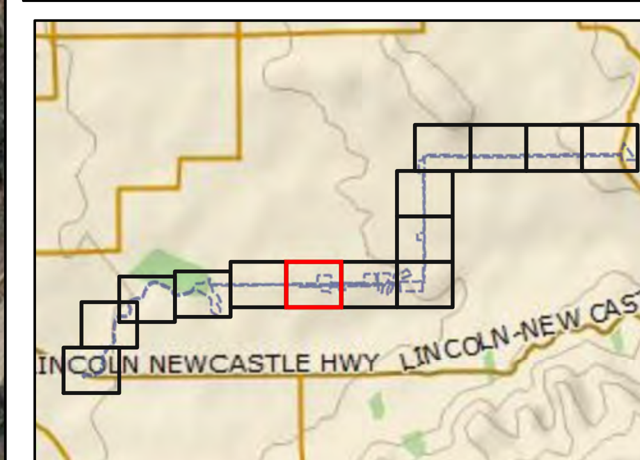
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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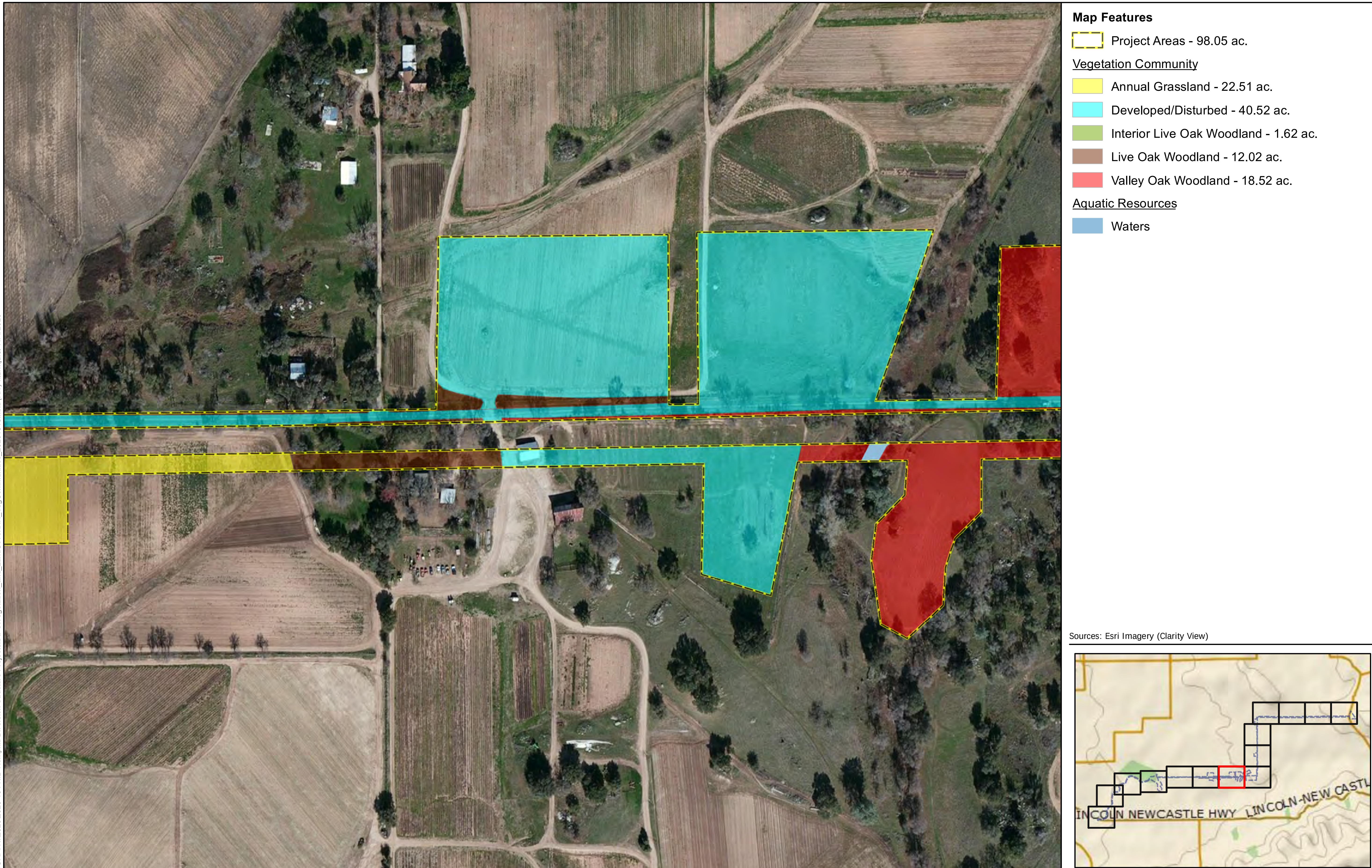
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 6 of 14
2020-104 NID-Hemphill Diversion Structure Project



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Map Date: 11/4/2020

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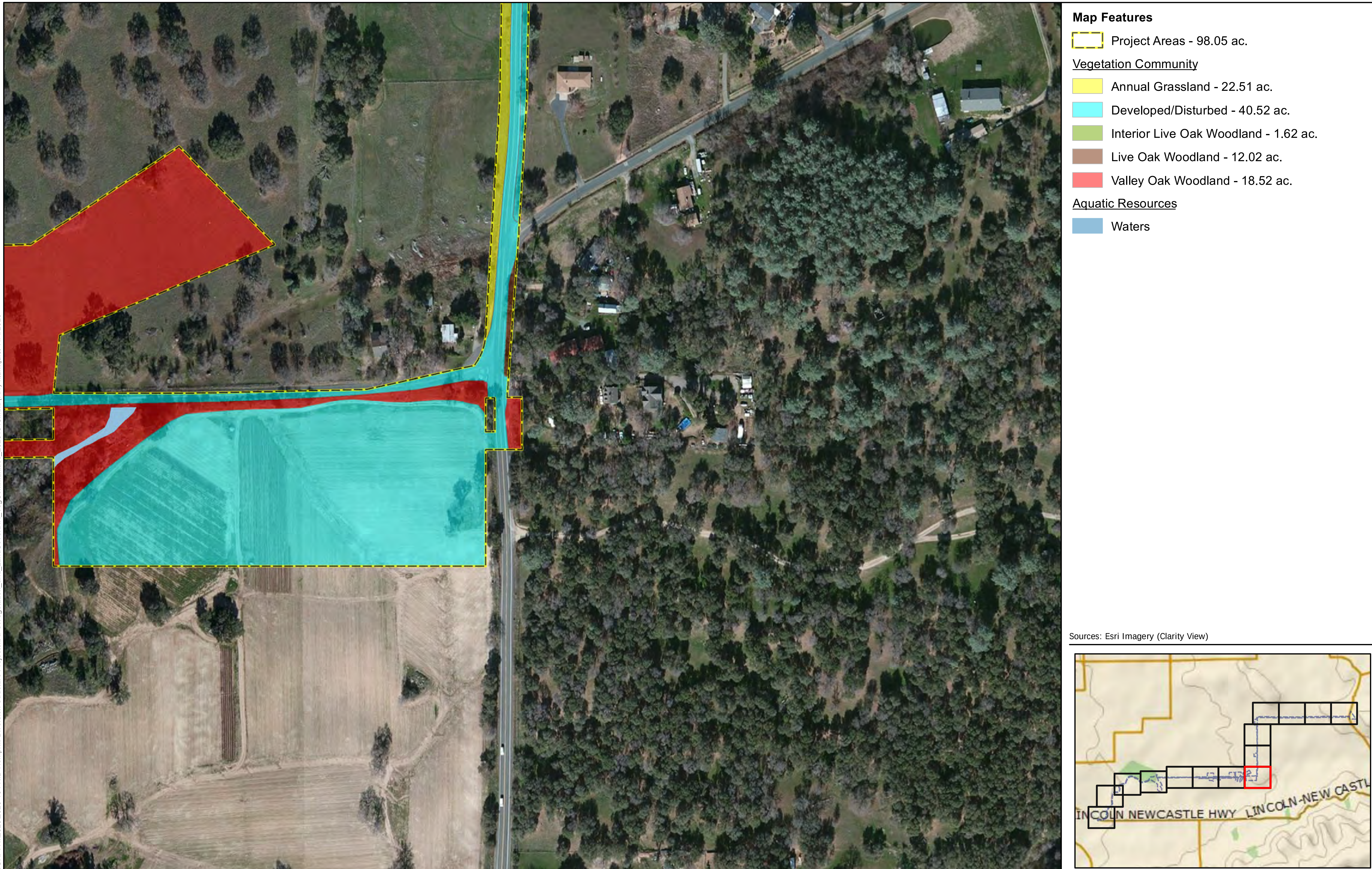
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 7 of 14
2020-104 NID-Hemphill Diversion Structure Project



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Map Date: 11/4/2020

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Figure 4. Vegetation Communities
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2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

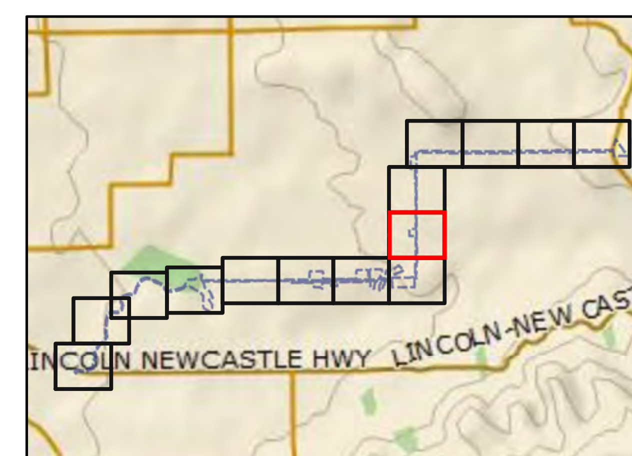
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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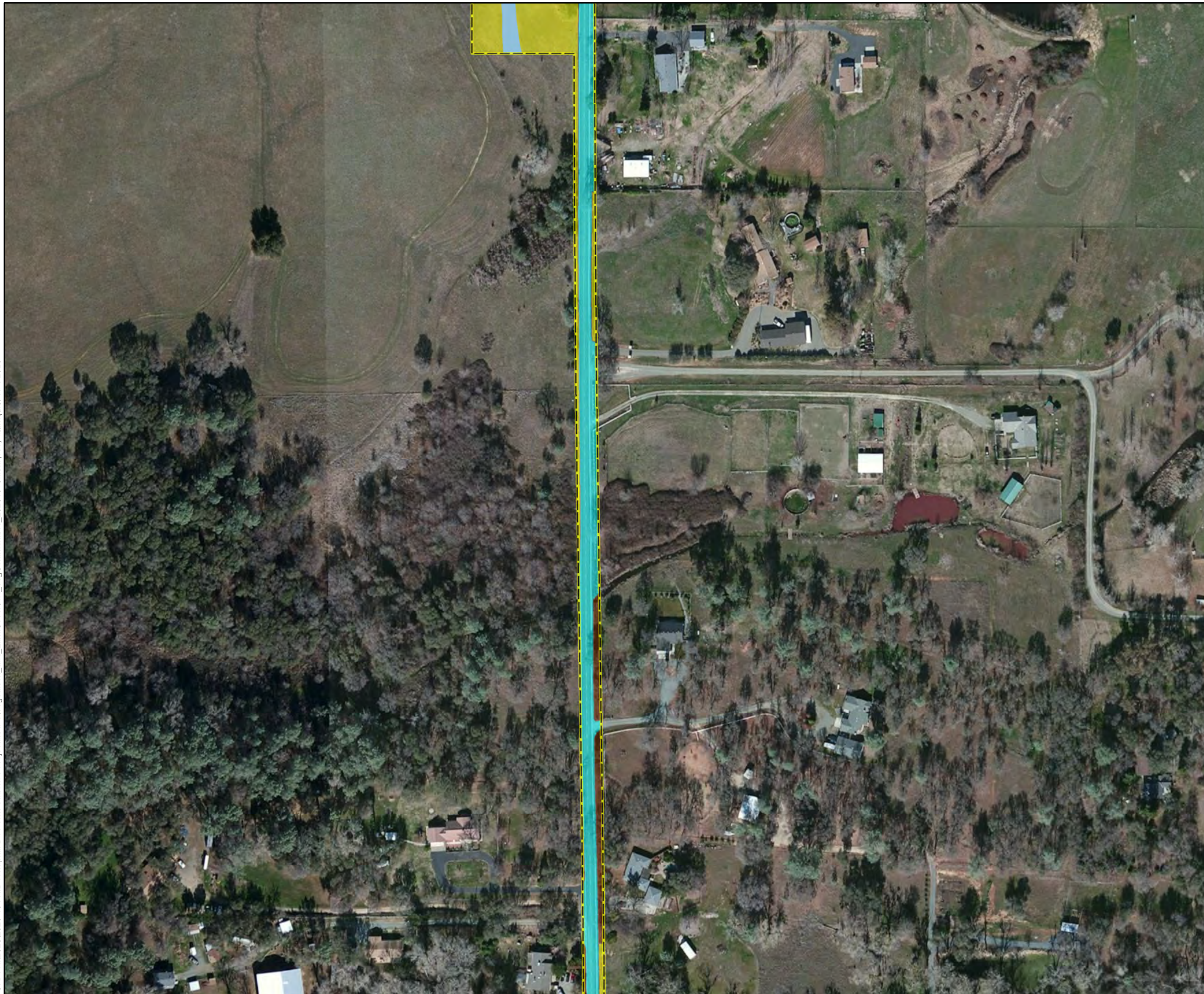
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 9 of 14
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

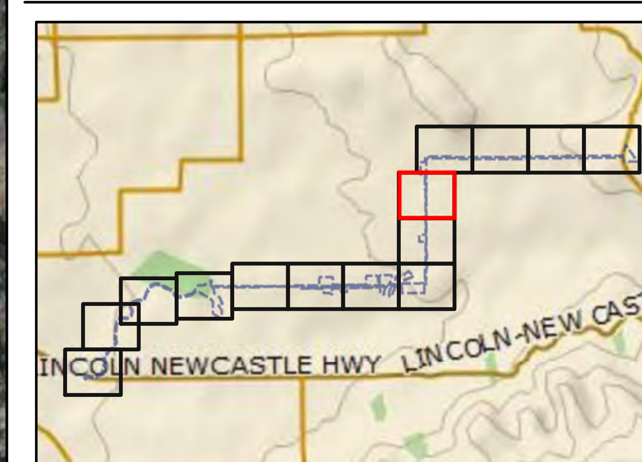
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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Scale in Feet
0 200

Figure 4. Vegetation Communities
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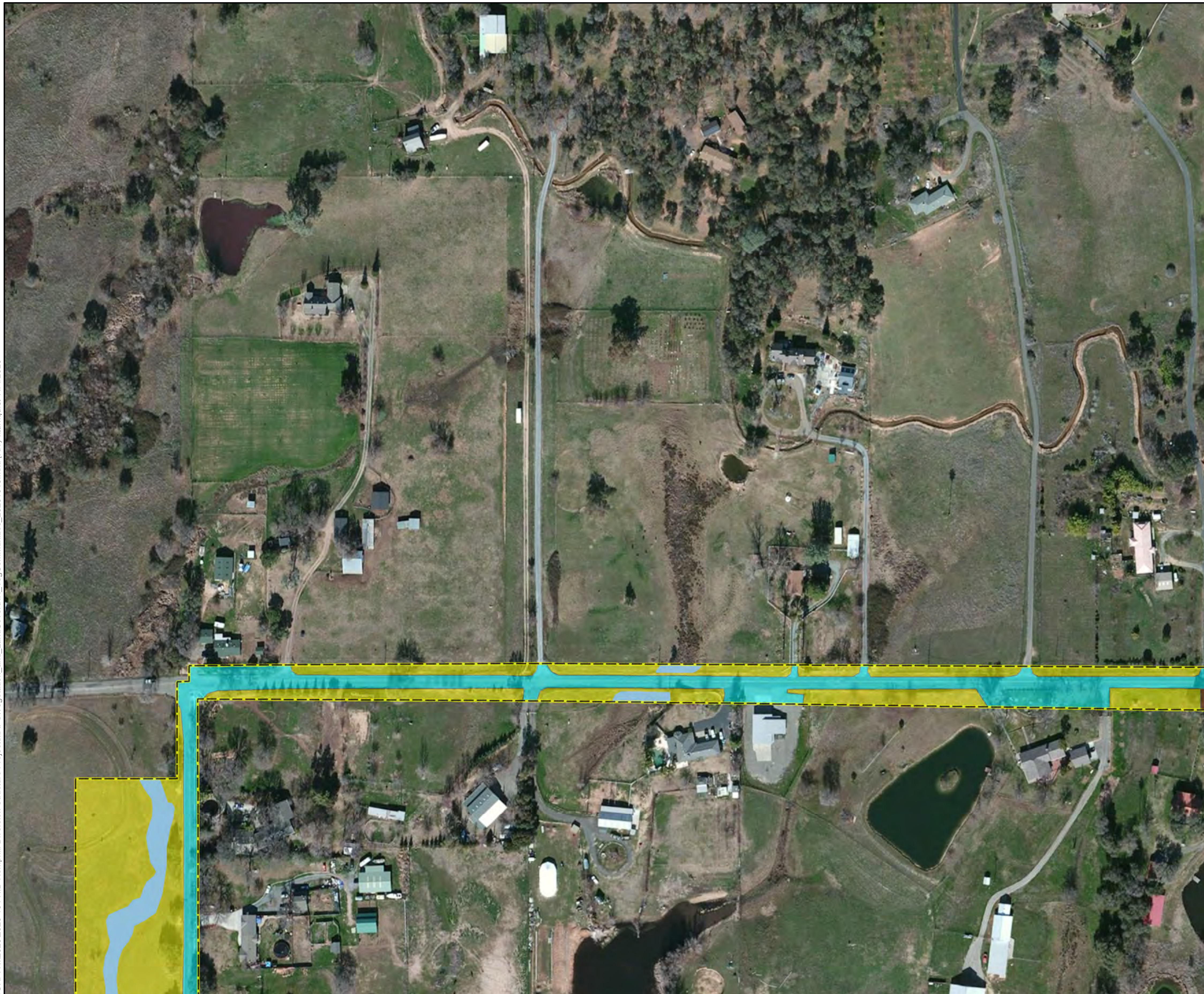
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

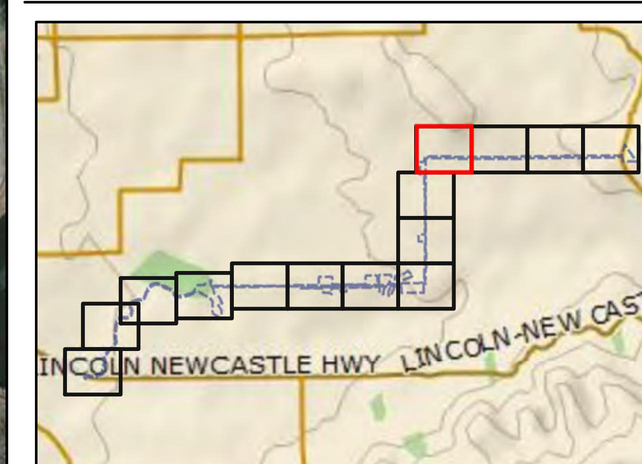
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 11 of 14
2020-104 NID-Hemphill Diversion Structure Project

Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

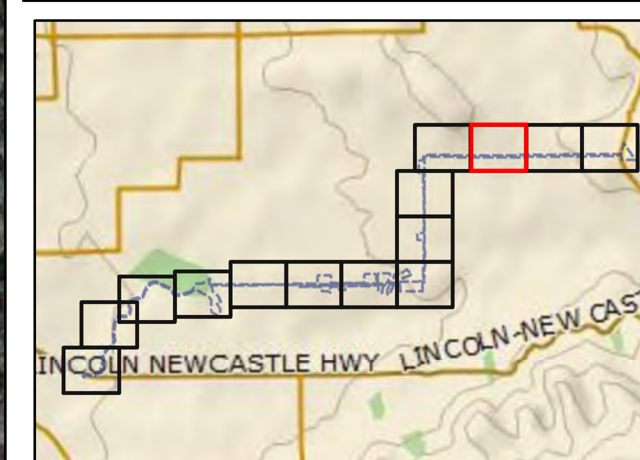
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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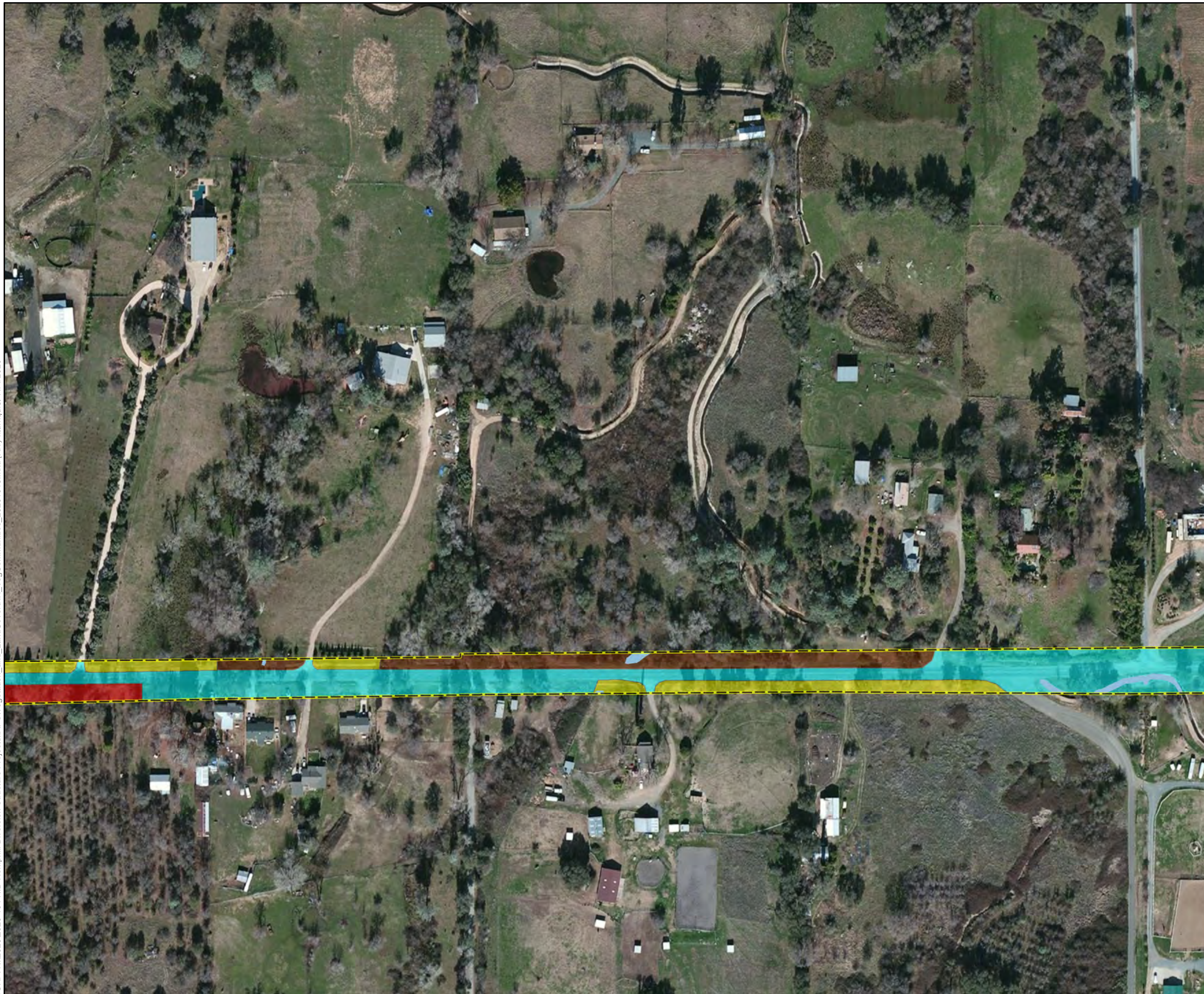
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 12 of 14
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

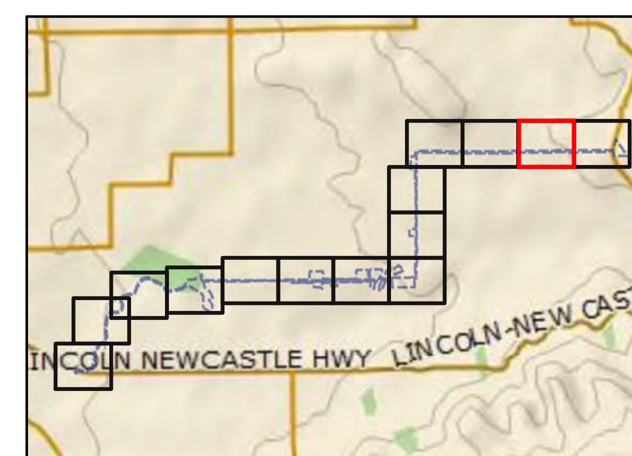
Vegetation Community

- Annual Grassland - 22.51 ac.
- Developed/Disturbed - 40.52 ac.
- Interior Live Oak Woodland - 1.62 ac.
- Live Oak Woodland - 12.02 ac.
- Valley Oak Woodland - 18.52 ac.

Aquatic Resources

- Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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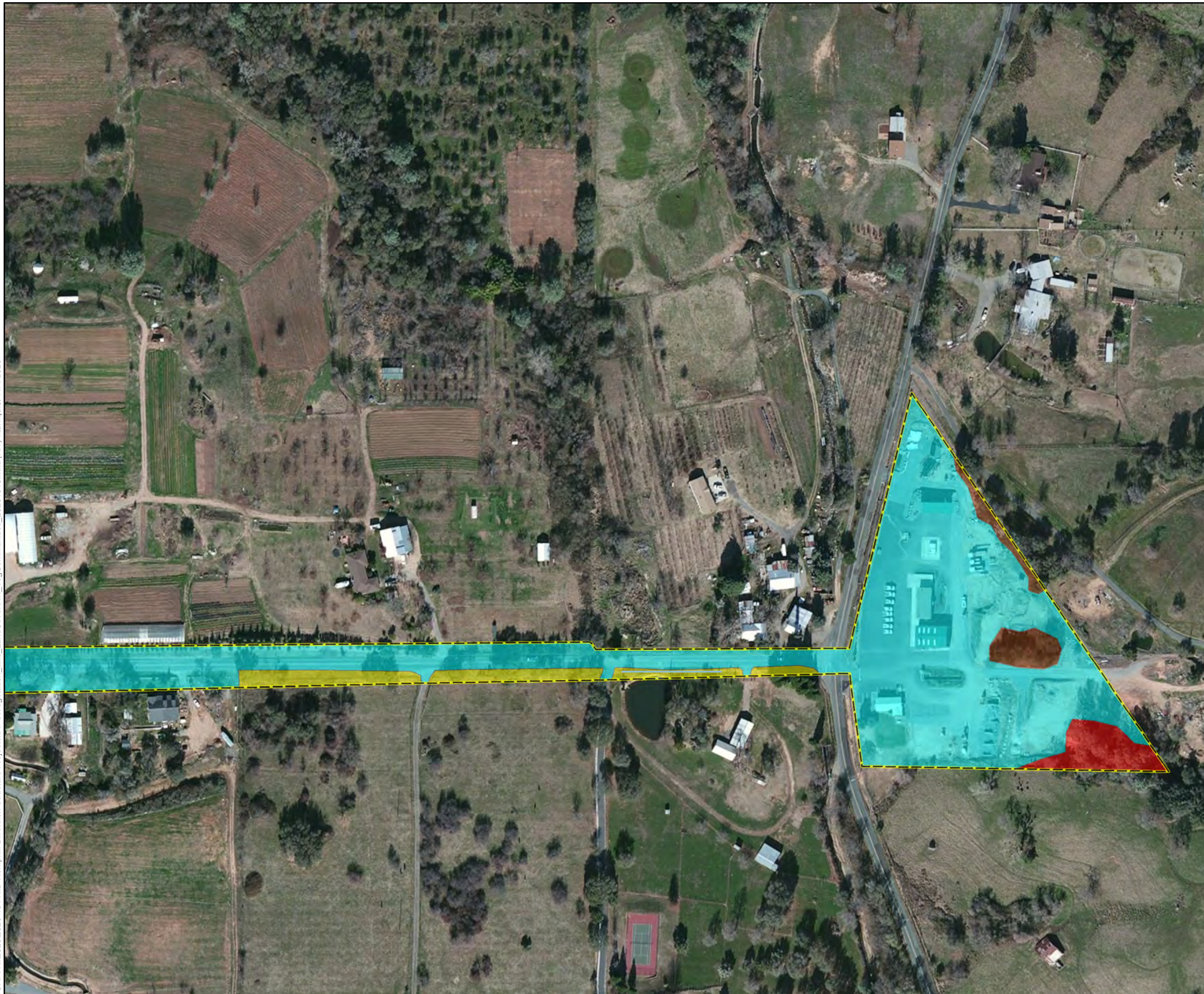
Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 13 of 14
2020-104 NID-Hemphill Diversion Structure Project



Map Features

Project Areas - 98.05 ac.

Vegetation Community

Annual Grassland - 22.51 ac.

Developed/Disturbed - 40.52 ac.

Interior Live Oak Woodland - 1.62 ac.

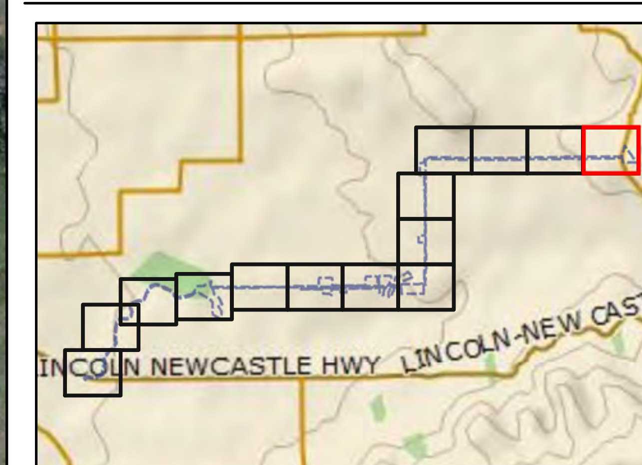
Live Oak Woodland - 12.02 ac.

Valley Oak Woodland - 18.52 ac.

Aquatic Resources

Waters

Sources: Esri Imagery (Clarity View)



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Map Date: 11/4/2020

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Scale in Feet
0 200

Figure 4. Vegetation Communities
Sheet 14 of 14
2020-104 NID-Hemphill Diversion Structure Project

3.1.3 Annual Grassland

Annual grasslands are found mostly on rural residential properties and fallow agricultural fields within the Assessment Area (Figure 4). The annual grasslands onsite are dominated by annual grasses that were either mowed or grazed at the time of the survey. The annual grasslands are likely consistent with the *Avena* spp. - *Bromus* spp. Herbaceous Semi-Natural Alliance (Sawyer et al. 2009). Grasses were hard to identify due to the disturbance, but likely include common non-native species such as wild oats (*Avena* sp.) and brome (*Bromus* sp.). The dominant forb at the time of the survey was narrow tarplant (*Holocarpha virgata*).

3.1.4 Ruderal/Cultivated

Ruderal or cultivated vegetation are located within the developed and disturbed portions of the Study Area. These areas include the dirt and gravel access roads for the canals and diversion dam, portions of the shoulders for the paved roadways, and the NID facility.

Ruderal vegetation was found along the roads and within the disturbed areas of the NID facility. Common ruderal species along the road includes johnsongrass (*Sorghum halepense*), wild oats, shortpod mustard (*Hirschfeldia incana*), prickly lettuce (*Lactuca serriola*), and puncture vine (*Tribulus terrestris*). Common ruderal species within the developed/disturbed areas of the NID facility include Italian ryegrass (*Festuca perennis*), Canada horseweed (*Erigeron canadensis*), shortpod mustard, and johnsongrass.

Cultivated vegetation was found within the Assessment Area and the NID facility. Cultivated vegetation within the Assessment Area included row crops and ornamental species such as pears (*Pyrus* sp.), apples (*Malus* sp.), almonds (*Prunus dulcis*), deodar cedars (*Cedrus deodara*), coast redwood (*Sequoia sempervirens*), crape myrtle (*Lagerstroemia indica*), and glossy privet (*Ligustrum* lucidum). Cultivated vegetation within the NID facility include incense-cedar (*Calocedrus decurrens*), juniper (*Juniperus* sp.), silk tree (*Albizia julibrissin*), and oleander (*Nerium oleander*).

3.2 Aquatic Resources

A preliminary aquatic resource assessment was conducted for the Study Area (Figure 3). The aquatic resource types delineated within the Study Area and the associated vegetation are described in the following sections.

3.2.1 Wetlands

Seasonal Wetlands

Seasonal wetlands are ephemerally wet due to accumulation of surface runoff and rainwater within low-lying areas. Inundation periods tend to be relatively short and they are commonly dominated by nonnative annual and sometimes perennial hydrophytic species. One seasonal wetland was mapped within the Study Area. Dominant plants within the seasonal wetland onsite included tall flatsedge (*Cyperus eragrostis*) and common smartweed (*Persicaria hydropiper*).

Seasonal Wetland Swales

Seasonal wetland swales are generally linear wetland features that convey precipitation runoff and support a predominance of hydrophytic vegetation, but do not exhibit an ordinary high-water mark (OHWM). These are typically inundated for short periods during and immediately after rain events, but usually maintain soil saturation for longer periods during the wet season. Three seasonal wetland swales occur in the eastern portion of the Study Area to the south of Auburn Ravine. Dominant plant species in the seasonal wetland swales included tall flatsedge, Italian ryegrass, dallis grass (*Paspalum dilatatum*), sticky tarweed (*Holocarpha virgata*), soft rush (*Juncus effusus*), Himalayan blackberry (*Rubus armeniacus*), curly dock (*Rumex crispus*), Johnson grass (*Sorghum halepense*), broad-leaf cattail (*Typha latifolia*), and rough cockle-bur (*Xanthium strumarium*).

Riparian Wetlands

Riparian wetlands have been mapped in a low-lying area along Fruitvale Road. This wetland area appears to be artificially irrigated by runoff from upslope rural residences and adjacent irrigated pastures. Dominant plants found in the riparian wetland include Himalayan blackberry, sandbar willow, Goodding's black willow, and broad-leaf cattail.

3.2.2 Non-Wetland Waters

Ditch

Much of the western portion of the Study Area follows a NID ditch (Hemphill Canal), and short segments of ditch were also found along the road corridors. The Hemphill Canal is excavated, unlined, and maintained for water conveyance. Portions of the Hemphill Canal were devoid of vegetation. Dominant species within vegetated portions of the Hemphill Canal include tickseed (*Bidens tripartita*) and barnyard grass (*Echinochloa crus-galli*). Northern water plantain (*Alisma triviale*) was abundant along the edges, and waterweed (*Elodea* sp.) was prevalent within the water.

Pond

There is a small portion of one pond mapped within the Study Area. This pond is located on private property within the Assessment Area. Dominant vegetation consisted of tall flatsedge and dallis grass.

Ephemeral Drainage

Ephemeral drainages are linear features that exhibit a bed and bank and an OHWM. These features typically convey runoff for short periods of time, during and immediately following rain events, and are not influenced by groundwater sources at any time during the year. Ephemeral drainages within the Study Area were located near the Hemphill Canal and were sparsely vegetated due to erosion and scouring.

Creek (Auburn Ravine)

Perennial creeks are linear features that exhibit a bed and bank, OHWM, and flow continuously throughout the year. The perennial creek (Auburn Ravine) mapped within the Study Area was sparsely and sometimes heavily vegetated depending on the depth and velocity of flowing water. Hydrophytic vegetation was present along the banks of Auburn Ravine and in areas of sediment accumulation that provide a substrate suitable for plant establishment and growth. Vegetation within the faster-moving portion of the creek consists of white alder grove as described in Section 3.1. Dominant vegetation in the slow-moving waters of the creek includes patches of cattail (*Typha* sp.), soft rush (*Juncus effuses*), common smartweed (*Persicaria hydropiper*), rice cutgrass, and waterweed.

3.3 Soils

According to the *Web Soil Survey* (NRCS 2020), ten soil units, or types, have been mapped within the Study Area (Figure 5. *Natural Resources Conservation Service Soil Types*):

- (106) Andregg coarse sandy loam, 2 to 9 percent slopes, and
- (109) Andregg coarse sandy loam, 2 to 15 percent slopes, and
- (113) Andregg-Shenandoah complex, 2 to 15 percent slopes
- (129) Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- (130) Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- (173) Pits and dumps
- (180) Rubble land
- (184) Sierra sandy loam, 9 to 15 percent slopes
- (194) Xerofluvents, frequently flooded
- (197) Xerorthents, placer areas

The Andregg series consists of moderately deep, well drained soils that formed in material weathered mainly from granodiorite. The Caperton series consists of shallow, somewhat excessively drained moderately rapidly permeable soils that formed in material weathered mainly from granodiorite and quartz diorite. The Sierra series consists of deep to very deep, well drained soils that formed in material weathered from intrusive igneous rocks (NRCS 2020).

Pits and Dumps are sand and gravel pits, refuse dumps, and rock quarries. Rubble Land is cobbly and stony mine debris and tailings from dredge or hydraulic mining. Xerofluvents, frequently flooded, consist of narrow stringers of somewhat poorly drained recent alluvium adjacent to stream channel. Xerorthents, placer areas, consist of stony, cobbly, and gravelly material commonly adjacent to streams that have been placer mined (NRCS 2020).

Figure 5.
Natural Resources Conservation Service Soil Types 1

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 8/7/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 8/7/2020

Figure 5.
Natural Resources Conservation Service Soil Types 2

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 8/7/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

N

Photo Source: NAIP 2018

Map Date: 8/7/2020

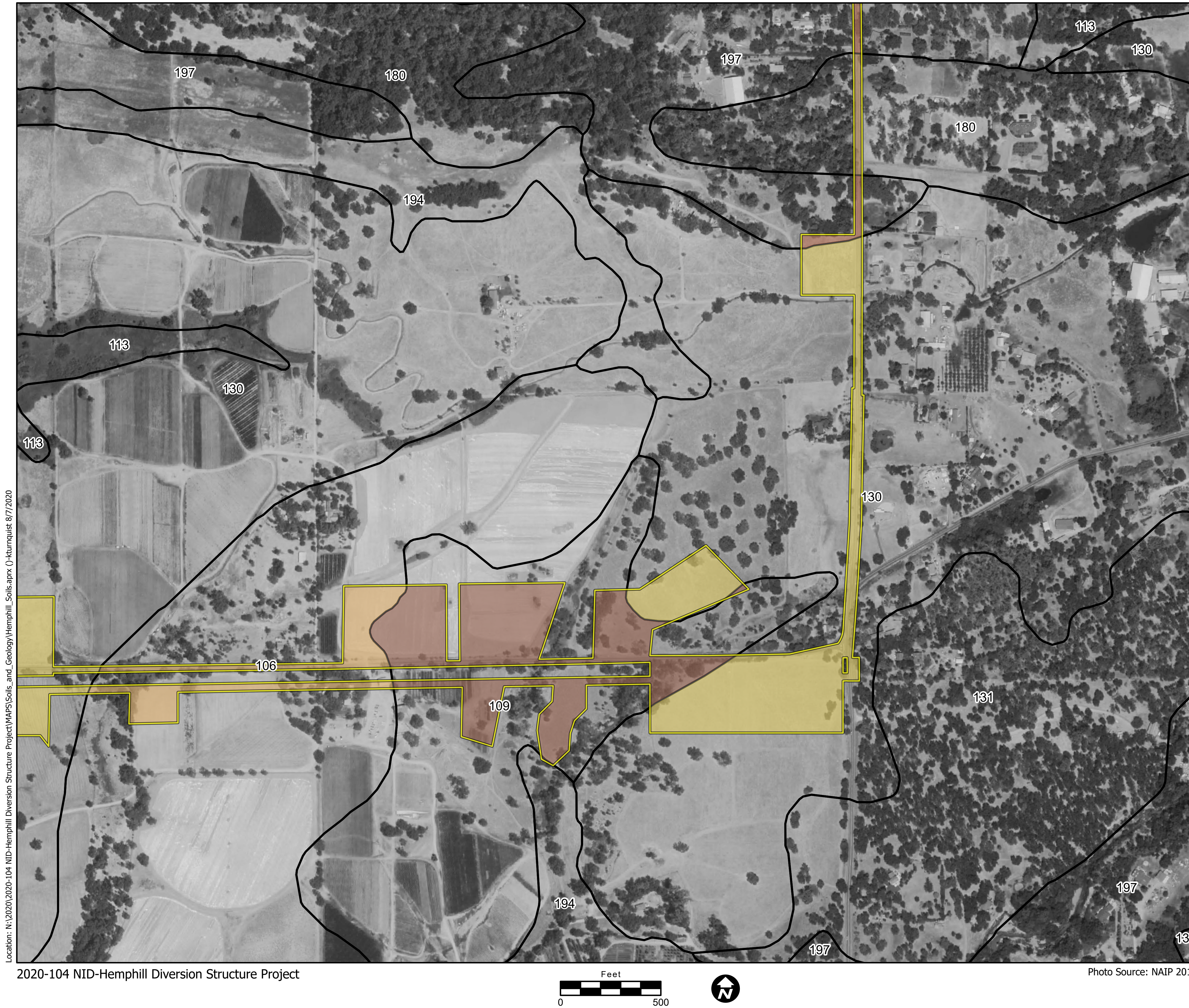

Figure 5.
Natural Resources Conservation Service Soil Types 3

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

2020-104 NID-Hemphill Diversion Structure Project

Photo Source: NAIP 2018

Map Date: 8/7/2020

Figure 5.
Natural Resources Conservation Service Soil Types 4

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 8/7/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 8/7/2020

Figure 5.
Natural Resources Conservation Service Soil Types 5

Map Features

Project Boundary - 98.05 ac.

Series Number - Series Name

- 106 - Andregg coarse sandy loam, 2 to 9 percent slopes
- 109 - Andregg coarse sandy loam, rocky, 2 to 15 percent slopes
- 113 - Andregg-Shenandoah complex, 2 to 15 percent slopes
- 129 - Caperton gravelly coarse sandy loam, 2 to 30 percent slopes
- 130 - Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes
- 173 - Pits and dumps
- 180 - Rubble land
- 184 - Sierra sandy loam, 9 to 15 percent slopes
- 194 - Xerofluvents, frequently flooded
- 197 - Xerorthents, placer areas

Natural Resources Conservation Service (NRCS) Soil Survey Geographic (SSURGO) Database for Placer County, CA

ECORP Consulting, Inc.
ENVIRONMENTAL CONSULTANTS

Location: N:\2020\2020-104 NID-Hemphill Diversion Structure Project\MAPS\Soils_and_Geology\Hemphill_Soils.aprx ()-kturnquist 8/7/2020

2020-104 NID-Hemphill Diversion Structure Project

Feet
0 500

Photo Source: NAIP 2018

Map Date: 8/7/2020

4.0 SPECIES DESCRIPTIONS

Nineteen special-status plants were considered to be target species for the survey. However, as described in Section 1.0 and 2.0, only a subset of these species were identifiable during the survey. A description of each target species is provided in the following sections.

4.1 Mexican Mosquito Fern

Mexican mosquito fern (*Azolla microphylla*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is an herbaceous annual/perennial that occurs in marshes and swamps (e.g., ponds and slow-moving water) (CNPS 2020). Mexican mosquito fern blooms in August and is known to occur at elevations ranging from 98 to 328 feet above MSL (CNPS 2020). The current range for Mexican mosquito fern in California includes Butte, Colusa, Glenn, Inyo, Kern, Lake, Modoc, Nevada, Plumas, San Bernardino, Santa Clara, San Diego, and Tulare counties (CNPS 2020).

While there are no documented CNDDB occurrences of Mexican mosquito fern within five miles of the Study Area (CDFW 2020), the aquatic features onsite represent suitable habitat for this species. Mexican mosquito fern has potential to occur onsite.

4.2 Big-Scale Balsamroot

Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 1B.2 species. This species is an herbaceous perennial that occurs in chaparral, cismontane woodlands, valley and foothill grassland, and occasionally on serpentinite soils (CNPS 2020). Big-scale balsamroot blooms from March through June and is known to occur at elevations ranging from 148 to 5,102 feet above MSL (CNPS 2020). Big-scale balsamroot is endemic to California; the current range of this species includes Alameda, Amador, Butte, Colusa, El Dorado, Lake, Mariposa, Napa, Placer, Santa Clara, Shasta, Solano, Sonoma, Tehama, and Tuolumne counties (CNPS 2020).

There is one documented CNDDB occurrence of big-scale balsamroot within five miles of the Study Area (CDFW 2020), the woodlands and grasslands onsite represent suitable habitat for this species. Big-scale balsamroot has potential to occur onsite.

4.3 Valley Brodiaea

Valley brodiaea (*Brodiaea rosea* ssp. *vallicola*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is a bulbiferous perennial herb that occurs in old alluvial terraces and silty, sandy, or gravelly soils in vernal pools, swales, and valley and foothill grassland (CNPS 2020). Valley brodiaea blooms from April through May and is known to occur at elevations ranging from 33 to 1,100 feet above MSL (CNPS 2020). Valley brodiaea is endemic to California; the current range of this species includes Butte, Calaveras, Nevada, Placer, Sacramento, San Joaquin, Sutter, and Yuba counties (CNPS 2020).

While there are no documented CNDDB occurrences of Valley brodiaea within five miles of the Study Area (CDFW 2020), the seasonal wetlands, seasonal wetland swales, and grasslands onsite represent suitable habitat for this species. Valley brodiaea has potential to occur onsite.

4.4 Hispid Bird's-Beak

Hispid bird's-beak (*Chloropyron molle* ssp. *hispidum*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 1B.1 species. This species is an herbaceous, hemiparasite annual that occurs on alkaline soils in meadows and seeps, playas, and valley and foothill grasslands. Hispid bird's-beak blooms from June through September and is known to occur at elevations ranging from three feet to 509 feet above MSL (CNPS 2020). Hispid bird's-beak is endemic to California; the current range of this species includes Alameda, Fresno, Kern, Merced, Placer, and Solano counties (CNPS 2020).

There is one documented CNDDB occurrence of Hispid bird's-beak within five miles of the Study Area (CDFW 2020). While no suitable alkaline habitat was observed within the Survey Area, marginal habitat may be present within the Assessment Area. Hispid bird's-beak has potential to occur onsite.

4.5 Brandegee's Clarkia

Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeeae*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 plant. This species is an herbaceous annual that occurs in chaparral, cismontane woodlands, and lower montane coniferous forest often along roadcuts (CNPS 2020). Brandegee's clarkia blooms from May through July and is known to occur at elevations ranging from 246 to 3,002 feet above MSL (CNPS 2020). Brandegee's clarkia is endemic to California, and the current range of this species includes Butte, El Dorado, Nevada, Placer, Sacramento, Sierra, and Yuba counties (CNPS 2020).

There are three documented CNDDB occurrences of Brandegee's clarkia within five miles of the Study Area (CDFW 2020). The woodlands onsite represent marginal habitat for this species. Brandegee's clarkia has low potential to occur onsite.

4.6 Dwarf Downingia

Dwarf downingia (*Downingia pusilla)* is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 2B.2 species. This species is an herbaceous annual that occurs in vernal pools and mesic areas in valley and foothill grasslands (CNPS 2020). Dwarf downingia also appears to have an affinity for slight disturbance since it has been found in manmade features such as tire ruts, scraped depressions, stock ponds, and roadside ditches (Baldwin et al. 2012, CDFW 2020). This species blooms from March through May and is known to occur at elevations ranging from 3 to 1,460 feet above MSL (CNPS 2020). The current range of this species in California includes Amador, Fresno, Merced, Napa, Placer, Sacramento, San Joaquin, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties (CNPS 2020).

There are six documented CNDDB occurrence of dwarf downingia within five miles of the Study Area (CDFW 2020). The mesic areas onsite represent suitable habitat for this species. Dwarf downingia has potential to occur onsite.

4.7 Stinkbells

Stinkbells (*Fritillaria agrestis*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is a perennial bulbiferous herb that occurs in clay, sometimes serpentinite areas in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (CNPS 2020). Stinkbells bloom from March to June and is known to occur at elevations ranging from 33 to 5,102 feet above MSL (CNPS 2020). This species is endemic to California; its current range includes Alameda, Contra Costa, Fresno, Kern, Mendocino, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, Santa Clara, Santa Cruz, San Luis Obispo, San Mateo, Stanislaus, Tuolumne, Ventura, and Yuba counties, and is considered to be extirpated from Santa Cruz and San Mateo counties (CNPS 2020).

While there are no documented CNDDB occurrences of stinkbells within five miles of the Study Area (CDFW 2020), the woodlands and grasslands onsite represent marginal habitat for this species. Stinkbells has low potential to occur onsite.

4.8 Butte County Fritillary

Butte County fritillary (*Fritillaria eastwoodiae*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 3.2 species. This species is an herbaceous bulbiferous perennial that occurs in chaparral, cismontane woodland, and lower montane coniferous forest, and is occasionally found on serpentinite soils (CNPS 2020). Butte County fritillary blooms from March to June and is known to occur at elevations ranging from 164 to 4,921 feet above MSL (CNPS 2020). The current range of this species in California includes Butte, El Dorado, Nevada, Placer, Plumas, Shasta, Tehama, and Yuba counties (CNPS 2020).

While there are no documented CNDDB occurrences of Butte County fritillary within five miles of the Study Area (CDFW 2020), the woodlands onsite represent marginal habitat for this species. Butte County fritillary has low potential to occur onsite.

4.9 Boggs Lake Hedge-Hyssop

Boggs Lake hedge-hyssop (*Gratiola heterosepala*) is not listed pursuant to the federal ESA, is listed as endangered pursuant to the California ESA, and is designated as a CRPR 1B.2 species. This species is an herbaceous annual that occurs in clay in marshes and swamps (lake margins), and vernal pools (CNPS 2020). Boggs Lake hedge-hyssop blooms from April through August and is known to occur at elevations ranging from 33 to 7,792 feet above MSL (CNPS 2020). The current range of this species in California includes Fresno, Lake, Lassen, Madera, Mendocino, Merced, Modoc, Placer, Sacramento, Shasta, Siskiyou, San Joaquin, Solano, Sonoma, and Tehama counties (CNPS 2020).

There is one documented CNDDB occurrences of Boggs Lake hedge-hyssop within five miles of the Study Area (CDFW 2020). The aquatic features onsite represent suitable habitat for this species. Boggs Lake hedge-hyssop has potential to occur onsite.

4.10 Ahart's Dwarf Rush

Ahart's dwarf rush *(Juncus leiospermus* var. *ahartii*) is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 1B.2 species. This species is an herbaceous annual that occurs in mesic areas in valley and foothill grasslands (CNPS 2020). This species also appears to have an affinity for slight disturbance since it has been found on farmed fields and gopher turnings (USFWS 2005). Ahart's dwarf rush blooms from March through May and is known to occur at elevations ranging from 98 to 751 feet above MSL (CNPS 2020; USFWS 2005). Ahart's dwarf rush is endemic to California; the current range of this species includes Butte, Calaveras, Placer, Sacramento, Tehama, and Yuba counties (CNPS 2020).

There is one documented CNDDB occurrence of Ahart's dwarf rush within five miles of the Study Area (CDFW 2020). The mesic areas within the grasslands onsite represent suitable habitat for this species. Ahart's dwarf rush has potential to occur onsite.

4.11 Red Bluff Dwarf Rush

Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 1B.1 species. This species is an herbaceous annual that occurs in vernally mesic areas in chaparral, cismontane woodland, meadows, seeps, valley and foothill grasslands, and vernal pools (CNPS 2020). Red Bluff dwarf rush blooms from March through June and is known to occur at elevations ranging from 115 to 4,101 feet above MSL (CNPS 2020). Red Bluff dwarf rush is endemic to California; the current range of this species includes Butte, Placer, Shasta, and Tehama counties (CNPS 2020).

While there are no documented CNDDB occurrences of Red Bluff dwarf rush within five miles of the Study Area (CDFW 2020), the mesic areas within the woodlands and grasslands onsite represent marginal habitat for this species. Bluff dwarf rush has low potential to occur onsite.

4.12 Dubious Pea

Dubious pea (*Lathyrus sulphureus* var. *argillaceus*) is not listed pursuant to either the federal or California ESAs but is designated as a CRPR 3 species. This species is an herbaceous perennial that occurs in cismontane woodland, lower montane coniferous forest, and upper montane coniferous forest (CNPS 2020). Dubious pea blooms from April through May and is known to occur at elevations ranging from 492 to 3,051 feet above MSL (CNPS 2020). Dubious pea is endemic to California; the current range of this species includes Calaveras, El Dorado, Nevada (distribution or identity is uncertain), Placer, Shasta, and Tehama counties (CNPS 2020).

While there are no documented CNDDB occurrences of dubious pea within five miles of the Study Area (CDFW 2020), the woodlands onsite provide marginally suitable habitat for this species. Therefore, dubious pea has low potential to occur onsite.

4.13 Legenere

Legenere (*Legenere limosa*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 1B.1 species (CNPS 2020). This species is an herbaceous annual that occurs in a variety of seasonally inundated environments including wetlands, wetland swales, marshes, vernal pools, artificial ponds, and floodplains of intermittent drainages (USFWS 2005). Legenere blooms from April through June and is known to occur at elevations ranging from 3 feet to 2,887 feet above MSL (CNPS 2020). Legenere is endemic to California; the current range of this species includes Alameda, Lake, Monterey, Napa, Placer, Sacramento, Santa Clara, San Joaquin, Shasta, San Mateo, Solano, Sonoma, Stanislaus, Tehama, and Yuba counties; is believed to be extirpated from Stanislaus County (CNPS 2020).

There are three documented CNDDB occurrences of legenere within five miles of the Study Area (CDFW 2020). The aquatic features onsite represent suitable habitat for this species. Legenere has potential to occur onsite.

4.14 Humboldt Lily

Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is a perennial bulbiferous herb that occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest (CNPS 2020). Humboldt lily blooms from May through August and is known to occur at elevations ranging from 295 to 4,199 feet above MSL (CNPS 2020). Humboldt lily is endemic to California; the current range of this species includes Amador, Butte, Calaveras, El Dorado, Fresno, Mariposa, Nevada, Placer, Tehama, Tuolumne, and Yuba counties (CNPS 2020).

While there are no documented CNDDB occurrences of Humboldt lily within five miles of the Study Area (CDFW 2020), the woodlands onsite represent marginal habitat for this species. Humboldt lily has low potential to occur onsite.

4.15 Pincushion Navarretia

Pincushion navarretia (*Navarretia myersii* ssp. *myersii*) is not listed pursuant to either the federal or California ESAs but is designated as a CNPS 1B.1 species. This species is an herbaceous annual that occurs in vernal pools that are often acidic (CNPS 2020). Pincushion navarretia blooms in April to May and is known to occur at elevations ranging from 66 to 1,083 feet above MSL (CNPS 2020). Pincushion navarretia is endemic to California; the current range of this species includes Amador, Calaveras, Merced, Placer, and Sacramento counties (CNPS 2020).

There is one documented CNDDB occurrence of pincushion navarretia within five miles of the Study Area (CDFW 2020). While no suitable vernal pool habitat was observed within the Survey Area, suitable habitat may be present within the Assessment Area. Pincushion navarretia has potential to occur onsite.

4.16 Adobe Navarretia

Adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*) is not listed pursuant to either the federal or California ESAs, but is designated as a CRPR 4.2 species. This species is an herbaceous annual that occurs in clay and sometimes serpentinite substrates in mesic areas in valley and foothill grassland and sometimes in vernal pools (CNPS 2020). Adobe navarretia blooms between April and June and is known to occur at elevations ranging from 328 to 3,281 feet above MSL (CNPS 2020). Adobe navarretia is endemic to California; its current range includes Alameda, Butte, Contra Costa, Colusa, Fresno, Kern, Merced, Monterey, Placer, Sutter, and Tulare counties (CNPS 2020).

While there are no documented CNDDB occurrences of adobe navarretia within five miles of the Study Area (CDFW 2020), the mesic areas of the grasslands onsite represent suitable habitat for this species. Adobe navarretia has potential to occur onsite.

4.17 Sacramento Orcutt Grass

Sacramento Orcutt grass (*Orcuttia viscida*) is listed as endangered pursuant to both the federal and California ESAs, and is designated as a CRPR 1B.1 species. This species is an herbaceous annual that occurs in vernal pools (CNPS 2020). The median area of occupied pools discovered prior to 1988 was 0.69 acre and ranged from 0.25 to 2.03 acres (USFWS 2005). Sacramento Orcutt grass blooms from April through July and is known to occur at elevations ranging from 98 to 328 feet above MSL (CNPS 2020). Sacramento Orcutt grass is endemic to California and to the southeastern Sacramento Valley (Keeler-Wolf et al. 1998, as cited in USFWS 2005), with all known occurrences restricted to Sacramento County. Known occurrences of this species within the general region are limited to a small area east of Mather Field, Phoenix Field Ecological Reserve, Phoenix Park (introduced population), and an area near Rancho Seco Lake (USFWS 2005).

While there are no documented CNDDB occurrences of Sacramento Orcutt grass within five miles of the Study Area (CDFW 2020) and no suitable vernal pool habitat was observed within the Survey Area, marginal habitat may be present within the Assessment Area. Sacramento Orcutt grass has potential to occur onsite.

4.18 Sanford's Arrowhead

Sanford’s arrowhead (*Sagittaria sanfordii*) is not listed pursuant to the federal or California ESAs, but is designated as a CRPR 1B.2 species. This species is a perennial rhizomatous herb that occurs in shallow, freshwater marshes and swamps (CNPS 2020). Sanford’s arrowhead blooms from May through October, and is known to occur at elevations ranging from sea level to 2,133 feet above MSL (CNPS 2020). Sanford’s arrowhead is endemic to California; the current range of this species includes Butte, Del Norte, El Dorado, Fresno, Merced, Mariposa, Marin, Napa, Orange, Placer, Sacramento, San Bernardino, San Joaquin, Shasta, Solano, Tehama, Tulare, Ventura, and Yuba counties; it is believed to be extirpated from both Orange and Ventura counties (CNPS 2020).

While there are no documented CNDDB occurrences of Sanford’s arrowhead within five miles of the Study Area (CDFW 2020), the aquatic features onsite represent suitable habitat for this species. Sanford’s arrowhead has potential to occur onsite.

4.19 Brazilian Watermeal

Brazilian watermeal (*Wolffia brasiliensis*) is not listed pursuant to either the federal or California ESA, but is designated as a CRPR 2B.3 species. This species is an herbaceous perennial that occurs in assorted shallow freshwater marshes and swamps (CNPS 2020). Brazilian watermeal blooms from April through December and is known to occur at elevations ranging from 66 to 328 feet above MSL (CNPS 2020). The current range for Brazilian watermeal in California includes Butte, Glenn, Sutter and Yuba counties (CNPS 2020).

While there are no documented CNDDB occurrences of Sanford's arrowhead within five miles of the Study Area (CDFW 2020), the aquatic features onsite represent suitable habitat for this species. Brazilian watermeal has potential to occur onsite.

5.0 RESULTS AND CONCLUSION

The Study Area includes a Survey Area and an Assessment Area, as described in Section 1.0 and depicted on Figure 2. The special-status plant survey was conducted within the Survey Area, and did not include the Assessment Area.

No special-status plant species were documented within the Survey Area during the 2020 late season special-status plant survey. However, as previously stated, only a subset of the target species were identifiable at the time of the survey. These species include Mexican mosquito fern, big-scale balsamroot, hispid bird's beak, Brandegee's clarkia, stinkbells, Butte County fritillary, Boggs Lake hedge-hyssop, Red Bluff dwarf rush, legenere, Humboldt lily, adobe navarretia, Sacramento Orcutt grass, Sanford's arrowhead, and Brazilian watermeal. An additional survey is required to ensure complete survey coverage for the remaining target species.

One sensitive natural community, *Quercus lobata* Forest & Woodland Alliance (Valley oak woodland), was documented within the Study Area (Figure 4). Valley oak woodland has a State rarity rank of S3.

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LIST OF ATTACHMENTS

Attachment A – Potentially Occurring Special-Status Plant Species

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ATTACHMENT A

Potentially Occurring Special-Status Plant Species

Attachment B. Potentially Occurring Special-Status Plant Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Jepson's onion *(Allium jepsonii)*	–	–	1B.2	Serpentinite or volcanic soils in chaparral, cismontane woodland, and lower montane coniferous forests (984'–4,331').	April–August	Absent. Outside of elevational range.
Sanborn's onion *(Allium sanbornii* var. *sanbornii)*	–	–	4.2	Chaparral, cismontane woodland, and lower montane coniferous forests, usually with gravelly, serpentinite soils (853'–4,954').	May–September	Absent. Outside of elevational range.
Mexican mosquito fern *(Azolla microphylla)*	–	–	4.2	Marshes and swamps, ponds or slow-moving bodies of water (98'–328').	August	Potential to occur. Suitable habitat present onsite.
Big-scale balsamroot *(Balsamorhiza macrolepis* var. *macrolepis)*	–	–	1B.2	Chaparral, cismontane woodland, and valley and foothill grassland, sometimes on serpentinite soils (148'–5,102').	March–June	Potential to occur. Suitable habitat present onsite.
Valley brodiaea (*Brodiaea rosea* ssp. *vallicola*)	–	–	4.2	Occurs in old alluvial terraces and silt, sandy, or gravelly soils in vernal pools and swale within valley and foothill grassland (33'–1,100').	April–May	Potential to occur. Suitable habitat present onsite.
Stebbins' morning-glory *(Calystegia stebbinsii)*	FE	CE	1B.1	Gabbroic or serpentine soils in chaparral and cismontane woodland (607'–3,576').	April–July	Absent. No suitable habitat onsite.
Chaparral sedge *(Carex xerophila)*	–	–	1B.2	Serpentinite or gabbroic soils within chaparral, cismontane woodland, and lower montane coniferous forest (1,444'–2,526').	March–June	Absent. No suitable habitat onsite.
Pine Hill ceanothus *(Ceanothus roderickii)*	FE	CR	1B.1	Rocky serpentinite or gabbroic soil in chaparral and cismontane woodland (804'–3,576').	April–June	Absent. No suitable habitat onsite.
Red Hills soaproot *(Chlorogalum grandiflorum)*	–	–	1B.2	Serpentinite or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest, occasionally on non–ultramafic soils (804'–5,545').	May–June	Absent. Outside of elevational range.

Attachment B. Potentially Occurring Special-Status Plant Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Hispid bird's-beak *(Chloropyron molle* ssp. *hispidum)*	–	–	1B.1	Alkaline soils in meadows and seeps, playas, and valley and foothill grasslands (3'–509').	June–September	Low potential to occur. While no suitable habitat was observed within the Study Area, marginal habitat may be present within areas that are inaccessible (i.e. private property).
Brandegee's clarkia *(Clarkia biloba* ssp. *brandegeeae)*	–	–	4.2	Chaparral, cismontane woodlands, and lower montane coniferous forest often along roadcuts (246'–3,002').	May–July	Low potential to occur. Marginal habitat present onsite.
Streambank spring beauty *(Claytonia parviflora* ssp. *grandiflora)*	–	–	4.2	Occurs in rocky cismontane woodland (820'–3,937').	February–May	Absent. Outside of elevational range.
Bisbee Peak rush-rose *(Crocanthemum suffrutescens)*	–	–	3.2	Often gabbroic or Ione soil or in burned or disturbed areas within chaparral (246'–2,198').	April–August	Absent. No suitable habitat onsite.
Dwarf downingia *(Downingia pusilla)*	–	–	2B.2	Mesic areas in valley and foothill grassland, and vernal pools. Species appears to have an affinity for slight disturbance (i.e., scraped depressions, ditches) (Baldwin et al. 2012, CDFW 2018) (3'–1,460').	March–May	Potential to occur. Suitable habitat present onsite.
Stinkbells *(Fritillaria agrestis)*	–	–	4.2	Clay and sometimes serpentinite soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland (33'–5,102').	March–June	Low potential to occur. Marginal habitat present onsite.
Butte County fritillary *(Fritillaria eastwoodiae)*	–	–	3.2	Chaparral, cismontane woodland, and openings in lower montane coniferous forest and occasionally is found on serpentinite soils (164'–4,921').	March–June	Low potential to occur. Marginal habitat present onsite.
El Dorado bedstraw *(Galium californicum* ssp. *sierrae)*	FE	CR	1B.2	Gabbroic soil in chaparral, cismontane woodland and lower montane coniferous forest communities (328'–1,919').	May–June	Absent. No suitable habitat onsite.

Attachment B. Potentially Occurring Special-Status Plant Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Boggs Lake hedge-hyssop *(Gratiola heterosepala)*	–	CE	1B.2	Marshes, swamps, lake margins, and vernal pools (33'–7,792').	April–August	Potential to occur. Suitable habitat present onsite.
Ahart's dwarf rush *(Juncus leiospermus* var. *ahartii)*	–	–	1B.2	Mesic areas in valley and foothill grassland. Species has an affinity for slight disturbance such as farmed fields (USFWS 2005) (98'–751').	March–May	Potential to occur. Suitable habitat present onsite.
Red Bluff dwarf rush *(Juncus leiospermus* var. *leiospermus)*	–	–	1B.1	Vernally mesic areas in chaparral, cismontane woodland, meadows and seeps, valley and foothill grassland, and vernal pools (115'–4,101').	March–June	Potential to occur. Suitable habitat present onsite.
Dubious pea *(Lathyrus sulphureus* var. *argillaceus)*	–	–	3	Cismontane woodland, lower montane coniferous forest and upper montane coniferous forest (492'–3,051').	April–May	Low potential to occur. Marginal habitat present onsite.
Legenere *(Legenere limosa)*	–	–	1B.1	Various seasonally inundated areas including wetlands, wetland swales, marshes, vernal pools, artificial ponds, and floodplains of intermittent drainages (USFWS 2005) (3'–2,887').	April–June	Potential to occur. Suitable habitat present onsite.
Humboldt lily *(Lilium humboldtii* ssp. *humboldtii)*	–	–	4.2	Occurs in openings within chaparral, cismontane woodland, and lower montane coniferous forest (295'–4,199').	May–August	Low potential to occur. Marginal habitat present onsite.
Pincushion navarretia *(Navarretia myersii* ssp. *myersii)*	–	–	1B.1	Often acidic soils in vernal pools (66'–1,083').	April–May	Potential to occur. While no suitable habitat was observed within the Study Area, suitable habitat may be present within areas that are inaccessible (i.e. private property).
Adobe navarretia *(Navarretia nigelliformis* ssp. *nigelliformis)*	–	–	4.2	Clay and sometimes serpentinite soils in vernally mesic valley and foothill grasslands and sometimes in vernal pools (328'–3,281).	April–June	Potential to occur. Suitable habitat present onsite.

Attachment B. Potentially Occurring Special-Status Plant Species						
Common Name (Scientific Name)	Status			Habitat Description	Survey Period	Potential to Occur On-site
	ESA	CESA	Other			
Sacramento Orcutt grass *(Orcuttia viscida)*	FE	CE	1B.1	Vernal pools (98'–328').	April–July	Low potential to occur. While no suitable habitat was observed within the Study Area, marginal habitat may be present within areas that are inaccessible (i.e. private property).
Layne's ragwort (*Packera layneae*)	FT	CR	1B.2	Rocky serpentinite or gabbroic soil in chaparral and cismontane woodland communities (656'–3,560').	April–August	Absent. No suitable habitat onsite.
Sanford's arrowhead *(Sagittaria sanfordii)*	–	–	1B.2	Shallow marshes and freshwater swamps (0'–2,133').	May–October	Potential to occur. Suitable habitat present onsite.
Oval-leaved viburnum *(Viburnum ellipticum)*	–	–	2B.3	Chaparral, cismontane woodland, and lower montane coniferous forest communities (705'–4,593').	May–June	Absent. Outside of elevational range.
Brazilian watermeal *(Wolffia brasiliensis)*	–	–	2B.3	Assorted shallow freshwater marshes and swamps (66'–328').	April–December	Potential to occur. Suitable habitat present onsite.
El Dorado County mule ears *(Wyethia reticulata)*	–	–	1B.2	Clay or gabbroic soils in chaparral, cismontane woodland, and lower montane coniferous forest communities (607'–2,067').	April–August	Absent. Outside of geographic range.

Status Codes:

ESA	Endangered Species Act
CESA	California Endangered Species Act
FE	FESA listed, Endangered.
FT	FESA listed, Threatened.
CE	CESA or NPPA listed, Endangered.
CR	CESA- or NPPA-listed, Rare.
1A	CRPR/Presumed extinct.
1B	California Rare Plant Ranks (CRPRs)/Rare or Endangered in California and elsewhere.
2B	CRPR /Rare or Endangered in California, more common elsewhere.
3	CRPR/Plants About Which More Information is Needed – A Review List.
4	CRPR/Plants of Limited Distribution – A Watch List.
0.1	Threat Rank/Seriously threatened in California (over 80 percent of occurrences threatened / high degree and immediacy of threat)
0.2	Threat Rank/Moderately threatened in California (20-80 percent occurrences threatened / moderate degree and immediacy of threat)
0.3	Threat Rank/Not very threatened in California (<20% of occurrences threatened / low degree and immediacy of threat or no current threats known)

ATTACHMENT B

Target Species Reference Source

Target Species Reference Source[1]				
Common Name (Scientific Name)	Location of Observation	Dates of Observation	Phenology	Remarks
Mexican mosquito fern *(Azolla microphylla)*	Calphotos, Calflora	N/A	Vegetative	
Big-scale balsamroot (*Balsamorhiza macrolepis* var. *macrolepis*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Valley brodiaea (*Brodiaea rosea* ssp. *vallicola*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Hispid bird's-beak (*Chloropyron* molle ssp. *hispidum*)	Rocklin, CA	06/02/2020	Flowering	
Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeeae*)	Auburn, CA	06/08/2020	25% flowering, 85% vegetative	
Dwarf downingia (*Downingia pusilla*)	Rio Linda, CA Elverta, CA	03/06/2020 4/1/2020	Mostly vegetative, few flowering 100% flowering	

[1] Calphotos (https://calphotos.berkeley.edu/), Calflora, herbarium specimens, and/or The Jepson Manual were used as reference for any species not listed in this table.

Target Species Reference Source[1]				
Common Name (Scientific Name)	Location of Observation	Dates of Observation	Phenology	Remarks
Stinkbells (*Fritillaria agrestis*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Boggs Lake hedge-hyssop (*Gratiola heterosepala*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Ahart's dwarf rush (*Juncus leiospermus* var. *ahartii*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Red Bluff dwarf rush (*Juncus leiospermus* var. *leiospermus*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Dubious pea (*Lathyrus sulphureus* var. *argillaceus*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.

Target Species Reference Source[1]				
Common Name (Scientific Name)	Location of Observation	Dates of Observation	Phenology	Remarks
Legenere (*Legenere limosa*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Pincushion navarretia (*Navarretia myersii* ssp. *myersii*)	Fair Oaks, CA	03/30/2020	90% flowering, 10% vegetative	

Target Species Reference Source[1]				
Common Name (Scientific Name)	Location of Observation	Dates of Observation	Phenology	Remarks
Shining navarretia (*Navarretia nigelliformis* ssp. *radians*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.
Sacramento Orcutt grass (*Orcuttia viscida*)	Sacramento, CA	06/02/2020	98% flowering, 2% vegetative	
Sanford's arrowhead (*Sagittaria sanfordii*)	Granite Bay, CA	05/13/20	20% flowering, 80% vegetative	
Brazilian watermeal (*Wolffia brasiliensis*)	Calphotos, Calflora	N/A	Flowering	Local timing for flowering was assessed using photographs from Calphotos and information from CNPS and the Jepson Manual, due to reference sites being unavailable.

ATTACHMENT C

Statement of Qualifications

Attachment C

Statement of Qualifications

Hannah Kang

Assistant Biologist, ECORP Consulting, Inc.

Hannah Kang is a botanist specializing in plant taxonomy, special-status surveys, and general floristic surveys. Miss Kang has two years of professional experience conducting botanical surveys, including surveys for special-status plants throughout Northern California and the Tahoe Basin. She is experienced in conducting focused and general floristic surveys, sensitive plant surveys, arborist surveys, and general surveys for nonnative plants.

Hannah Stone

Staff Biologist, ECORP Consulting, Inc.

Hannah Stone is a biologist with more than eight years of professional experience in botanical, forest inventory, and ecological data collection. She is experienced in leading and conducting floristic surveys, special-status plant surveys, vegetation community mapping, invasive plant species mapping, and habitat assessments. She is also experienced in preparing technical reports including special-status plant reports, Biological Resource Assessments, biological evaluations/biological assessments (BAs) for Forest Service projects, BAs for Section 7 consultation, and National Environmental Policy Act compliance documents.

ATTACHMENT D

Plant Species Observed (June 28 and June 29, 2020)

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ADOXACEAE	**MUSKROOT FAMILY**
Sambucus nigra subsp. *caerulea*	Blue elderberry
AGAVACEAE	**AGAVE FAMILY**
Agave sp.*	Agave (cultivated)
Chlorogalum pomeridianum	Wavyleaf soap plant
ALISMATACEAE	**WATER-PLANTAIN FAMILY**
Alisma triviale	Northern water plantain
AMARANTHACEAE	**AMARANTH FAMILY**
*Amaranthus albus**	Pigweed amaranth
ANACARDIACEAE	**SUMAC FAMILY**
*Pistacia terebinthus**	Turpentine tree (cultivated)
Toxicodendron diversilobum	Poison oak
APIACEAE	**CARROT FAMILY**
*Conium maculatum**	Poison hemlock
*Daucus carota**	Queen Anne's lace
*Foeniculum vulgare**	Sweet fennel
*Torilis arvensis**	Field hedge parsley
APOCYNACEAE	**DOGBANE FAMILY**
Asclepias fascicularis	Narrow-leaf milkweed
*Nerium oleander**	Oleander
*Vinca major**	Periwinkle
ARACEAE	**ARUM FAMILY**
Lemna minuta	Least duckweed
ARALIACEAE	**IVY FAMILY**
*Hedera helix**	English ivy
ARECACEAE	**PALM FAMILY**
*Washingtonia robusta**	Mexican fan
ARISTOLOCHIACEAE	**PIPEVINE FAMILY**
Aristolochia californica	California pipevine
ASTERACEAE	**SUNFLOWER FAMILY**
Artemisia douglasiana	Mugwort

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ASTERACEAE	**SUNFLOWER FAMILY**
Baccharis pilularis	Coyote bush
*Bidens tripartita**	Tickseed
*Carduus pycnocephalus**	Italian thistle
*Centaurea solstitialis**	Yellow star-thistle
Centromadia fitchii	Fitch's spikeweed
*Chondrilla juncea**	Skeleton weed
*Cichorium intybus**	Chicory
*Cirsium vulgare**	Bull thistle
*Dittrichia graveolens**	Stinkwort
Erigeron canadensis	Canada horseweed
Helenium puberulum	Sneezeweed
Helianthus annuus	Common sunflower
Holocarpha virgata	Narrow tarplant
*Hypochaeris radicata**	Rough cat's-ear
*Lactuca serriola**	Prickly lettuce
*Pseudognaphalium luteoalbum**	Jersey cudweed
*Silybum marianum**	Milk thistle
Xanthium strumarium	Rough cockle-bur
AZOLLACEAE	**MOSQUITO FERN FAMILY**
Azolla filiculoides	Mosquito fern
BERBERIDACEAE	**BARBERRY FAMILY**
Nandina sp.*	Nandina (cultivated)
BETULACEAE	**BIRCH FAMILY**
Alnus rhombifolia	White alder
BIGNONIACEAE	**TRUMPET-CREEPER FAMILY**
*Campsis radicans**	Trumpet vine (cultivated)
*Catalpa bignonioides**	Southern catalpa
BORAGINACEAE	**BORAGE FAMILY**
Amsinckia sp.	Fiddleneck

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
BRASSICACEAE	**MUSTARD FAMILY**
*Brassica nigra**	Black mustard
*Hirschfeldia incana**	Shortpod mustard
*Raphanus sativus**	Purple wild radish
CACTACEAE	**CACTUS FAMILY**
Opuntia sp.*	Prickly pear cactus (cultivated)
CAPRIFOLIACEAE	**HONEYSUCKLE FAMILY**
Lonicera hispidula	Pink honeysuckle
CARYOPHYLLACEAE	**PINK FAMILY**
Cerastium sp.*	Chickweed
*Spergularia rubra**	Purple sandspurry
CHENOPODIACEAE	**GOOSEFOOT FAMILY**
*Dysphania ambrosioides**	Mexican tea
*Kochia scoparia**	Mexican fireweed
CISTACEAE	**ROCK-ROSE FAMILY**
Cistus sp.*	Rock rose (cultivated)
CONVOLVULACEAE	**MORNING-GLORY FAMILY**
*Convolvulus arvensis**	Field bindweed
CONVOLVULAVEAE	**MORNING GLORY FAMILY**
*Ipomoea purpurea**	Common morning-glory (cultivated)
CYPERACEAE	**SEDGE FAMILY**
Carex barbarae	Santa Barbara sedge
Cyperus eragrostis	Tall flatsedge
Eleocharis macrostachya	Creeping spikerush
Schoenoplectus acutus var. *occidentalis*	Hard-stem bulrush
EQUISETACEAE	**HORSETAIL FAMILY**
Equisetum arvense	Field horsetail
Equisetum hyemale	Rough horsetail
EUPHORBIACEAE	**SPURGE FAMILY**
Croton setiger	Turkey mullein
*Euphorbia crenulata**	Chinese caps

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
EUPHORBIACEAE	**SPURGE FAMILY**
*Euphorbia maculata**	Spotted spurge
FABACEAE	**LEGUME FAMILY**
Acmispon americanus	Spanish clover
*Albizia julibrissin**	Silk tree
*Lotus corniculatus**	Birdsfoot trefoil
Melilotus sp.*	Sweetclover
*Trifolium hirtum**	Rose clover
*Trifolium incarnatum**	Crimson clover
*Trifolium repens**	White clover
Trifolium sp.	Clover
*Vicia sativa**	Spring vetch
FAGACEAE	**OAK FAMILY**
Quercus douglasii	Blue oak
Quercus lobata	Valley oak
Quercus wislizeni	Interior live oak
GENTIANACEAE	**GENTIAN FAMILY**
Zeltnera muehlenbergii	Muehlenberg's centaury
GERANIACEAE	**GERANIUM FAMILY**
Erodium sp.*	Filaree
*Geranium molle**	Dovefoot geranium
HYDROCHARITACEAE	**WATERWEED FAMILY**
Elodea canadensis	Common water weed
HYPERICACEAE	**ST. JOHN'S WORT FAMILY**
*Hypericum perforatum**	Klamath weed
IRIDACEAE	**IRIS FAMILY**
Iris sp.*	Iris (cultivated)
JUGLANDACEAE	**WALNUT FAMILY**
Juglans hindsii	Black walnut
JUNCACEAE	**RUSH FAMILY**
Juncus balticus ssp. *ater*	Baltic rush

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
JUNCACEAE	**RUSH FAMILY**
Juncus effusus	Soft rush
Juncus xiphioides	Iris-leaf rush
LAMIACEAE	**MINT FAMILY**
Lycopus americanus	Bugleweed
*Marrubium vulgare**	Common horehound
*Mentha pulegium**	Pennyroyal
*Salvia rosmarinus**	Rosemary (cultivated)
LYTHRACEAE	**LOOSESTRIFE FAMILY**
*Lagerstroemia indica**	Crape mytle (cultivated)
*Punica granatum**	Pomegranate (cultivated)
MALVACEAE	**MALLOW FAMILY**
Malva sp.*	Mallow
MARTYNIACEAE	**UNICORN-PLANT FAMILY**
*Proboscidea louisianica**	Devil's claw
MOLLUGINACEAE	**CARPET-WEED FAMILY**
*Mollugo verticillata**	Indian chickweed
MORACEAE	**MULBERRY FAMILY**
*Ficus carica**	Common fig
*Morus alba**	White mulberry
MYRSINACEAE	**MYRSINE FAMILY**
*Lysimachia arvensis**	Scarlet pimpernel
MYRTACEAE	**MYRTLE FAMILY**
Callistemon sp.*	Bottlebrush (cultivated)
*Eucalyptus rudis**	Western australian floodedgum
OLEACEAE	**OLIVE FAMILY**
Fraxinus latifolia	Oregon ash
*Ligustrum lucidum**	Glossy privet (cultivated)
ONAGRACEAE	**EVENING PRIMROSE FAMILY**
Epilobium brachycarpum	Panicled willow-herb
Epilobium ciliatum	Hairy willow-herb

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ONAGRACEAE	**EVENING PRIMROSE FAMILY**
Epilobium densiflorum	Dense-flower spike primrose
Ludwigia peploides ssp. *peploides**	Water primrose
Oenothera elata	Hooker's evening-primrose
OXALIDACEAE	**OXALIS FAMILY**
*Oxalis corniculata**	Creeping woodsorrel
PAPAVERACEAE	**POPPY FAMILY**
Eschscholzia californica	California poppy
PHRYMACEAE	**LOPSEED FAMILY**
Erythranthe cardinalis	Scarlet monkeyflower
PHYTOLACCACEAE	**POKEWEED FAMILY**
*Phytolacca americana**	American pokeweed
PINACEAE	**PINE FAMILY**
*Cedrus deodara**	Deodar cedar (cultivated)
Pinus sabiniana	Gray pine
Pinus sp.*	Pine (cultivated)
PLANTAGINACEAE	**PLANTAIN FAMILY**
Callitriche heterophylla	Varied leaved water starwort
*Kickxia elatine**	Sharp-leaved fluellin
*Plantago lanceolata**	English plantain
Veronica americana	American speedwell
PLATANACEAE	**PLANE-TREE FAMILY**
Platanus racemosa	California sycamore
POACEAE	**GRASS FAMILY**
*Aira caryophyllea**	Silvery hairgrass
Avena sp.*	Wild oat
*Briza maxima**	Big quaking grass
*Bromus diandrus**	Ripgut brome
*Bromus hordeaceus**	Soft brome
*Cynodon dactlyon**	Bermuda grass
*Cynosurus echinatus**	Hedgehog dog-tail grass

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
POACEAE	**GRASS FAMILY**
*Digitaria ciliaris**	Hairy crabgrass
*Echinochloa crus-galli**	Barnyard grass
*Festuca glauca**	Blue fescue
*Festuca perennis**	Italian Ryegrass
Hordeum murinum ssp. *glaucum**	Foxtail barley
Leersia oryzoides	Rice cutgrass
Muhlenbergia rigens	Deergrass
*Panicum dichotomiflorum**	Fall panicgrass
*Paspalum dilatatum**	Dallis grass
*Phyllostachys aurea**	Golden bamboo (cultivated)
*Poa annua**	Annual bluegrass
*Polypogon monspeliensis**	Annual rabbit-foot grass
*Setaria pumila**	Yellow bristlegrass
*Sorghum halepense**	Johnson grass
*Triticum aestivum**	Cultivated wheat
POLEMONIACEAE	**PHLOX FAMILY**
Navarretia sp.	Navarretia
POLYGONACEAE	**BUCKWHEAT FAMILY**
*Persicaria hydropiper**	Common smartweed
Polygonum aviculare ssp. *depressum**	Prostrate knotweed
*Rumex crispus**	Curly dock
*Rumex pulcher**	Fiddle dock
PONTEDERIACEAE	**PICKEREL-WEED FAMILY**
*Eichhornia crassipes**	Water hyacinth
PORTULACEAE	**PURSLANE FAMILY**
*Portulaca oleracea**	Common purslane
ROSACEAE	**ROSE FAMILY**
*Malus pumila**	Apple (cultivated)
Photinia sp.*	Photinia (cultivated)
*Prunus cerasifera**	Cherry plum (cultivated)

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
ROSACEAE	**ROSE FAMILY**
*Prunus dulcis**	Almond (cultivated)
*Prunus mume**	Plum blossom (cultivated)
*Pyrus calleryana**	Callery pear (cultivated)
Pyrus sp.*	Pear (cultivated)
Rosa sp.	Rose (native)
Rosa sp.*	Rose (cultivated)
*Rubus armeniacus**	Himalayan blackberry
Rubus ursinus	California blackberry
SALICACEAE	**WILLOW FAMILY**
Populus fremontii	Fremont's cottonwood
Salix exigua	Sandbar willow
Salix gooddingii	Goodding's black willow
Salix lasiolepis	Arroyo willow
SAPINDACEAE	**SOAPBERRY FAMILY**
Acer sp.*	Maple (cultivated)
Aesculus californica	California buckeye
SCROPHULARIACEAE	**FIGWORT FAMILY**
*Verbascum blattaria**	Moth mullein
*Verbascum thapsus**	Common mullein
SIMAROUBACEAE	**QUASSIA FAMILY**
*Ailanthus altissima**	Tree-of-heaven
SOLANACEAE	**NIGHTSHADE FAMILY**
Nicotiana attenuata	Coyote tobacco
Solanum americanum	Common nightshade
*Solanum elaeagnifolium**	Silverleaf nightshade
*Solanum rostratum**	Buffalo bur
Solanum xanti	Purple nightshade
TAXODIACEAE	**BALD CYPRESS FAMILY**
Sequoia sempervirens	Coast redwood (cultivated)

An asterisk (*) indicates a non-native species.

Hemphill Diversion Structure Project
Plant Species Observed (June 28 and June 29, 2020)

SCIENTIFIC NAME	COMMON NAME
THEMIDACEAE	**BRODIAEA FAMILY**
Brodiaea sp.	Brodiaea
Dichelostemma capitatum	Blue dicks
Dichelostemma volubile	Twining brodiaea
TYPHACEAE	**CATTAIL FAMILY**
Typha sp.	Cattail
VERBENACEAE	**VERVAIN FAMILY**
Phyla nodiflora	Common lippia
*Verbena bonariensis**	Purpletop vervain
VITACEAE	**GRAPE FAMILY**
Vitis californica	California wild grape
ZYGOPHYLLACEAE	**CALTROP FAMILY**
*Tribulus terrestris**	Puncture vine

An asterisk (*) indicates a non-native species.

APPENDIX 3.3 D

Tree Impact Report
(ECORP Consulting, Inc.)

Row Labels	Bypass Pipe Fish Return (Alt 2) Temporary	Fish Passage (Alternative 2) Temporary	Hemphill Canal (All Alternatives) Temporary	Hemphill Canal (Alternative 2) Temporary	Hemphill Canal Access Road (All Alts) No Impact	Infiltration Gallery Footprint (Alt 1) Permanent	Infiltration Gallery Work Area (Alt 1) Temporary	No Improvements No Impact	North Access Road (All Alts) Permanent	North Staging Area (All Alts) Temporary	Pipeline Terrestrial Impacts (Alt 3) Temporary	South Access Road (All Alts) Permanent	South Staging Area (All Alts) Temporary	Grand Total
American sycamore								2						2
Arroyo willow								30						30
Blue Oak				1	1			214						216
California Buckeye				2	3			19			1		3	28
Freemont's Cottonwood							4	17						21
Goodding's Black Willow								16						16
Interior Live Oak				16	3			661				1		681
Northern California Black Walnut			1	2	3	1		142			9		5	163
Oregon ash	1			1		1	2	8				1		14
Red willow								1						1
Valley Oak				11	5			365	2	2	1	3	6	395
White Alder		1					2	41						44
Grand Total	**1**	**1**	**1**	**33**	**15**	**2**	**8**	**1516**	**2**	**2**	**11**	**5**	**14**	**1611**

Row Labels	No	Yes - Seasonal Water	Yes - Year Round Water	Grand Total
American sycamore	2			2
Arroyo willow	3	7	20	30
Blue Oak	209	7		216
California Buckeye	16	3	9	28
Freemont's Cottonwood	8		13	21
Goodding's Black Willow	12		4	16
Interior Live Oak	627	28	26	681
Northern California Black Walnut	77	13	73	163
Oregon ash	1		13	14
Red willow			1	1
Valley Oak	293	24	78	395
White Alder	1		43	44
Grand Total	**1249**	**82**	**280**	**1611**

APPENDIX 3.5

Energy Consumption Outputs
(ECORP Consulting, Inc.)

Proposed Project
Total Construction-Related
Gasoline Usage

Action	Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]	Conversion of Metric Tons to Kilograms[2]	Construction Equipment Emission Factor[2]	Total Gallons of Fuel Consumed
Alternative 1	**651**	**651000**	**10.15**	**64,138**
	Per CalEEMod Output Files.	Per Climate Registry Equation 13e	Per Climate Registry Equation 13e	

Total Gallons Consumed During Project Construction: 64,138

Notes:
Fuel used by all construction equipment, including vehicle hauling trucks, assumed to be diesel.

Sources:
[1]ECORP Consulting, 2021.

[2]Climate Registry. 2016. *General Reporting Protocol for the Voluntary Reporting Program version 2.1.* January 2016.

Action	Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]	Conversion of Metric Tons to Kilograms[2]	Construction Equipment Emission Factor[2]	Total Gallons of Fuel Consumed
Alternative 2	**259**	**259000**	**10.15**	**25,517**
	Per CalEEMod Output Files.	Per Climate Registry Equation 13e	Per Climate Registry Equation 13e	

Total Gallons Consumed During Project Construction: 25,517

Notes:

Fuel used by all construction equipment, including vehicle hauling trucks, assumed to be diesel.

Sources:

[1]ECORP Consulting, 2021.

[2]Climate Registry. 2016. *General Reporting Protocol for the Voluntary Reporting Program version 2.1.* January 2016.
http://www.theclimateregistry.org/wp-content/uploads/2014/11/General-Reporting-Protocol-Version-2.1.pdf

Action	Carbon Dioxide Equivalents (CO_2e) in Metric Tons[1]	Conversion of Metric Tons to Kilograms[2]	Construction Equipment Emission Factor[2]	Total Gallons of Fuel Consumed
Alternative 3	**506**	**506000**	**10.15**	**49,852**
	Per CalEEMod Output Files.	Per Climate Registry Equation 13e	Per Climate Registry Equation 13e	

Total Gallons Consumed During Project Construction: 49,852

Notes:

Fuel used by all construction equipment, including vehicle hauling trucks, assumed to be diesel.

Sources:

[1]ECORP Consulting, 2021.

[2]Climate Registry. 2016. *General Reporting Protocol for the Voluntary Reporting Program version 2.1.* January 2016.
http://www.theclimateregistry.org/wp-content/uploads/2014/11/General-Reporting-Protocol-Version-2.1.pdf

APPENDIX 3.6

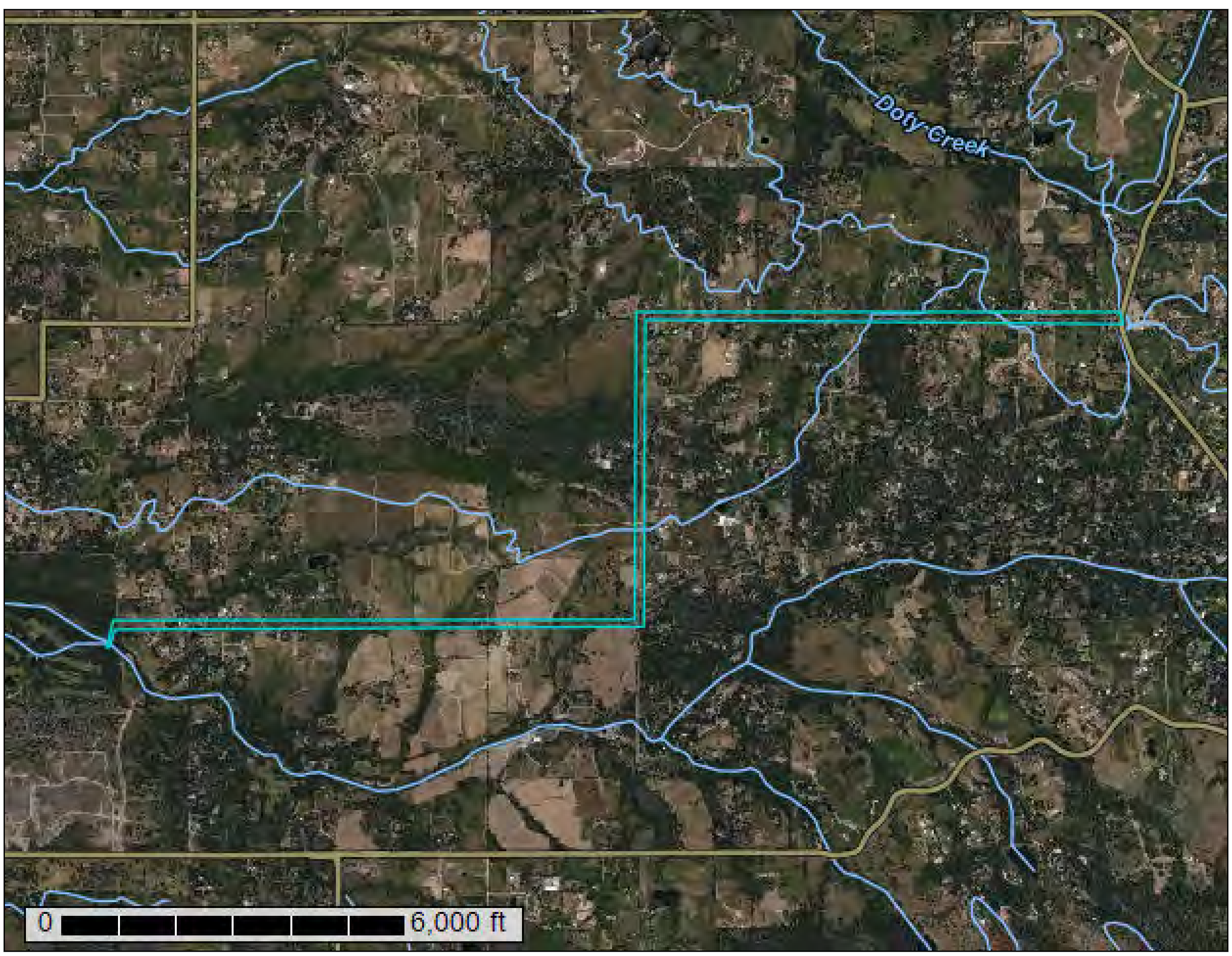
Custom Soil Resource Reports
(U.S, Department of Agriculture's Natural Resources Conservation Service, 2020)

United States Department of Agriculture

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for
Placer County, California, Western Part



July 10, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

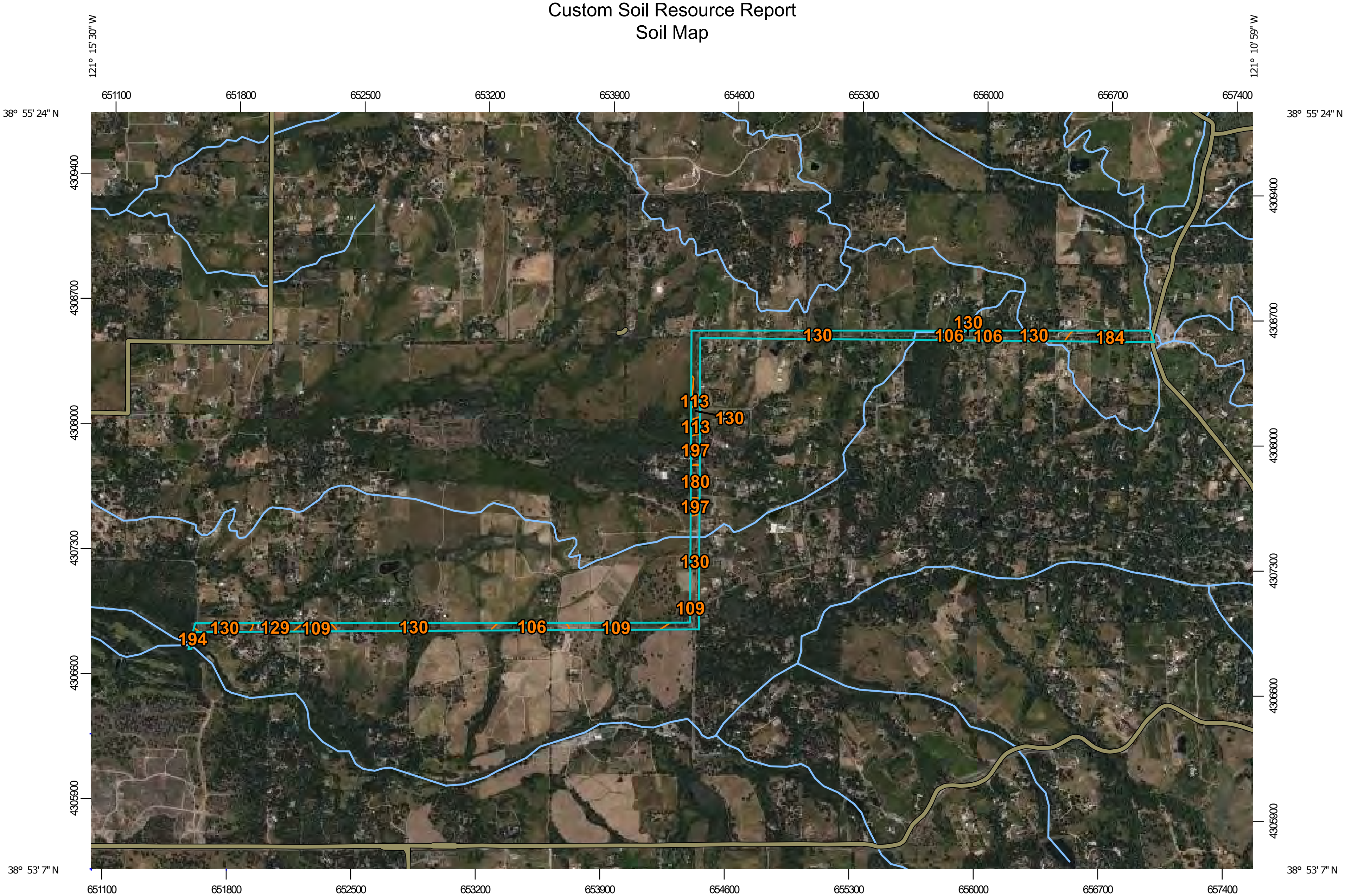
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 400, 800, 1600, 2400

Feet: 0, 1000, 2000, 4000, 6000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	51.4	60.5%
180	Rubble land	2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	7.3	8.6%
194	Xerofluvents, frequently flooded	0.5	0.6%
197	Xerorthents, placer areas	3.3	3.9%
Totals for Area of Interest		**85.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Placer County, California, Western Part

106—Andregg coarse sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hfyf
Elevation: 200 to 1,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Andregg and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Caperton

Percent of map unit: 5 percent
Hydric soil rating: No

Sierra

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, mod deep

Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

109—Andregg coarse sandy loam, rocky, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfyj
Elevation: 200 to 1,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Andregg and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Sierra
Percent of map unit: 5 percent
Hydric soil rating: No

Caperton
Percent of map unit: 5 percent
Hydric soil rating: No

Xerofluvents
Percent of map unit: 2 percent
Landform: Drainageways
Hydric soil rating: Yes

Unnamed
Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

113—Andregg-Shenandoah complex, 2 to 15 percent slopes

Map Unit Setting
National map unit symbol: hfyn
Elevation: 200 to 1,800 feet
Mean annual precipitation: 12 to 40 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition
Andregg and similar soils: 55 percent
Shenandoah and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Thermic Granitic Foothills 27-40 PZ (F018XI205CA)
Hydric soil rating: No

Description of Shenandoah

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 16 inches: sandy loam
H2 - 16 to 34 inches: clay
H3 - 34 to 38 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: About 16 inches to abrupt textural change; 34 to 38 inches to paralithic bedrock
Natural drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Low Gradient, Concave Depressions (R018XI111CA)
Hydric soil rating: Yes

Minor Components

Caperton
Percent of map unit: 5 percent
Hydric soil rating: No

Sierra
Percent of map unit: 5 percent
Hydric soil rating: No

Xerofluvents
Percent of map unit: 4 percent
Landform: Drainageways
Hydric soil rating: Yes

Unnamed
Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

129—Caperton gravelly coarse sandy loam, 2 to 30 percent slopes

Map Unit Setting
National map unit symbol: hfz5
Elevation: 200 to 1,500 feet
Mean annual precipitation: 20 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 220 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition
Caperton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caperton

Setting
Landform: Hills

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 18 inches: gravelly coarse sandy loam
H2 - 18 to 22 inches: weathered bedrock

Properties and qualities

Slope: 2 to 30 percent
Depth to restrictive feature: 18 to 22 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: D
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Andregg

Percent of map unit: 10 percent
Hydric soil rating: No

Shenandoah

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed, mod deep

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

130—Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfz6

Elevation: 200 to 1,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Caperton and similar soils: 50 percent
Andregg and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caperton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 18 inches: coarse sandy loam
H2 - 18 to 22 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 18 to 22 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam

H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed, mod deep

Percent of map unit: 4 percent
Hydric soil rating: No

Sierra

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

180—Rubble land

Map Unit Setting

National map unit symbol: hg0t
Elevation: 650 to 4,000 feet
Mean annual precipitation: 8 to 50 inches

Mean annual air temperature: 45 to 54 degrees F
Frost-free period: 75 to 180 days
Farmland classification: Not prime farmland

Map Unit Composition

Rubble land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rubble Land

Setting

Parent material: Residuum

Typical profile

H1 - 0 to 60 inches: fragmental material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

184—Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI

Map Unit Setting

National map unit symbol: 2z5kw
Elevation: 430 to 1,820 feet
Mean annual precipitation: 24 to 45 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 245 to 335 days
Farmland classification: Not prime farmland

Map Unit Composition

Sierra and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sierra

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Residuum weathered from granodiorite

Typical profile

A - 0 to 9 inches: sandy loam
BAt - 9 to 16 inches: sandy loam
Bt - 16 to 35 inches: sandy clay loam
BCt - 35 to 45 inches: sandy clay loam
Cr - 45 to 55 inches: bedrock

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: 39 to 79 inches to paralithic bedrock
Natural drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: Thermic Granitic Foothills 27-40 PZ (F018XI205CA)
Hydric soil rating: No

Minor Components

Andregg, coarse sandy loam

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Flanly

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Rock outcrop

Percent of map unit: 3 percent
Landform: Hills
Hydric soil rating: No

Shenandoah

Percent of map unit: 2 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

194—Xerofluvents, frequently flooded

Map Unit Setting

National map unit symbol: hg18
Elevation: 0 to 1,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents, Frequently Flooded

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 15 inches: stratified loamy sand to fine sandy loam
H2 - 15 to 37 inches: stratified loamy sand to fine sandy loam to silt loam
H3 - 37 to 55 inches: stratified loam to silty clay loam to clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 30 to 57 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

197—Xerorthents, placer areas

Map Unit Setting

National map unit symbol: hg1c
Elevation: 50 to 3,200 feet
Mean annual precipitation: 8 to 18 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 150 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerorthents and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerorthents

Setting

Parent material: Mine spoil or earthy fill

Typical profile

H1 - 0 to 60 inches: variable

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Ecological site: PLACER DIGGINGS (R018XD084CA)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Erosion Hazard (Road, Trail)

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

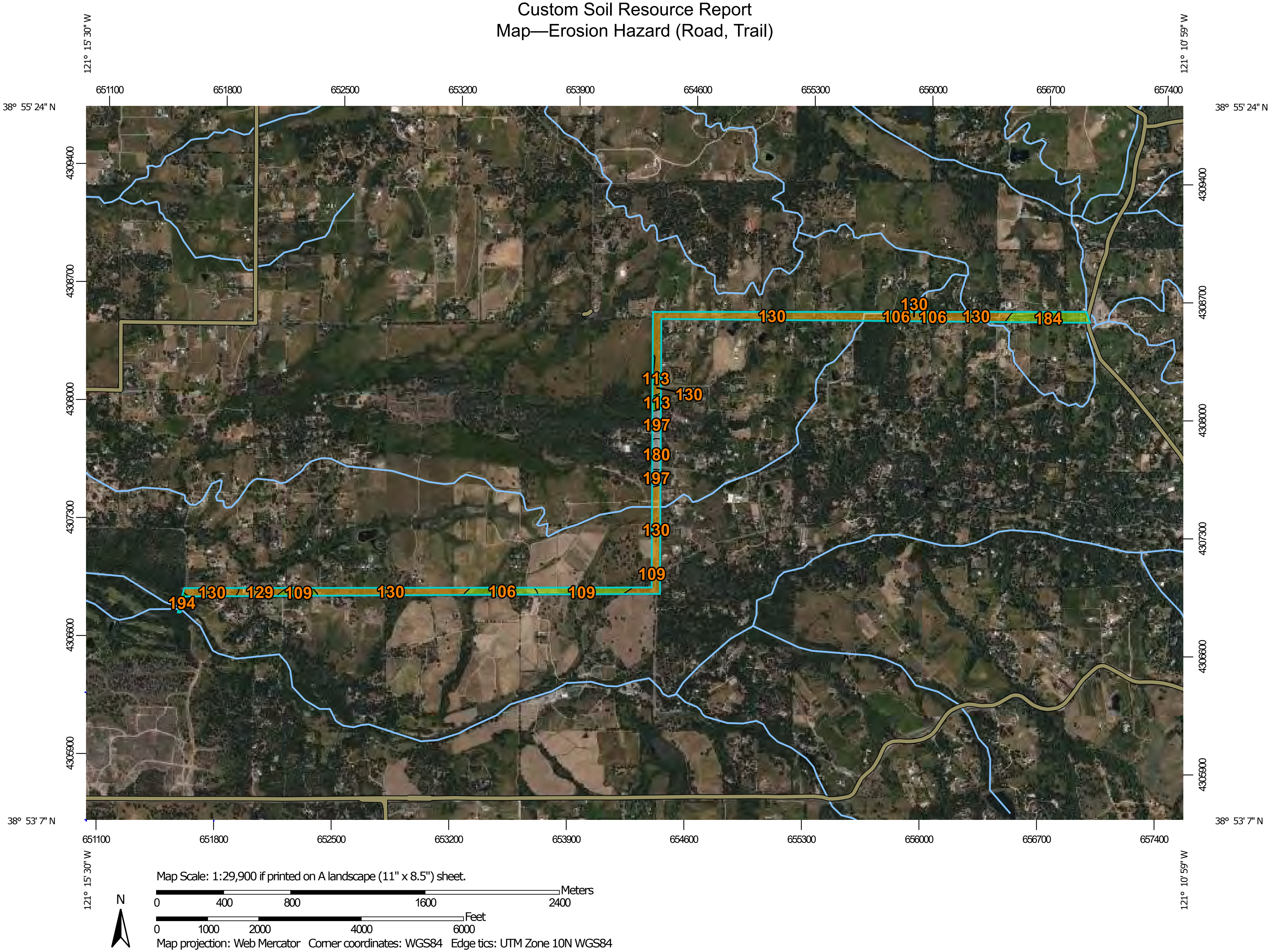
The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Erosion Hazard (Road, Trail)



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Tables—Erosion Hazard (Road, Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	Moderate	Andregg (85%)	Slope/erodibility (0.50)	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	Moderate	Andregg (85%)	Slope/erodibility (0.50)	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	Moderate	Andregg (55%)	Slope/erodibility (0.50)	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	Severe	Caperton (85%)	Slope/erodibility (0.95)	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Severe	Caperton (50%)	Slope/erodibility (0.95)	51.4	60.5%
180	Rubble land	Not rated	Rubble land (100%)		2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	Moderate	Sierra (80%)	Slope/erodibility (0.50)	7.3	8.6%
194	Xerofluvents, frequently flooded	Slight	Xerofluvents, frequently flooded (90%)		0.5	0.6%
197	Xerorthents, placer areas	Not rated	Xerorthents (90%)		3.3	3.9%
			Unnamed (10%)			
Totals for Area of Interest					**85.0**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Severe	54.6	64.3%
Moderate	24.3	28.5%
Slight	0.5	0.6%
Null or Not Rated	5.6	6.5%
Totals for Area of Interest	**85.0**	**100.0%**

Rating Options—Erosion Hazard (Road, Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

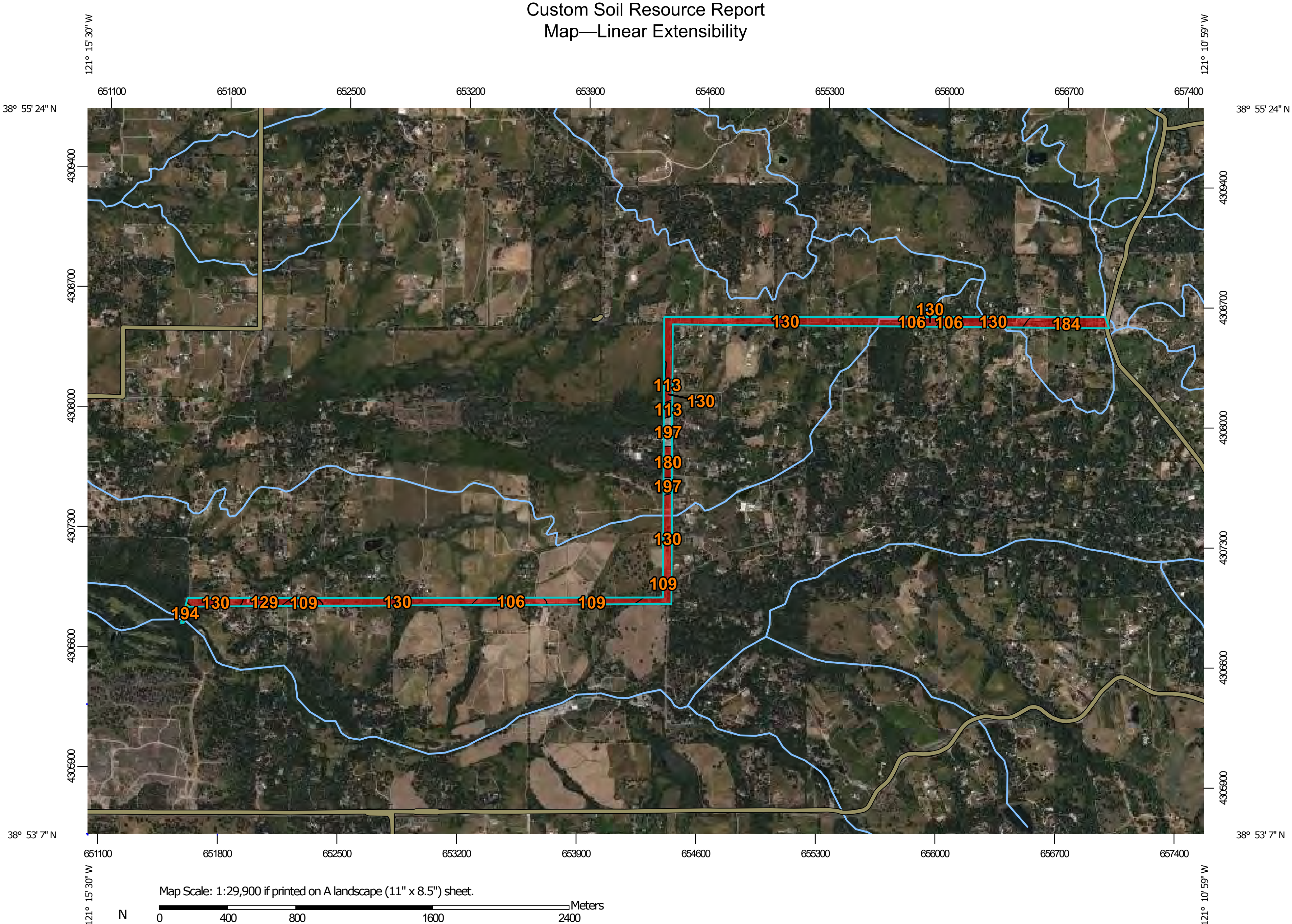
Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Linear Extensibility

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Linear Extensibility



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters 0 400 800 1600 2400

Feet 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Lines

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Points

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Linear Extensibility

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	1.5	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	1.5	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	1.5	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	1.5	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	1.5	51.4	60.5%
180	Rubble land	1.5	2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	2.4	7.3	8.6%
194	Xerofluvents, frequently flooded	4.5	0.5	0.6%
197	Xerorthents, placer areas		3.3	3.9%
Totals for Area of Interest			**85.0**	**100.0%**

Rating Options—Linear Extensibility

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 6

Bottom Depth: 120

Units of Measure: Inches

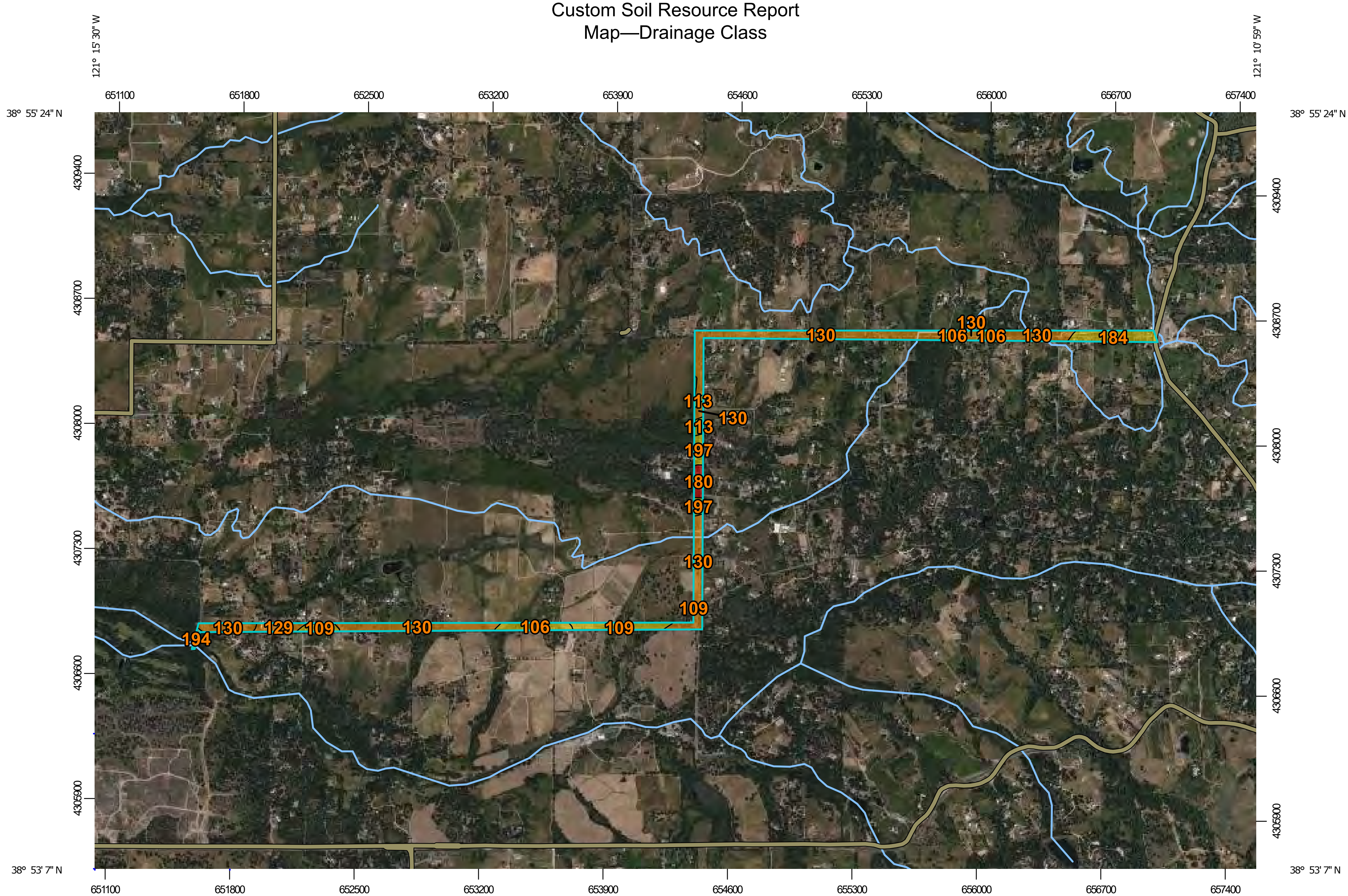
Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Map—Drainage Class



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 400, 800, 1600, 2400

Feet: 0, 1000, 2000, 4000, 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

Not rated or not available

Soil Rating Lines

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

Not rated or not available

Soil Rating Points

Excessively drained

Somewhat excessively drained

Well drained

Moderately well drained

Somewhat poorly drained

Poorly drained

Very poorly drained

Subaqueous

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	Well drained	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	Well drained	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	Well drained	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	Somewhat excessively drained	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Somewhat excessively drained	51.4	60.5%
180	Rubble land	Excessively drained	2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	Well drained	7.3	8.6%
194	Xerofluvents, frequently flooded	Somewhat poorly drained	0.5	0.6%
197	Xerorthents, placer areas	Well drained	3.3	3.9%
Totals for Area of Interest			**85.0**	**100.0%**

Rating Options—Drainage Class

Aggregation Method: Dominant Condition

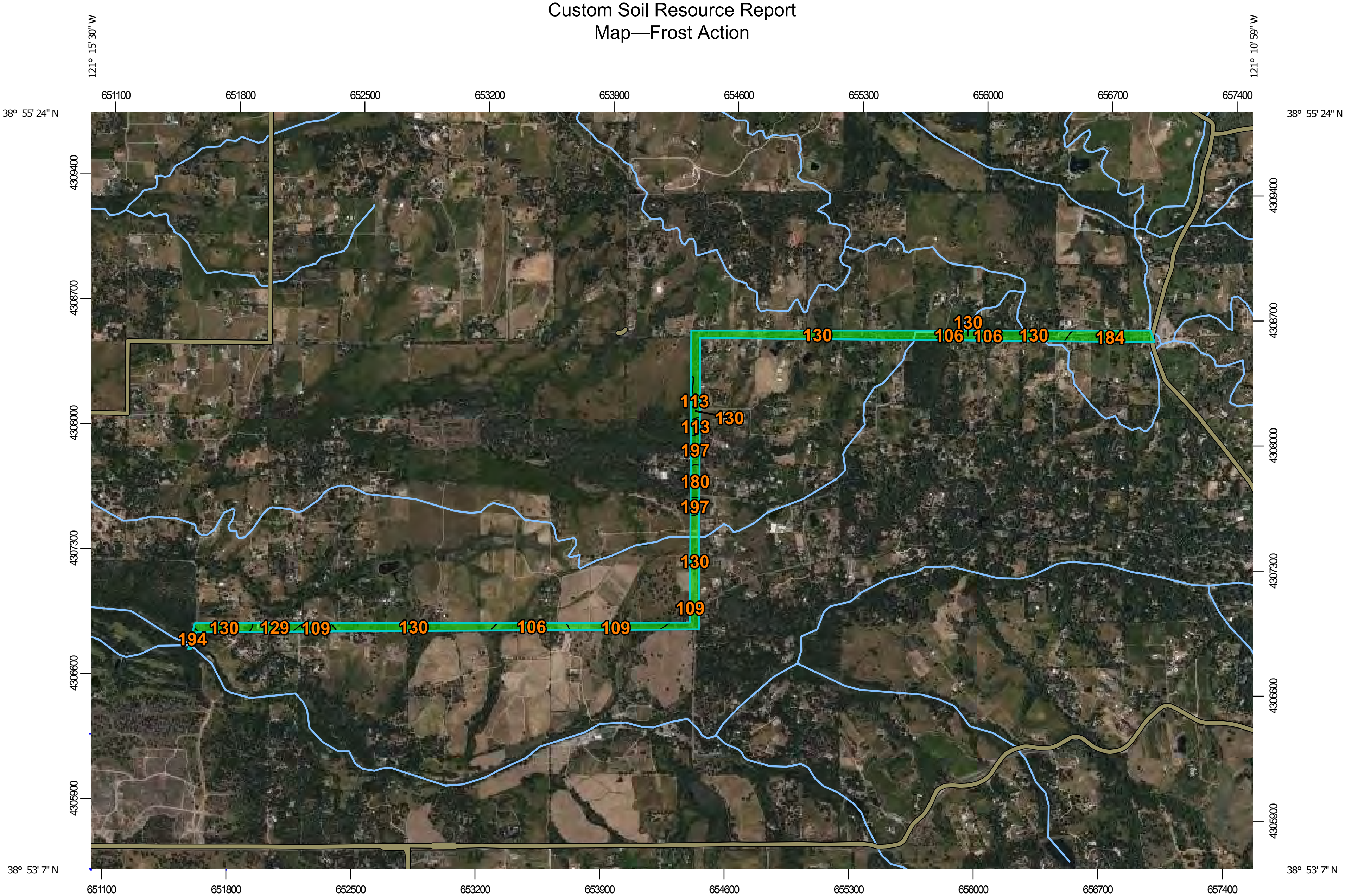
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Frost Action

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Custom Soil Resource Report
Map—Frost Action



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 400 800 1600 2400

Feet: 0 1000 2000 4000 6000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

High

Moderate

Low

None

Not rated or not available

Soil Rating Lines

High

Moderate

Low

None

Not rated or not available

Soil Rating Points

High

Moderate

Low

None

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

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Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Frost Action

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	None	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	None	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	None	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	None	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	51.4	60.5%
180	Rubble land	None	2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	None	7.3	8.6%
194	Xerofluvents, frequently flooded	None	0.5	0.6%
197	Xerorthents, placer areas	None	3.3	3.9%
Totals for Area of Interest			**85.0**	**100.0%**

Rating Options—Frost Action

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

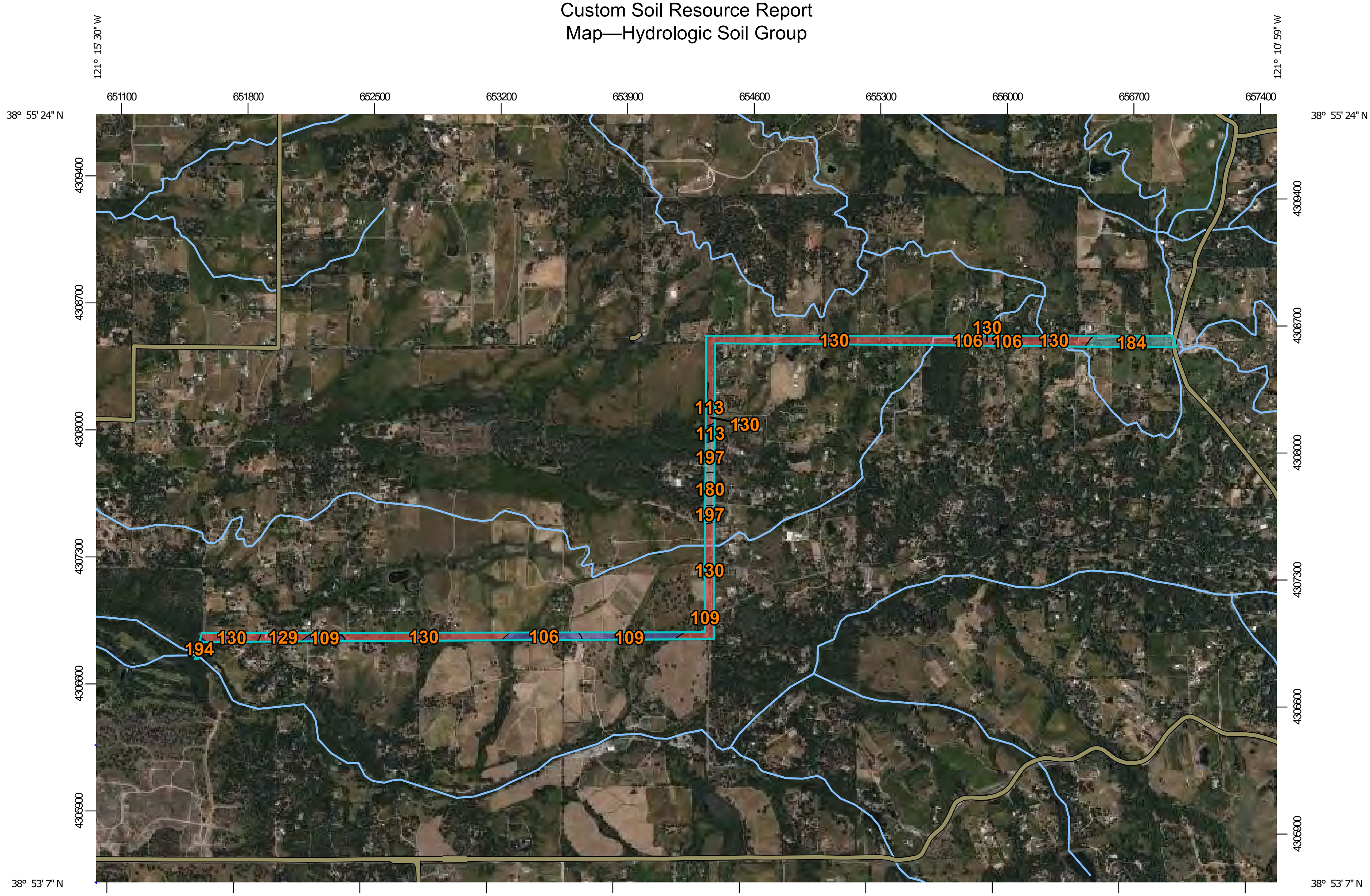
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 400, 800, 1600, 2400

Feet: 0, 1000, 2000, 4000, 6000

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	B	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	B	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	B	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	D	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	D	51.4	60.5%
180	Rubble land		2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	C	7.3	8.6%
194	Xerofluvents, frequently flooded	B	0.5	0.6%
197	Xerorthents, placer areas		3.3	3.9%
Totals for Area of Interest			**85.0**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Flooding Frequency Class

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

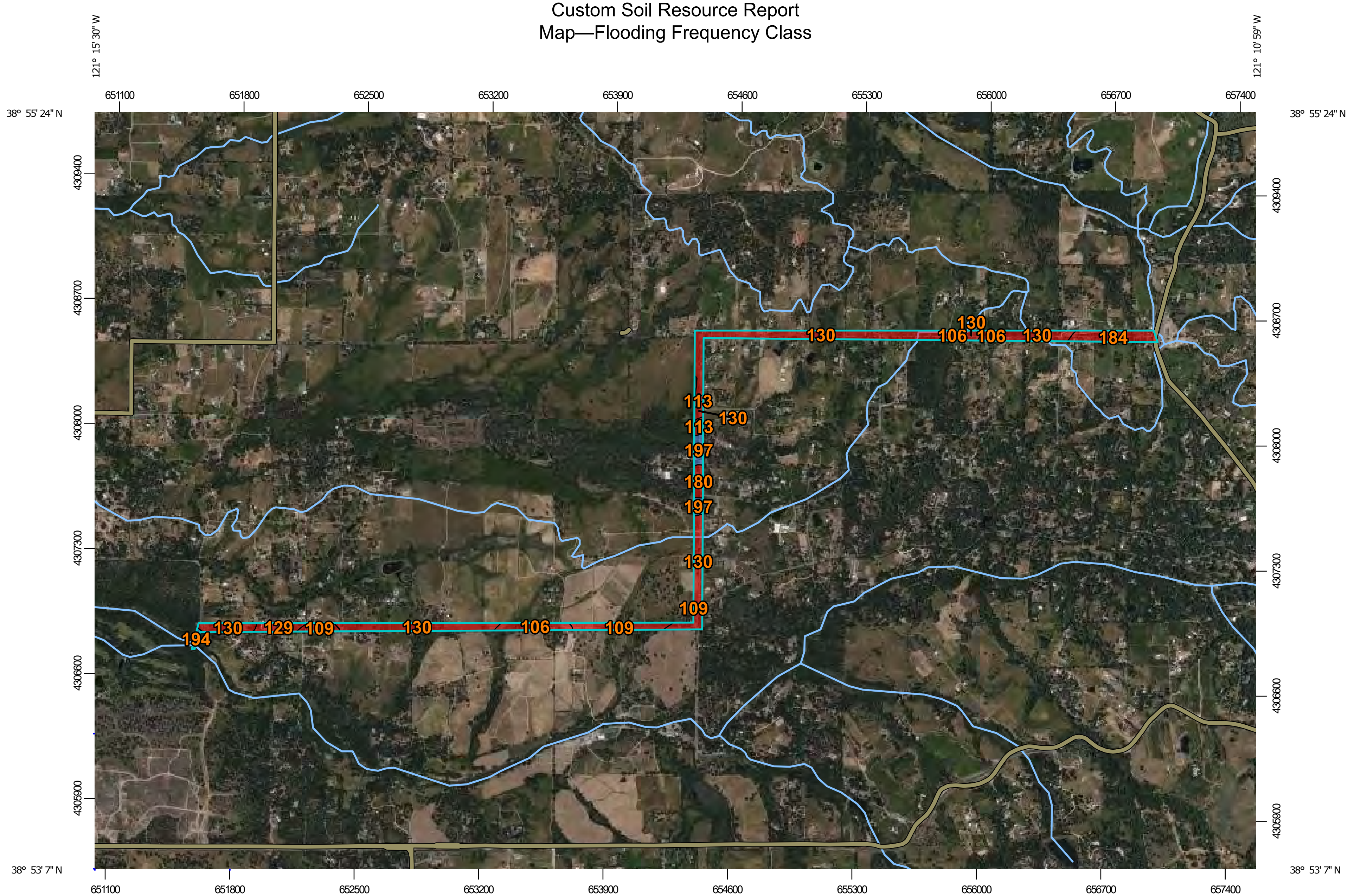
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

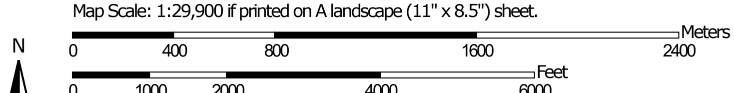
"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class



Map Scale: 1:29,900 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Lines

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Points

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
106	Andregg coarse sandy loam, 2 to 9 percent slopes	None	7.4	8.7%
109	Andregg coarse sandy loam, rocky, 2 to 15 percent slopes	None	7.6	8.9%
113	Andregg-Shenandoah complex, 2 to 15 percent slopes	None	1.9	2.3%
129	Caperton gravelly coarse sandy loam, 2 to 30 percent slopes	None	3.2	3.8%
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	51.4	60.5%
180	Rubble land	None	2.3	2.7%
184	Sierra sandy loam, deep, 9 to 15 percent slopes, LRU 18XI	None	7.3	8.6%
194	Xerofluvents, frequently flooded	Frequent	0.5	0.6%
197	Xerorthents, placer areas	Frequent	3.3	3.9%
Totals for Area of Interest			**85.0**	**100.0%**

Rating Options—Flooding Frequency Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Placer County, California, Western Part

July 10, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	0.1	6.5%
194	Xerofluvents, frequently flooded	0.9	93.5%
Totals for Area of Interest		**1.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Placer County, California, Western Part

130—Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfz6
Elevation: 200 to 1,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Caperton and similar soils: 50 percent
Andregg and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caperton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 18 inches: coarse sandy loam
H2 - 18 to 22 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 18 to 22 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed, mod deep

Percent of map unit: 4 percent
Hydric soil rating: No

Sierra

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

194—Xerofluvents, frequently flooded

Map Unit Setting

National map unit symbol: hg18
Elevation: 0 to 1,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents, Frequently Flooded

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 15 inches: stratified loamy sand to fine sandy loam
H2 - 15 to 37 inches: stratified loamy sand to fine sandy loam to silt loam
H3 - 37 to 55 inches: stratified loam to silty clay loam to clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 30 to 57 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Erosion Hazard (Road, Trail)

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

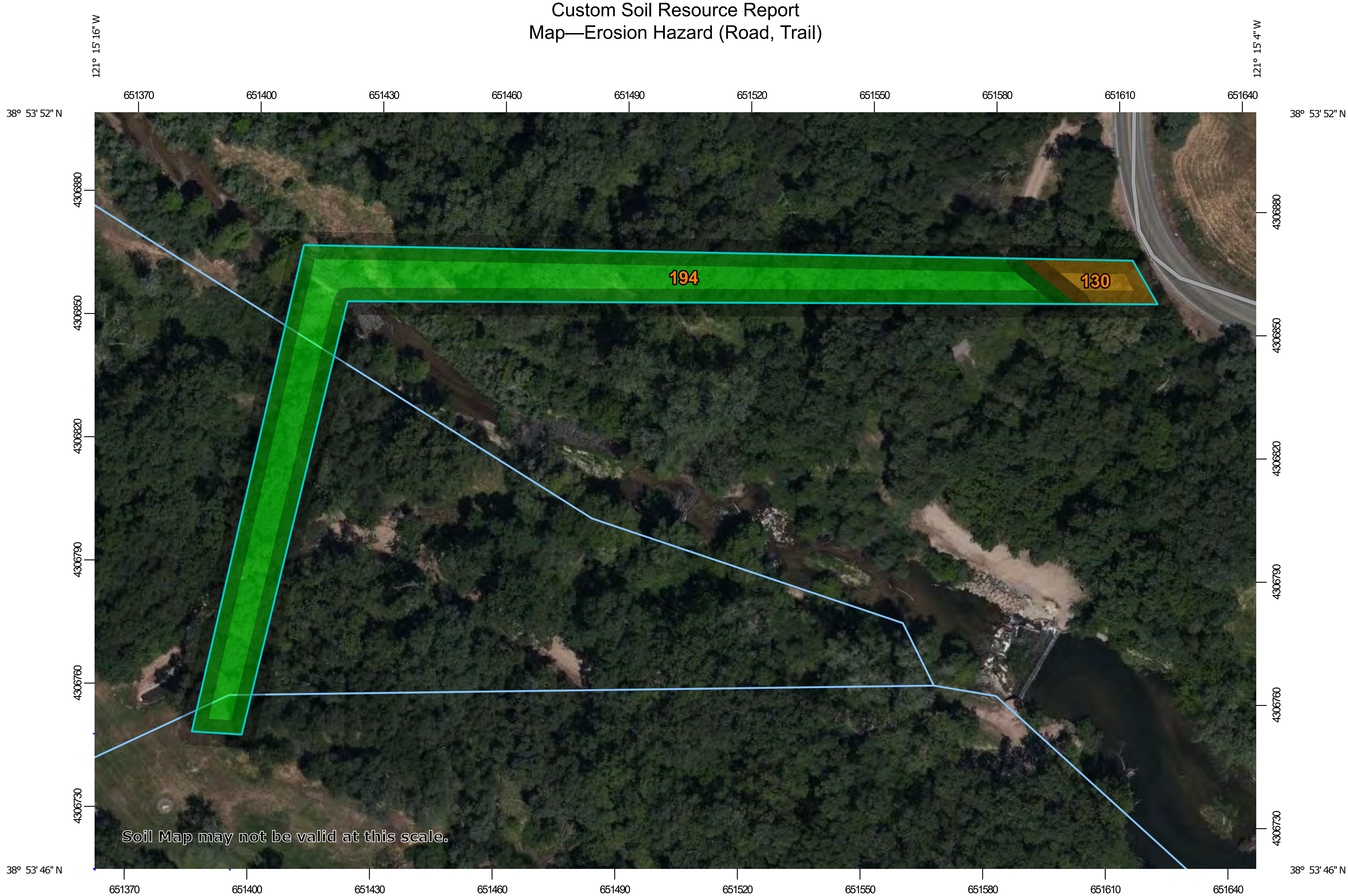
The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Erosion Hazard (Road, Trail)



Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Lines

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Points

Very severe

Severe

Moderate

Slight

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Tables—Erosion Hazard (Road, Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Severe	Caperton (50%)	Slope/erodibility (0.95)	0.1	6.5%
194	Xerofluvents, frequently flooded	Slight	Xerofluvents, frequently flooded (90%)		0.9	93.5%
Totals for Area of Interest					**1.0**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	0.9	93.5%
Severe	0.1	6.5%
Totals for Area of Interest	**1.0**	**100.0%**

Rating Options—Erosion Hazard (Road, Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Linear Extensibility

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Linear Extensibility

Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Lines

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Points

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 12, May 29, 2020

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Linear Extensibility

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	1.5	0.1	6.5%
194	Xerofluvents, frequently flooded	4.5	0.9	93.5%
Totals for Area of Interest			**1.0**	**100.0%**

Rating Options—Linear Extensibility

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 6

Bottom Depth: 120

Units of Measure: Inches

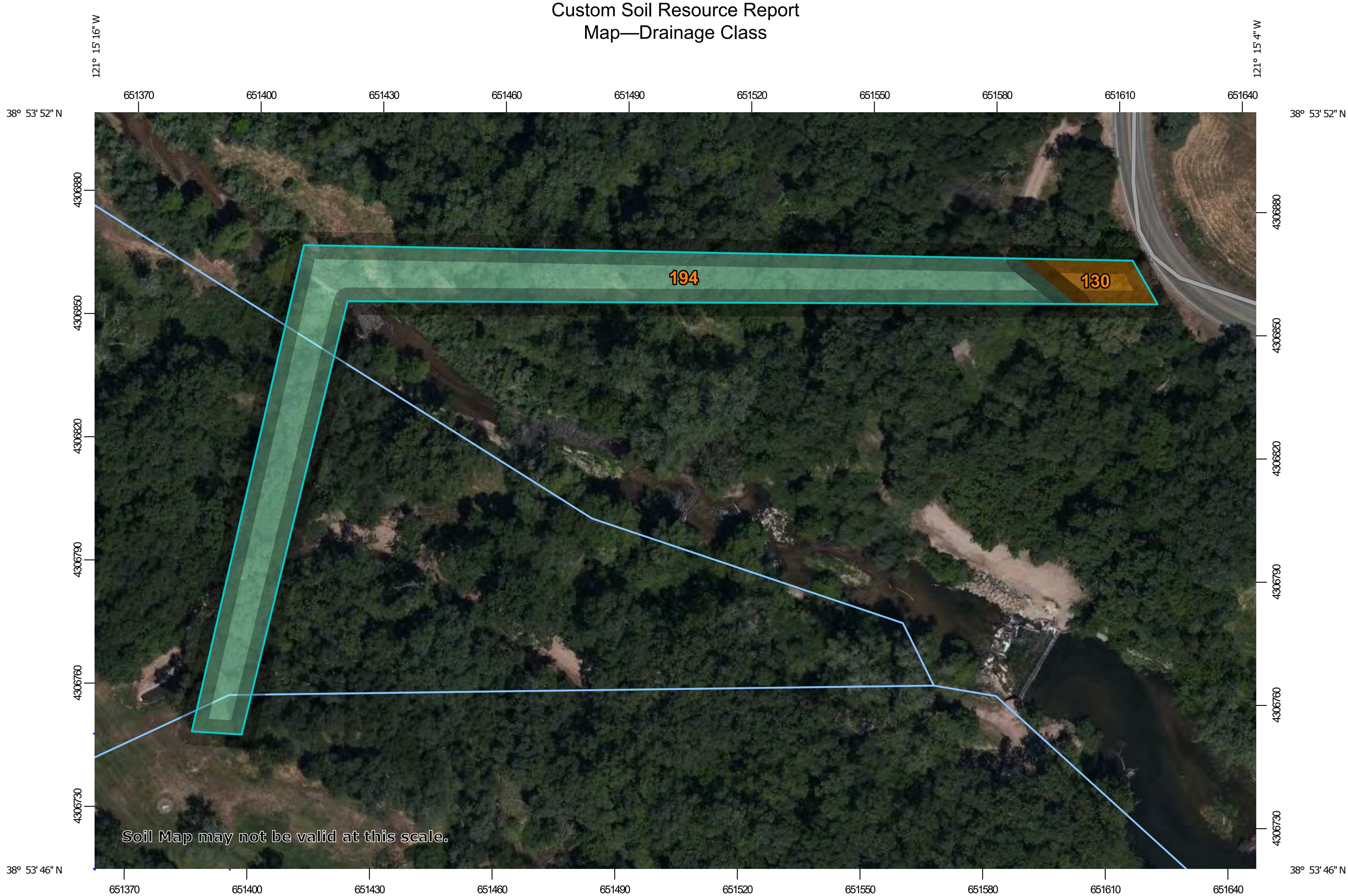
Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

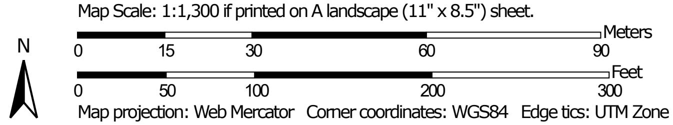
Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Map—Drainage Class



Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Somewhat excessively drained	0.1	6.5%
194	Xerofluvents, frequently flooded	Somewhat poorly drained	0.9	93.5%
Totals for Area of Interest			**1.0**	**100.0%**

Rating Options—Drainage Class

Aggregation Method: Dominant Condition

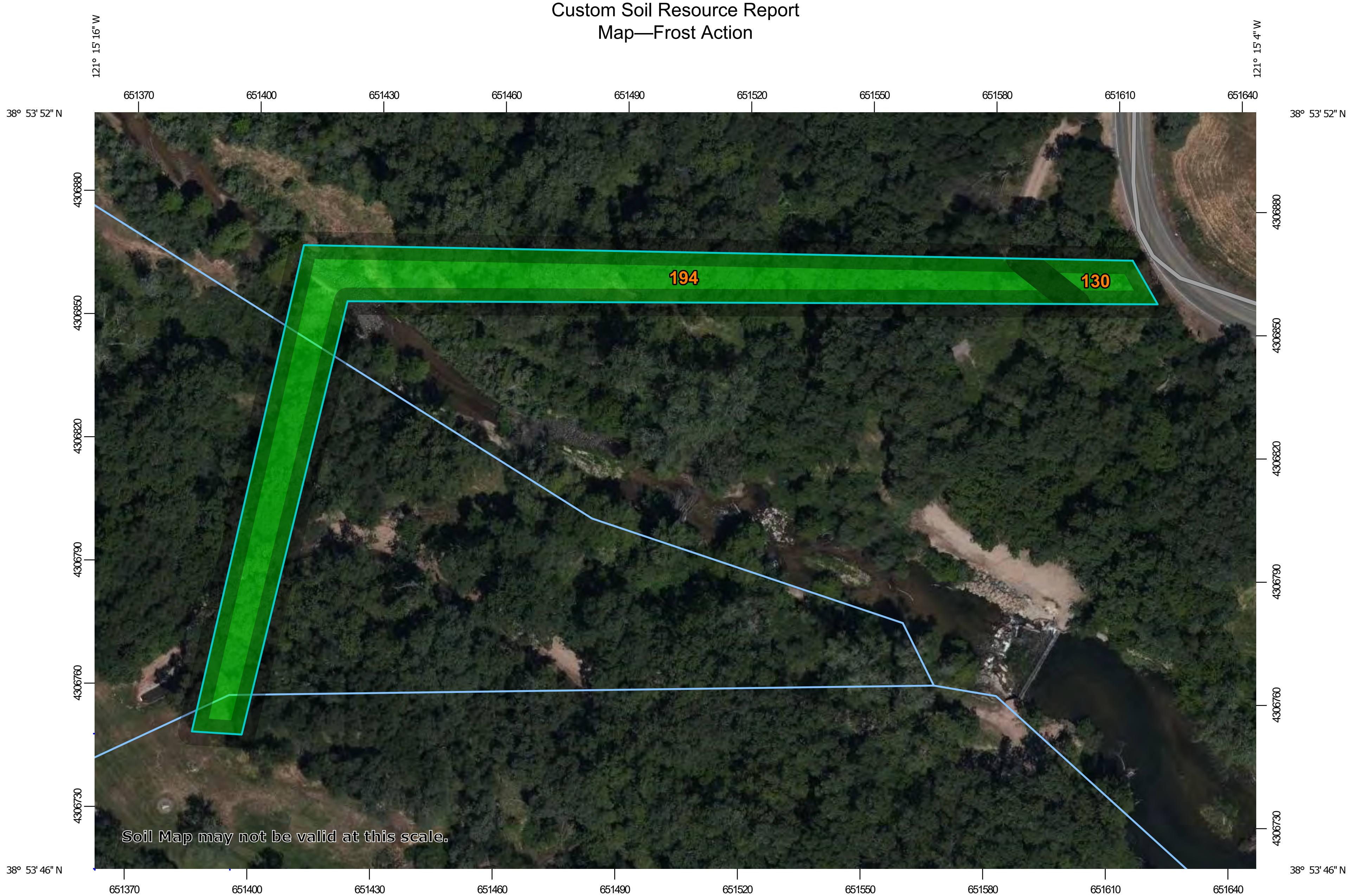
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Frost Action

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Map—Frost Action



Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

High

Moderate

Low

None

Not rated or not available

Soil Rating Lines

High

Moderate

Low

None

Not rated or not available

Soil Rating Points

High

Moderate

Low

None

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Frost Action

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	0.1	6.5%
194	Xerofluvents, frequently flooded	None	0.9	93.5%
Totals for Area of Interest			**1.0**	**100.0%**

Rating Options—Frost Action

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

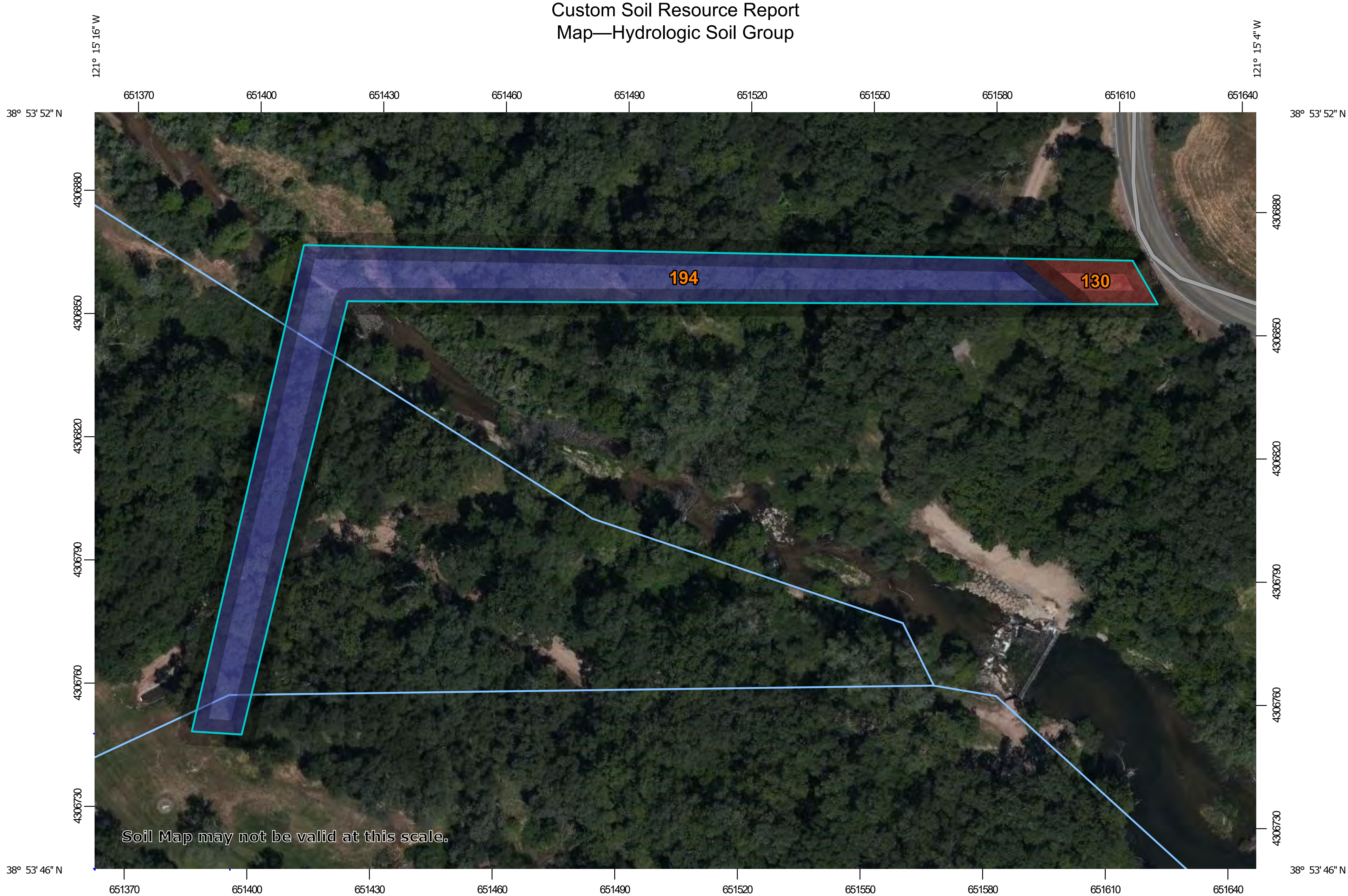
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

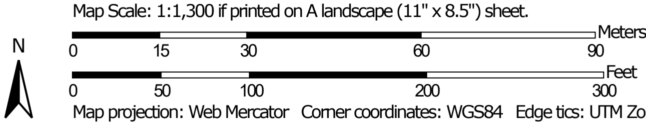
Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group



Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	D	0.1	6.5%
194	Xerofluvents, frequently flooded	B	0.9	93.5%
Totals for Area of Interest			**1.0**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Flooding Frequency Class

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

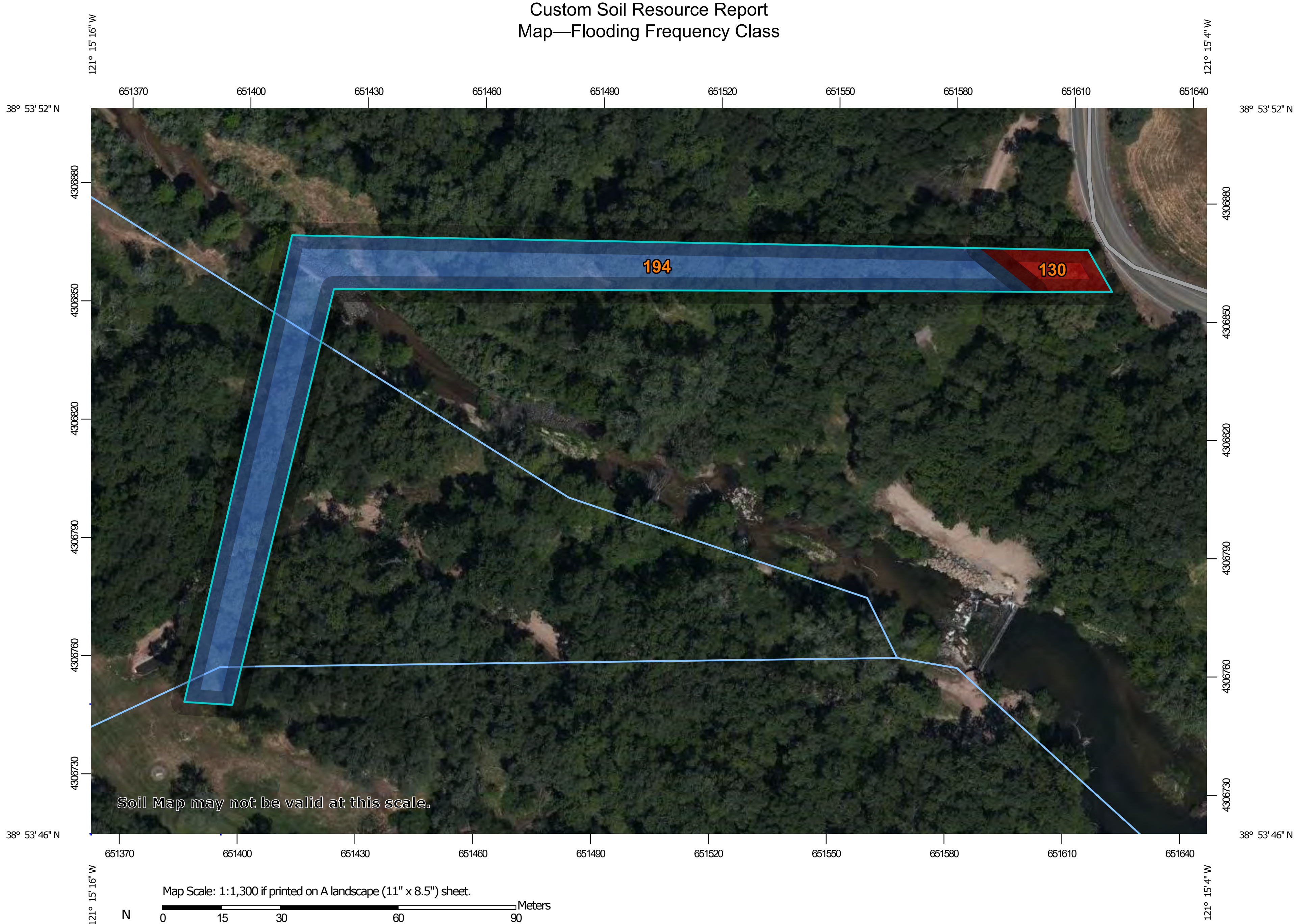
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class



Map Scale: 1:1,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Lines

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Points

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	0.1	6.5%
194	Xerofluvents, frequently flooded	Frequent	0.9	93.5%
Totals for Area of Interest			**1.0**	**100.0%**

Rating Options—Flooding Frequency Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Placer County, California, Western Part

June 9, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 11, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	3.5	100.0%
Totals for Area of Interest		**3.5**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Placer County, California, Western Part

194—Xerofluvents, frequently flooded

Map Unit Setting

National map unit symbol: hg18
Elevation: 0 to 1,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents, Frequently Flooded

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 15 inches: stratified loamy sand to fine sandy loam
H2 - 15 to 37 inches: stratified loamy sand to fine sandy loam to silt loam
H3 - 37 to 55 inches: stratified loam to silty clay loam to clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 30 to 57 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways

Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Erosion Hazard (Off-Road, Off-Trail)

The ratings in this interpretation indicate the hazard of soil loss from off-road and off-trail areas after disturbance activities that expose the soil surface. The ratings are based on slope, soil erosion factor K, and an index of rainfall erosivity (R). The soil loss is caused by sheet or rill erosion in off-road or off-trail areas where 50 to 75 percent of the surface has been exposed by logging, grazing, mining, or other kinds of disturbance.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," "severe," or "very severe." A rating of "slight" indicates that erosion is unlikely under ordinary climatic conditions; "moderate" indicates that some erosion is likely and that erosion-control measures may be needed; "severe" indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and "very severe" indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Erosion Hazard (Off-Road, Off-Trail)

Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Lines

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Points

Very severe

Severe

Moderate

Slight

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 11, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Tables—Erosion Hazard (Off-Road, Off-Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	Slight	Xerofluvents, frequently flooded (90%)		3.5	100.0%
Totals for Area of Interest					**3.5**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	3.5	100.0%
Totals for Area of Interest	**3.5**	**100.0%**

Rating Options—Erosion Hazard (Off-Road, Off-Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Erosion Hazard (Road, Trail)

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

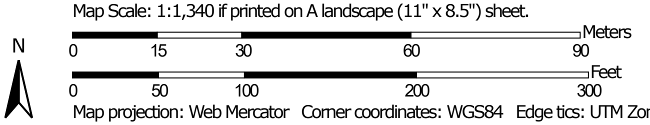
Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Erosion Hazard (Road, Trail)

Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Lines
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Soil Rating Points
- Very severe
- Severe
- Moderate
- Slight
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 11, Sep 16, 2019

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Tables—Erosion Hazard (Road, Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	Slight	Xerofluvents, frequently flooded (90%)		3.5	100.0%
Totals for Area of Interest					**3.5**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Slight	3.5	100.0%
Totals for Area of Interest	**3.5**	**100.0%**

Rating Options—Erosion Hazard (Road, Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

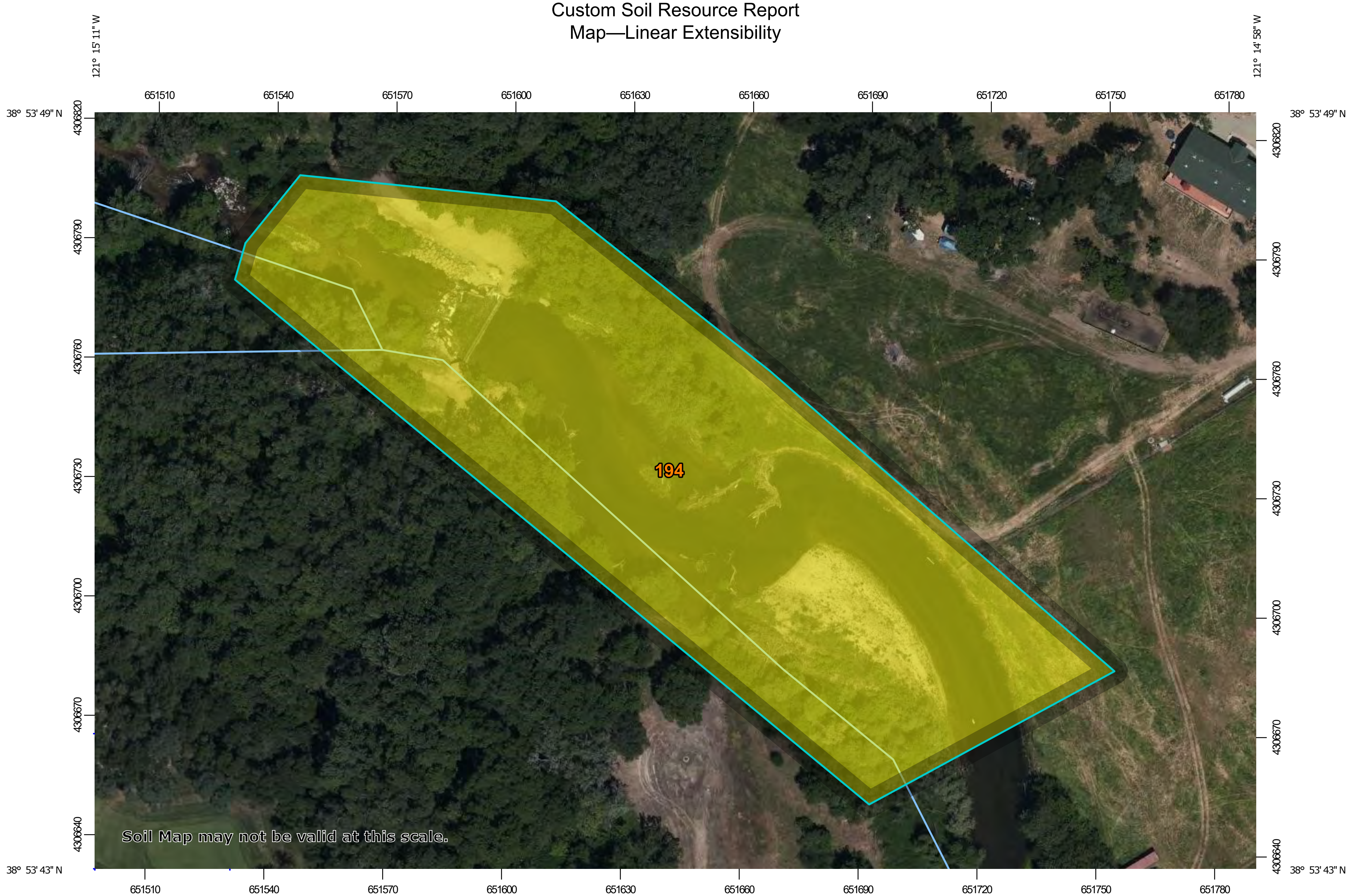
Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Linear Extensibility

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Linear Extensibility



Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Lines

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Points

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 11, Sep 16, 2019

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Linear Extensibility

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	4.5	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Linear Extensibility

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 6

Bottom Depth: 120

Units of Measure: Inches

Plasticity Index

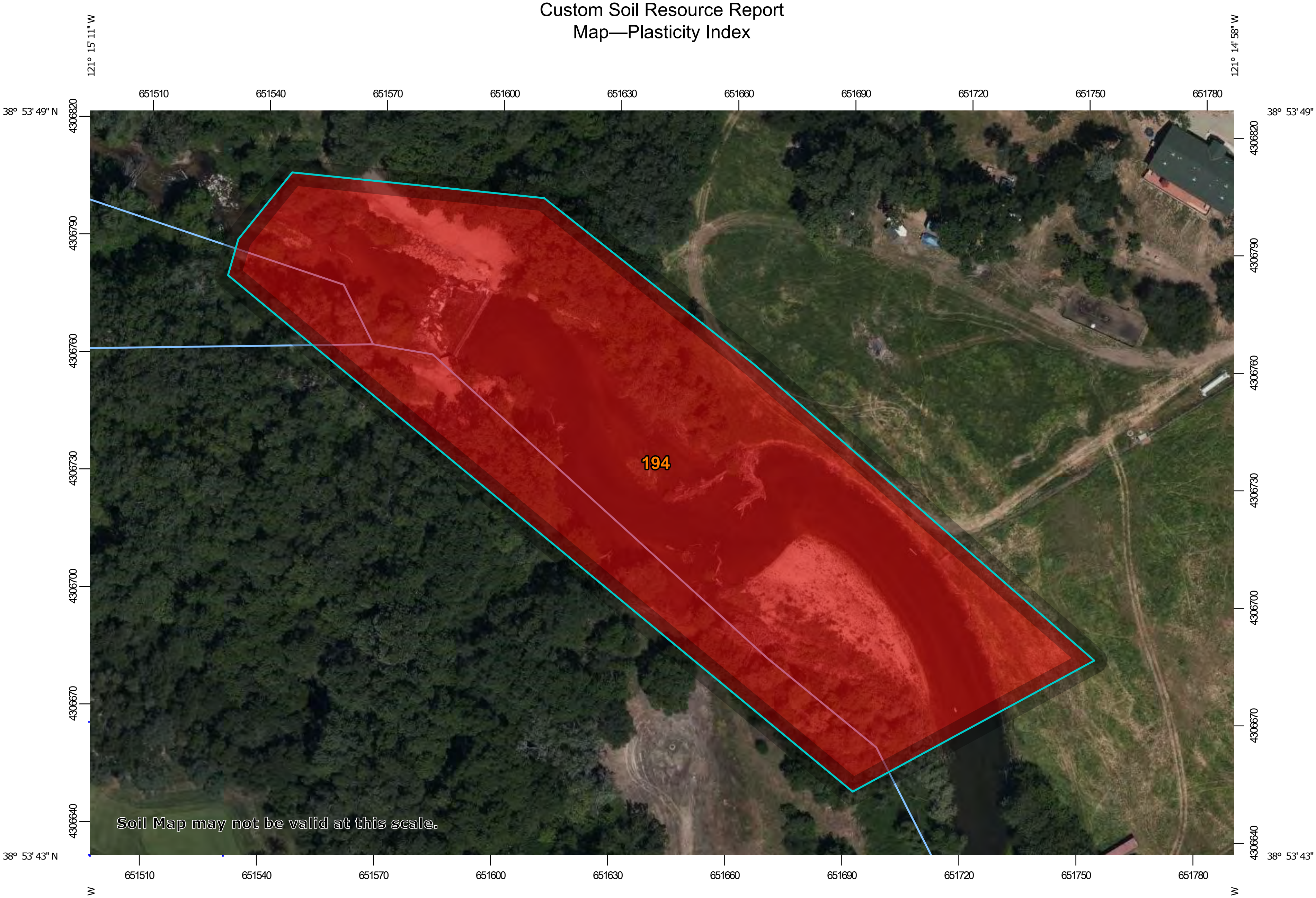
Plasticity index (PI) is one of the standard Atterberg limits used to indicate the plasticity characteristics of a soil. It is defined as the numerical difference between the liquid limit and plastic limit of the soil. It is the range of water content in which a soil exhibits the characteristics of a plastic solid.

The plastic limit is the water content that corresponds to an arbitrary limit between the plastic and semisolid states of a soil. The liquid limit is the water content, on a percent by weight basis, of the soil (passing #40 sieve) at which the soil changes from a plastic to a liquid state.

Soils that have a high plasticity index have a wide range of moisture content in which the soil performs as a plastic material. Highly and moderately plastic clays have large PI values. Plasticity index is used in classifying soils in the Unified and AASHTO classification systems.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Map—Plasticity Index



Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 15 30 60 90

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

= 16.8

Not rated or not available

Soil Rating Lines

= 16.8

Not rated or not available

Soil Rating Points

= 16.8

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Plasticity Index

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	16.8	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Plasticity Index

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 6

Bottom Depth: 120

Units of Measure: Inches

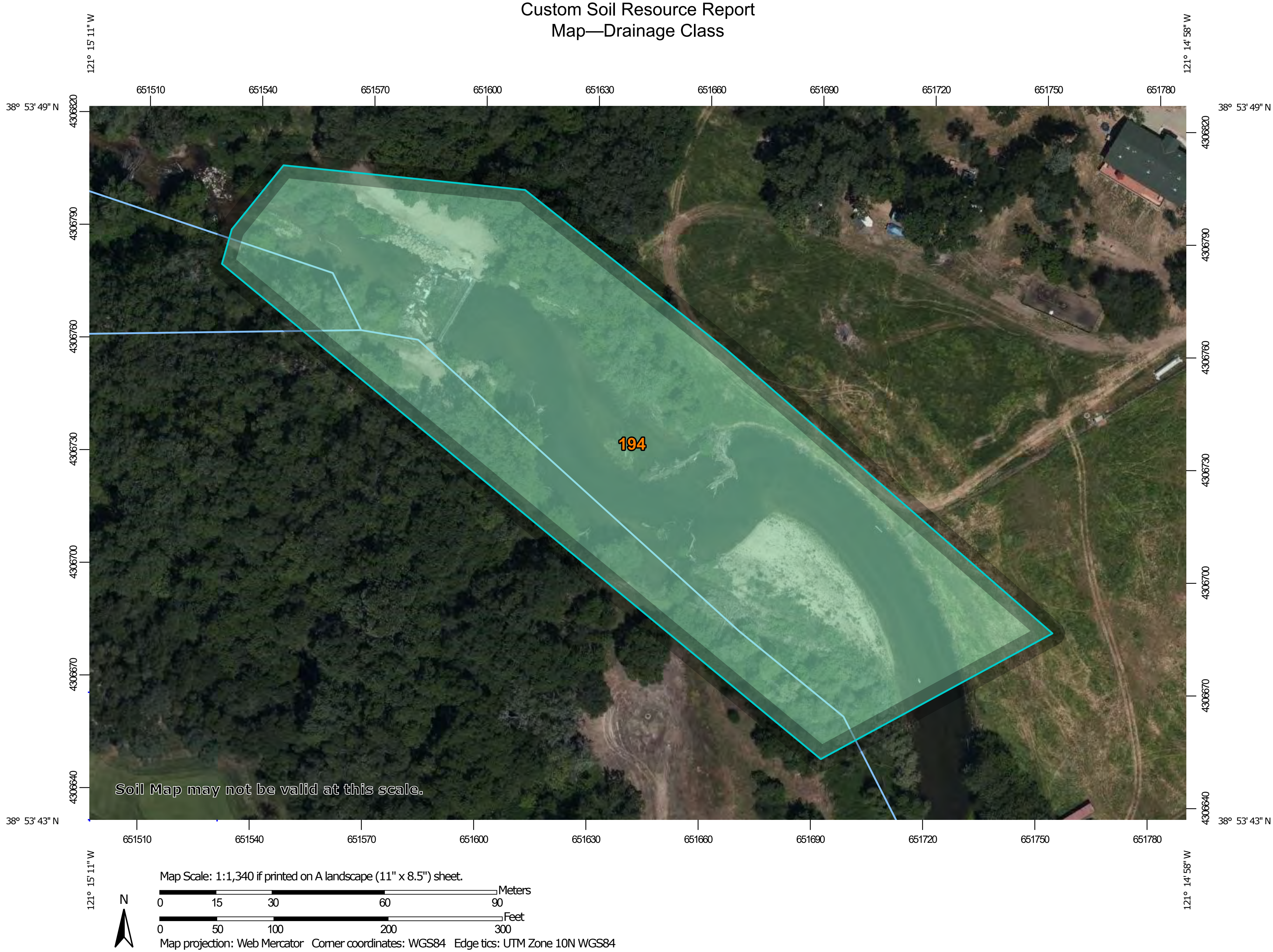
Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Map—Drainage Class



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	Somewhat poorly drained	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Drainage Class

Aggregation Method: Dominant Condition

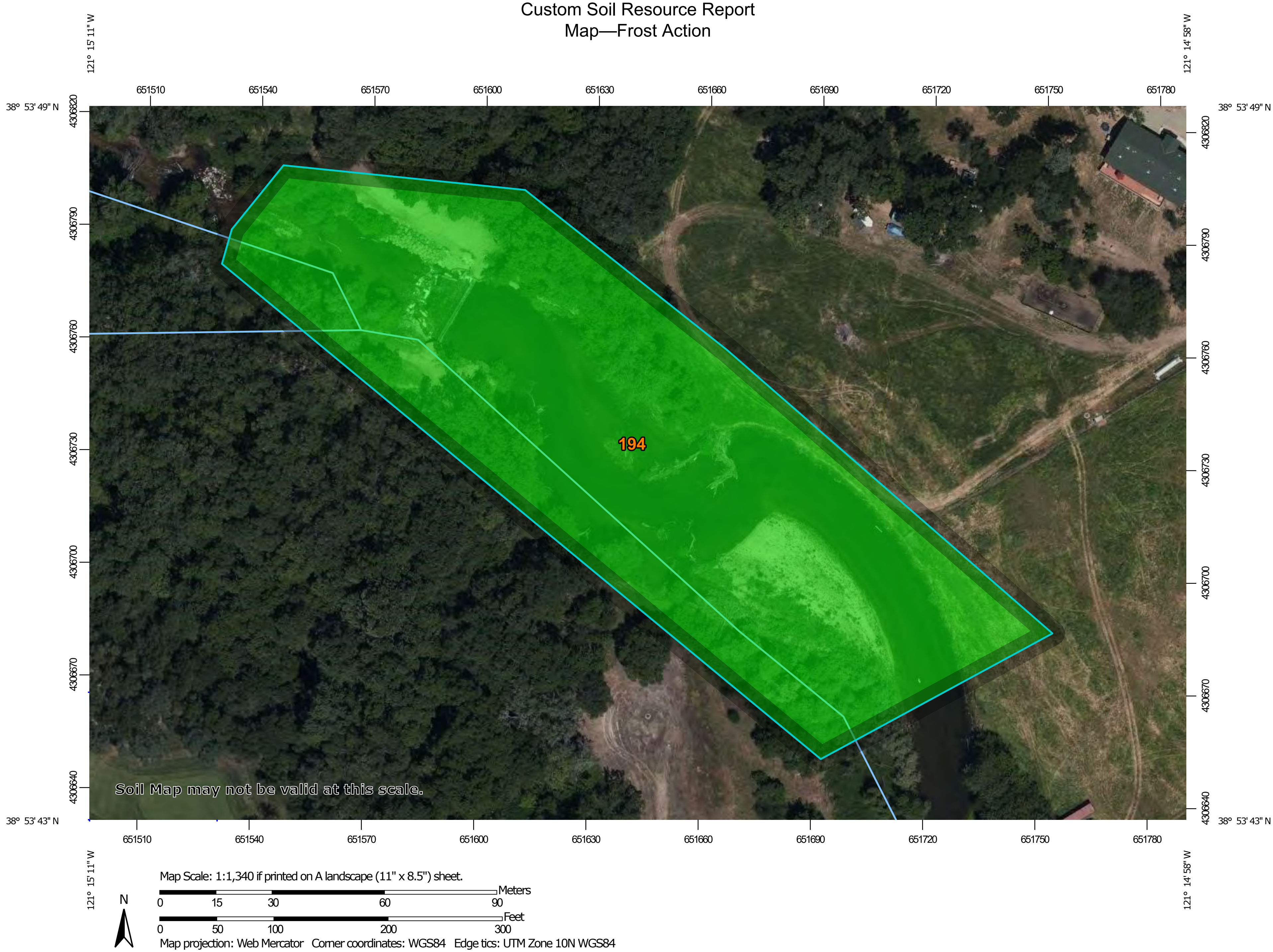
Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Frost Action

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Map—Frost Action



Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 15, 30, 60, 90

Feet: 0, 50, 100, 200, 300

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

High

Moderate

Low

None

Not rated or not available

Soil Rating Lines

High

Moderate

Low

None

Not rated or not available

Soil Rating Points

High

Moderate

Low

None

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Frost Action

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	None	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Frost Action

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

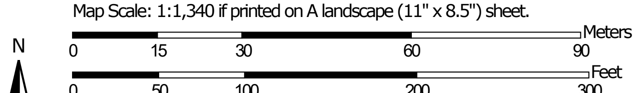
Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group

Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 11, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	B	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Flooding Frequency Class

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

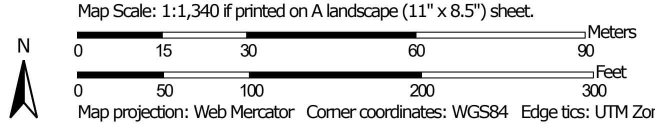
"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class

Map Scale: 1:1,340 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Lines

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Points

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 11, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
194	Xerofluvents, frequently flooded	Frequent	3.5	100.0%
Totals for Area of Interest			**3.5**	**100.0%**

Rating Options—Flooding Frequency Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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United States Department of Agriculture

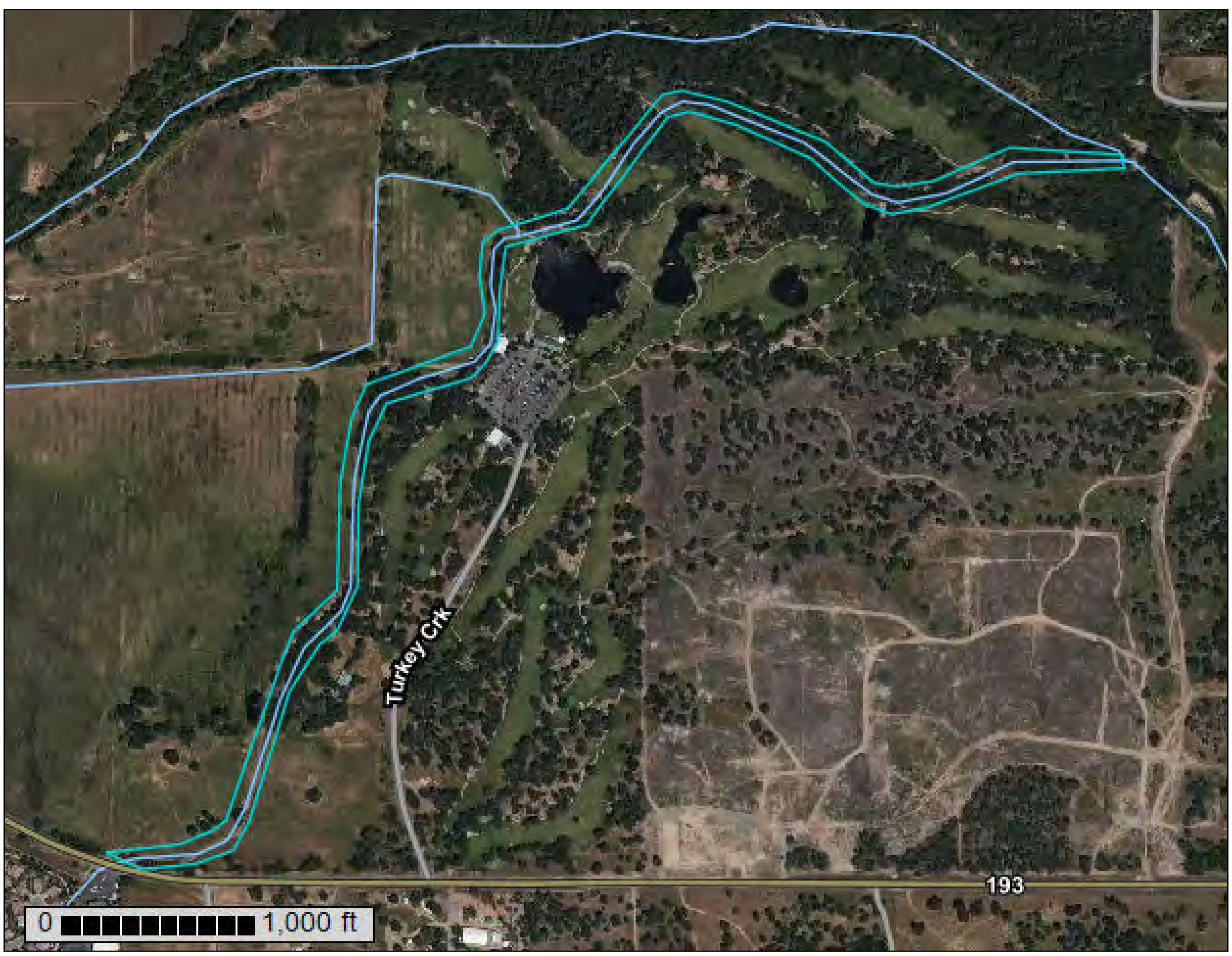
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Placer County, California, Western Part



July 10, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	7.3	35.9%
173	Pits and dumps	1.3	6.3%
194	Xerofluvents, frequently flooded	6.3	31.1%
197	Xerorthents, placer areas	5.4	26.7%
Totals for Area of Interest		**20.2**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Placer County, California, Western Part

130—Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes

Map Unit Setting

National map unit symbol: hfz6
Elevation: 200 to 1,500 feet
Mean annual precipitation: 12 to 35 inches
Mean annual air temperature: 61 degrees F
Frost-free period: 200 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Caperton and similar soils: 50 percent
Andregg and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caperton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 18 inches: coarse sandy loam
H2 - 18 to 22 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 18 to 22 inches to paralithic bedrock
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Description of Andregg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 15 inches: coarse sandy loam
H2 - 15 to 29 inches: coarse sandy loam
H3 - 29 to 33 inches: weathered bedrock

Properties and qualities

Slope: 2 to 15 percent
Depth to restrictive feature: 29 to 33 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: Low Elevation Foothills 18-25 PZ (F018XI200CA)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Hydric soil rating: No

Unnamed, mod deep

Percent of map unit: 4 percent
Hydric soil rating: No

Sierra

Percent of map unit: 3 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

173—Pits and dumps

Map Unit Composition

Pits and dumps: 95 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits And Dumps

Typical profile

H1 - 0 to 60 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 5 percent
Landform: Drainageways
Hydric soil rating: Yes

194—Xerofluvents, frequently flooded

Map Unit Setting

National map unit symbol: hg18
Elevation: 0 to 1,500 feet
Mean annual precipitation: 14 to 20 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 250 to 270 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerofluvents, frequently flooded, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerofluvents, Frequently Flooded

Setting

Landform: Drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 15 inches: stratified loamy sand to fine sandy loam
H2 - 15 to 37 inches: stratified loamy sand to fine sandy loam to silt loam
H3 - 37 to 55 inches: stratified loam to silty clay loam to clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 30 to 57 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B
Hydric soil rating: Yes

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

197—Xerorthents, placer areas

Map Unit Setting

National map unit symbol: hg1c
Elevation: 50 to 3,200 feet
Mean annual precipitation: 8 to 18 inches
Mean annual air temperature: 61 to 64 degrees F
Frost-free period: 150 to 280 days
Farmland classification: Not prime farmland

Map Unit Composition

Xerorthents and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Xerorthents

Setting

Parent material: Mine spoil or earthy fill

Typical profile

H1 - 0 to 60 inches: variable

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Depth to water table: More than 80 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water storage in profile: Very low (about 0.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Ecological site: PLACER DIGGINGS (R018XD084CA)
Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

Soil Information for All Uses

Suitabilities and Limitations for Use

The Suitabilities and Limitations for Use section includes various soil interpretations displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each interpretation.

Land Management

Land management interpretations are tools designed to guide the user in evaluating existing conditions in planning and predicting the soil response to various land management practices, for a variety of land uses, including cropland, forestland, hayland, pastureland, horticulture, and rangeland. Example interpretations include suitability for a variety of irrigation practices, log landings, haul roads and major skid trails, equipment operability, site preparation, suitability for hand and mechanical planting, potential erosion hazard associated with various practices, and ratings for fencing and waterline installation.

Erosion Hazard (Road, Trail)

The ratings in this interpretation indicate the hazard of soil loss from unsurfaced roads and trails. The ratings are based on soil erosion factor K, slope, and content of rock fragments.

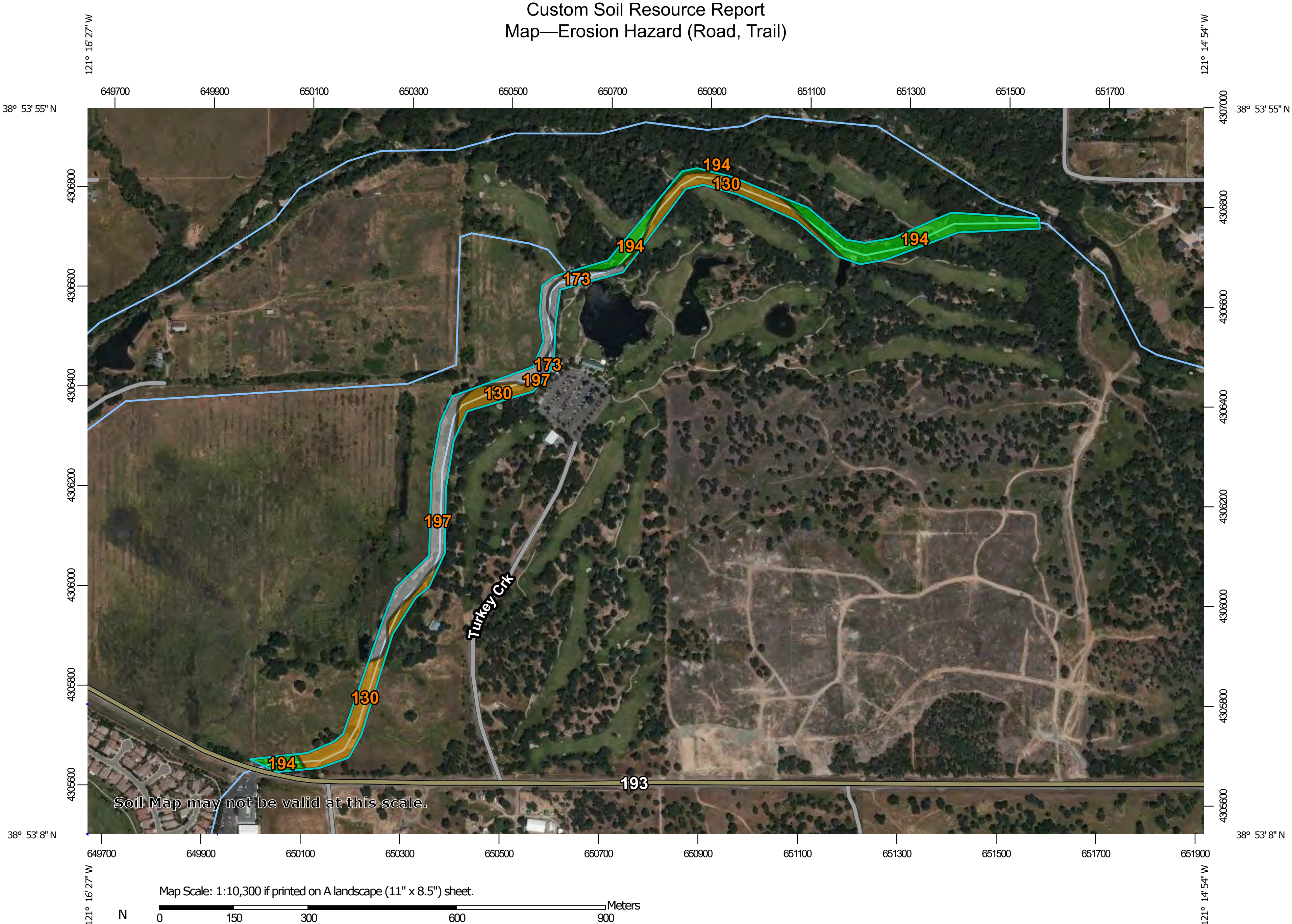
The ratings are both verbal and numerical. The hazard is described as "slight," "moderate," or "severe." A rating of "slight" indicates that little or no erosion is likely; "moderate" indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and "severe" indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified aspect of forestland management (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

Map—Erosion Hazard (Road, Trail)



Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Lines

Very severe

Severe

Moderate

Slight

Not rated or not available

Soil Rating Points

Very severe

Severe

Moderate

Slight

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Tables—Erosion Hazard (Road, Trail)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Severe	Caperton (50%)	Slope/erodibility (0.95)	7.3	35.9%
173	Pits and dumps	Not rated	Pits and dumps (95%)		1.3	6.3%
			Unnamed (5%)			
194	Xerofluvents, frequently flooded	Slight	Xerofluvents, frequently flooded (90%)		6.3	31.1%
197	Xerorthents, placer areas	Not rated	Xerorthents (90%)		5.4	26.7%
			Unnamed (10%)			
Totals for Area of Interest					**20.2**	**100.0%**

Rating	Acres in AOI	Percent of AOI
Severe	7.3	35.9%
Slight	6.3	31.1%
Null or Not Rated	6.7	33.0%
Totals for Area of Interest	**20.2**	**100.0%**

Rating Options—Erosion Hazard (Road, Trail)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Physical Properties

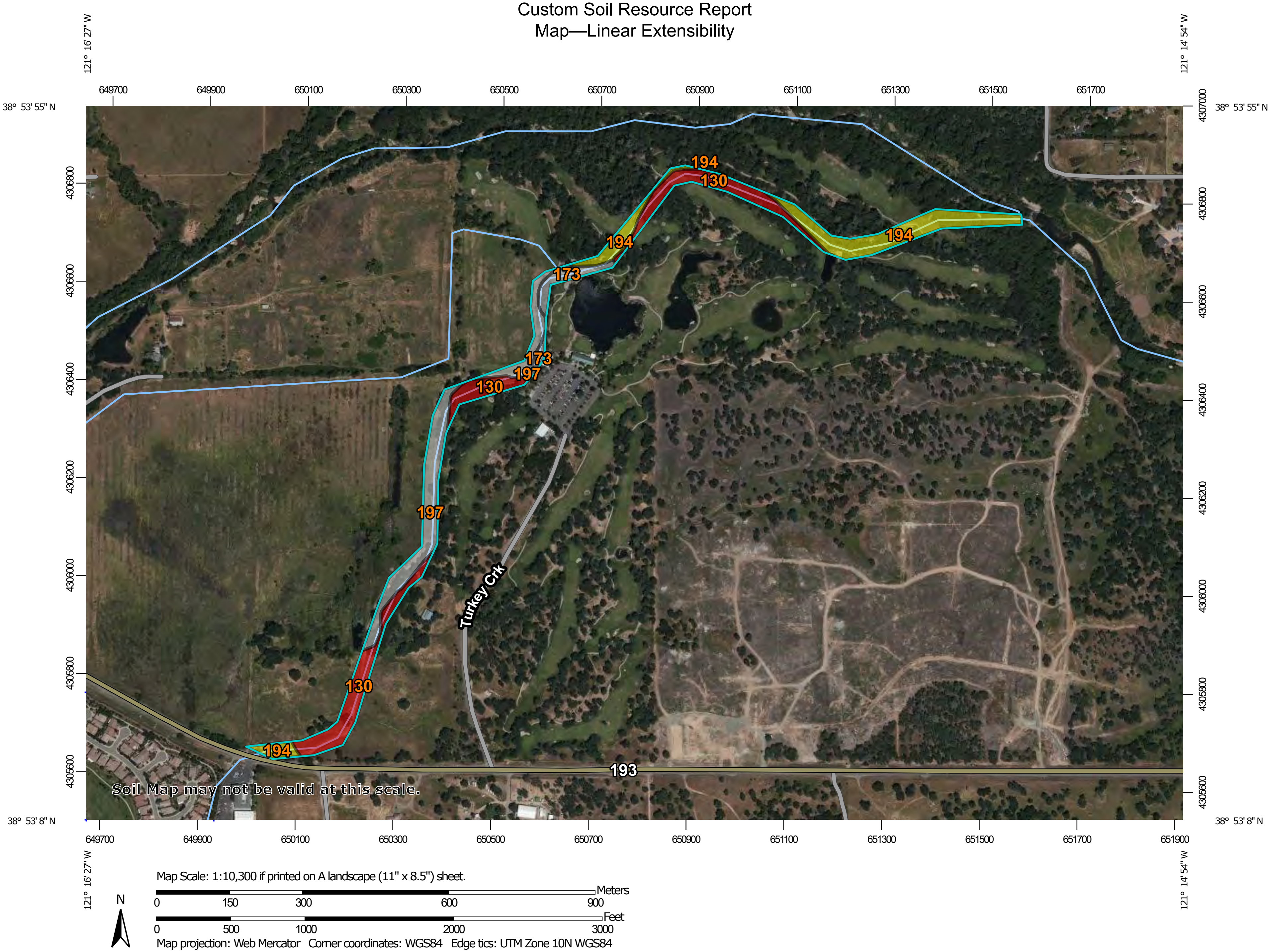
Soil Physical Properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Linear Extensibility

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Custom Soil Resource Report
Map—Linear Extensibility



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Lines

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Soil Rating Points

Low (0 - 3)

Moderate (3 - 6)

High (6 - 9)

Very High (9 - 30)

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Survey Area Data: Version 12, May 29, 2020

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Linear Extensibility

Map unit symbol	Map unit name	Rating (percent)	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	1.5	7.3	35.9%
173	Pits and dumps		1.3	6.3%
194	Xerofluvents, frequently flooded	4.5	6.3	31.1%
197	Xerorthents, placer areas		5.4	26.7%
Totals for Area of Interest			**20.2**	**100.0%**

Rating Options—Linear Extensibility

Units of Measure: percent

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): Depth Range (Weighted Average)

Top Depth: 6

Bottom Depth: 120

Units of Measure: Inches

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Drainage Class

"Drainage class (natural)" refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized-excessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."

Custom Soil Resource Report
Map—Drainage Class

Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Lines

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Soil Rating Points

- Excessively drained
- Somewhat excessively drained
- Well drained
- Moderately well drained
- Somewhat poorly drained
- Poorly drained
- Very poorly drained
- Subaqueous
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

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Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Drainage Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	Somewhat excessively drained	7.3	35.9%
173	Pits and dumps		1.3	6.3%
194	Xerofluvents, frequently flooded	Somewhat poorly drained	6.3	31.1%
197	Xerorthents, placer areas	Well drained	5.4	26.7%
Totals for Area of Interest			**20.2**	**100.0%**

Rating Options—Drainage Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Frost Action

Potential for frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, saturated hydraulic conductivity (Ksat), content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

Custom Soil Resource Report
Map—Frost Action

Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- High
- Moderate
- Low
- None
- Not rated or not available

Soil Rating Lines
- High
- Moderate
- Low
- None
- Not rated or not available

Soil Rating Points
- High
- Moderate
- Low
- None
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Table—Frost Action

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	7.3	35.9%
173	Pits and dumps	None	1.3	6.3%
194	Xerofluvents, frequently flooded	None	6.3	31.1%
197	Xerorthents, placer areas	None	5.4	26.7%
Totals for Area of Interest			**20.2**	**100.0%**

Rating Options—Frost Action

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group

Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	D	7.3	35.9%
173	Pits and dumps		1.3	6.3%
194	Xerofluvents, frequently flooded	B	6.3	31.1%
197	Xerorthents, placer areas		5.4	26.7%
Totals for Area of Interest			**20.2**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Water Features

Water Features include ponding frequency, flooding frequency, and depth to water table.

Flooding Frequency Class

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent.

"None" means that flooding is not probable. The chance of flooding is nearly 0 percent in any year. Flooding occurs less than once in 500 years.

"Very rare" means that flooding is very unlikely but possible under extremely unusual weather conditions. The chance of flooding is less than 1 percent in any year.

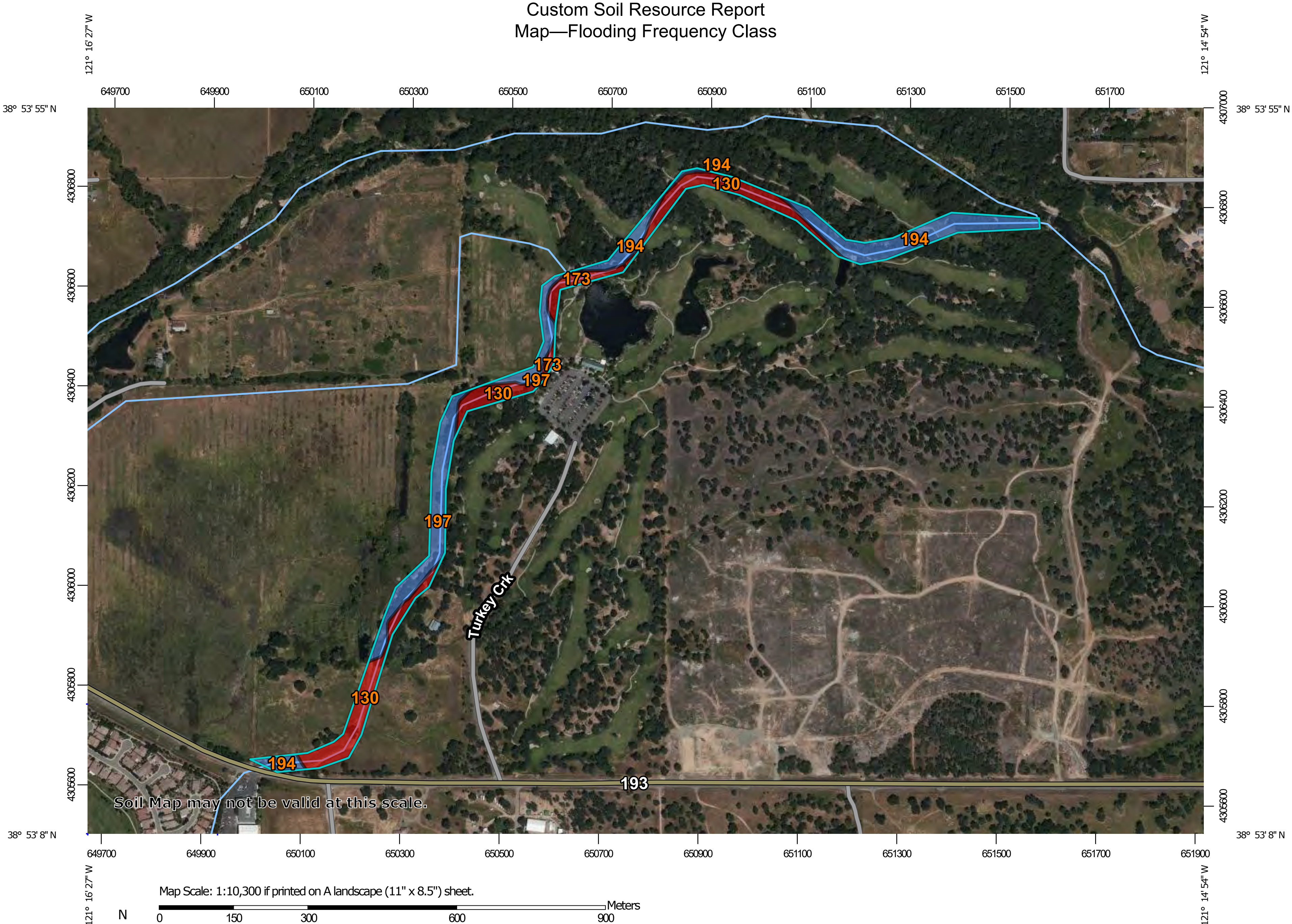
"Rare" means that flooding is unlikely but possible under unusual weather conditions. The chance of flooding is 1 to 5 percent in any year.

"Occasional" means that flooding occurs infrequently under normal weather conditions. The chance of flooding is 5 to 50 percent in any year.

"Frequent" means that flooding is likely to occur often under normal weather conditions. The chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year.

"Very frequent" means that flooding is likely to occur very often under normal weather conditions. The chance of flooding is more than 50 percent in all months of any year.

Map—Flooding Frequency Class



Map Scale: 1:10,300 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0, 150, 300, 600, 900

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Lines

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Soil Rating Points

None

Very Rare

Rare

Occasional

Frequent

Very Frequent

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Placer County, California, Western Part
Survey Area Data: Version 12, May 29, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2019—May 7, 2019

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

Table—Flooding Frequency Class

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
130	Caperton-Andregg coarse sandy loams, 2 to 15 percent slopes	None	7.3	35.9%
173	Pits and dumps	None	1.3	6.3%
194	Xerofluvents, frequently flooded	Frequent	6.3	31.1%
197	Xerorthents, placer areas	Frequent	5.4	26.7%
Totals for Area of Interest			**20.2**	**100.0%**

Rating Options—Flooding Frequency Class

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: More Frequent

Beginning Month: January

Ending Month: December

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APPENDIX 3.7

Greenhouse Gasses CalEEMod Modeling Outputs
(ECORP Consulting, Inc.)

Hemphill Diversion Structure - Alternative 1

Placer-Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 1 timing and duration per Section 2.0, Project Description

Off-road Equipment - Material haul trucks represented in Trips and VMT tab

Off-road Equipment - Equipment per Project Description

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker trips based on the number of estimated workers identified in the Project Description.

Hemphill Diversion Structure - Alternative 1 - Placer-Sacramento County, Annual

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	78.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	2/1/2023
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	10/16/2022
tblGrading	MaterialExported	0.00	9,000.00
tblGrading	MaterialImported	0.00	3,300.00
tblGrading	MaterialImported	0.00	9,000.00
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Pumps
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00

tblTripsAndVMT	WorkerTripNumber	20.00	16.00
tblTripsAndVMT	WorkerTripNumber	18.00	16.00
tblTripsAndVMT	WorkerTripNumber	0.00	16.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2888	2.6685	3.2668	6.3900e-003	0.0433	0.1247	0.1680	0.0102	0.1228	0.1330	0.0000	559.8170	559.8170	0.0563	0.0000	561.2252
2023	0.0420	0.3983	0.5083	1.1200e-003	0.0180	0.0165	0.0345	4.5200e-003	0.0163	0.0208	0.0000	98.8734	98.8734	8.0000e-003	0.0000	99.0735
Maximum	**0.2888**	**2.6685**	**3.2668**	**6.3900e-003**	**0.0433**	**0.1247**	**0.1680**	**0.0102**	**0.1228**	**0.1330**	**0.0000**	**559.8170**	**559.8170**	**0.0563**	**0.0000**	**561.2252**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2888	2.6685	3.2668	6.3900e-003	0.0433	0.1247	0.1680	0.0102	0.1228	0.1330	0.0000	559.8165	559.8165	0.0563	0.0000	561.2246
2023	0.0420	0.3983	0.5083	1.1200e-003	0.0180	0.0165	0.0345	4.5200e-003	0.0163	0.0208	0.0000	98.8733	98.8733	8.0000e-003	0.0000	99.0735
Maximum	**0.2888**	**2.6685**	**3.2668**	**6.3900e-003**	**0.0433**	**0.1247**	**0.1680**	**0.0102**	**0.1228**	**0.1330**	**0.0000**	**559.8165**	**559.8165**	**0.0563**	**0.0000**	**561.2246**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
5	3-8-2022	6-7-2022	0.0244	0.0244
6	6-8-2022	9-7-2022	1.2171	1.2171
7	9-8-2022	12-7-2022	1.3444	1.3444
8	12-8-2022	3-7-2023	0.8048	0.8048
		Highest	1.3444	1.3444

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
2	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
3	Infiltration Gallery Installation	Site Preparation	10/16/2022	2/1/2023	5	78	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	2	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Diversion Structure Removal	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Diversion Structure Removal	Other Construction Equipment	1	6.00	172	0.42
Infiltration Gallery Installation	Excavators	2	8.00	158	0.38
Infiltration Gallery Installation	Pumps	3	24.00	84	0.74
Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Infiltration Gallery Installation	Skid Steer Loaders	2	8.00	65	0.37
Infiltration Gallery Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Infiltration Gallery Installation	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Diversion Structure Removal	8	16.00	0.00	99.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Infiltration Gallery Installation	7	16.00	0.00	2,250.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	0	16.00	0.00	413.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9000e-004	0.0000	1.9000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Material Import - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4600e-003	0.0481	8.5500e-003	1.7000e-004	3.4700e-003	1.4000e-004	3.6200e-003	9.6000e-004	1.4000e-004	1.0900e-003	0.0000	15.7044	15.7044	4.9000e-004	0.0000	15.7166
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.4000e-004	1.6000e-004	1.7500e-003	1.0000e-005	6.3000e-004	0.0000	6.3000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5040	0.5040	1.0000e-005	0.0000	0.5043
Total	**1.7000e-003**	**0.0482**	**0.0103**	**1.8000e-004**	**4.1000e-003**	**1.4000e-004**	**4.2500e-003**	**1.1300e-003**	**1.4000e-004**	**1.2600e-003**	**0.0000**	**16.2084**	**16.2084**	**5.0000e-004**	**0.0000**	**16.2209**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9000e-004	0.0000	1.9000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Material Import - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4600e-003	0.0481	8.5500e-003	1.7000e-004	3.4700e-003	1.4000e-004	3.6200e-003	9.6000e-004	1.4000e-004	1.0900e-003	0.0000	15.7044	15.7044	4.9000e-004	0.0000	15.7166
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.4000e-004	1.6000e-004	1.7500e-003	1.0000e-005	6.3000e-004	0.0000	6.3000e-004	1.7000e-004	0.0000	1.7000e-004	0.0000	0.5040	0.5040	1.0000e-005	0.0000	0.5043
Total	**1.7000e-003**	**0.0482**	**0.0103**	**1.8000e-004**	**4.1000e-003**	**1.4000e-004**	**4.2500e-003**	**1.1300e-003**	**1.4000e-004**	**1.2600e-003**	**0.0000**	**16.2084**	**16.2084**	**5.0000e-004**	**0.0000**	**16.2209**

3.3 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0107	0.0000	0.0107	1.6200e-003	0.0000	1.6200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1755	1.5379	2.0171	3.4400e-003		0.0787	0.0787		0.0774	0.0774	0.0000	297.3885	297.3885	0.0352	0.0000	298.2688
Total	**0.1755**	**1.5379**	**2.0171**	**3.4400e-003**	**0.0107**	**0.0787**	**0.0894**	**1.6200e-003**	**0.0774**	**0.0790**	**0.0000**	**297.3885**	**297.3885**	**0.0352**	**0.0000**	**298.2688**

3.3 Diversion Structure Removal - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-004	0.0115	2.0500e-003	4.0000e-005	8.3000e-004	3.0000e-005	8.7000e-004	2.3000e-004	3.0000e-005	2.6000e-004	0.0000	3.7645	3.7645	1.2000e-004	0.0000	3.7674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1300e-003	1.3700e-003	0.0154	5.0000e-005	5.5300e-003	3.0000e-005	5.5600e-003	1.4700e-003	3.0000e-005	1.5000e-003	0.0000	4.4352	4.4352	9.0000e-005	0.0000	4.4375
Total	**2.4800e-003**	**0.0129**	**0.0174**	**9.0000e-005**	**6.3600e-003**	**6.0000e-005**	**6.4300e-003**	**1.7000e-003**	**6.0000e-005**	**1.7600e-003**	**0.0000**	**8.1997**	**8.1997**	**2.1000e-004**	**0.0000**	**8.2050**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0107	0.0000	0.0107	1.6200e-003	0.0000	1.6200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1755	1.5379	2.0171	3.4400e-003		0.0787	0.0787		0.0774	0.0774	0.0000	297.3881	297.3881	0.0352	0.0000	298.2685
Total	**0.1755**	**1.5379**	**2.0171**	**3.4400e-003**	**0.0107**	**0.0787**	**0.0894**	**1.6200e-003**	**0.0774**	**0.0790**	**0.0000**	**297.3881**	**297.3881**	**0.0352**	**0.0000**	**298.2685**

3.3 Diversion Structure Removal - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-004	0.0115	2.0500e-003	4.0000e-005	8.3000e-004	3.0000e-005	8.7000e-004	2.3000e-004	3.0000e-005	2.6000e-004	0.0000	3.7645	3.7645	1.2000e-004	0.0000	3.7674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.1300e-003	1.3700e-003	0.0154	5.0000e-005	5.5300e-003	3.0000e-005	5.5600e-003	1.4700e-003	3.0000e-005	1.5000e-003	0.0000	4.4352	4.4352	9.0000e-005	0.0000	4.4375
Total	**2.4800e-003**	**0.0129**	**0.0174**	**9.0000e-005**	**6.3600e-003**	**6.0000e-005**	**6.4300e-003**	**1.7000e-003**	**6.0000e-005**	**1.7600e-003**	**0.0000**	**8.1997**	**8.1997**	**2.1000e-004**	**0.0000**	**8.2050**

3.4 Infiltration Gallery Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0200e-003	0.0000	1.0200e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1021	0.8839	1.1796	2.0300e-003		0.0452	0.0452		0.0446	0.0446	0.0000	174.9200	174.9200	0.0185	0.0000	175.3817
Total	**0.1021**	**0.8839**	**1.1796**	**2.0300e-003**	**1.0200e-003**	**0.0452**	**0.0462**	**1.5000e-004**	**0.0446**	**0.0448**	**0.0000**	**174.9200**	**174.9200**	**0.0185**	**0.0000**	**175.3817**

3.4 Infiltration Gallery Installation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6200e-003	0.1847	0.0329	6.3000e-004	0.0175	5.6000e-004	0.0181	4.7000e-003	5.3000e-004	5.2300e-003	0.0000	60.3286	60.3286	1.8700e-003	0.0000	60.3754
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3300e-003	8.6000e-004	9.6200e-003	3.0000e-005	3.4600e-003	2.0000e-005	3.4800e-003	9.2000e-004	2.0000e-005	9.4000e-004	0.0000	2.7720	2.7720	6.0000e-005	0.0000	2.7735
Total	**6.9500e-003**	**0.1856**	**0.0425**	**6.6000e-004**	**0.0210**	**5.8000e-004**	**0.0215**	**5.6200e-003**	**5.5000e-004**	**6.1700e-003**	**0.0000**	**63.1005**	**63.1005**	**1.9300e-003**	**0.0000**	**63.1488**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0200e-003	0.0000	1.0200e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1021	0.8839	1.1796	2.0300e-003		0.0452	0.0452		0.0446	0.0446	0.0000	174.9197	174.9197	0.0185	0.0000	175.3815
Total	**0.1021**	**0.8839**	**1.1796**	**2.0300e-003**	**1.0200e-003**	**0.0452**	**0.0462**	**1.5000e-004**	**0.0446**	**0.0448**	**0.0000**	**174.9197**	**174.9197**	**0.0185**	**0.0000**	**175.3815**

3.4 Infiltration Gallery Installation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	5.6200e-003	0.1847	0.0329	6.3000e-004	0.0175	5.6000e-004	0.0181	4.7000e-003	5.3000e-004	5.2300e-003	0.0000	60.3286	60.3286	1.8700e-003	0.0000	60.3754
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.3300e-003	8.6000e-004	9.6200e-003	3.0000e-005	3.4600e-003	2.0000e-005	3.4800e-003	9.2000e-004	2.0000e-005	9.4000e-004	0.0000	2.7720	2.7720	6.0000e-005	0.0000	2.7735
Total	**6.9500e-003**	**0.1856**	**0.0425**	**6.6000e-004**	**0.0210**	**5.8000e-004**	**0.0215**	**5.6200e-003**	**5.5000e-004**	**6.1700e-003**	**0.0000**	**63.1005**	**63.1005**	**1.9300e-003**	**0.0000**	**63.1488**

3.4 Infiltration Gallery Installation - 2023

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0200e-003	0.0000	1.0200e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0398	0.3405	0.4926	8.5000e-004		0.0164	0.0164		0.0162	0.0162	0.0000	73.1522	73.1522	7.4200e-003	0.0000	73.3376
Total	**0.0398**	**0.3405**	**0.4926**	**8.5000e-004**	**1.0200e-003**	**0.0164**	**0.0174**	**1.5000e-004**	**0.0162**	**0.0163**	**0.0000**	**73.1522**	**73.1522**	**7.4200e-003**	**0.0000**	**73.3376**

3.4 Infiltration Gallery Installation - 2023

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7400e-003	0.0574	0.0120	2.6000e-004	0.0155	1.1000e-004	0.0156	3.9800e-003	1.0000e-004	4.0800e-003	0.0000	24.6062	24.6062	5.7000e-004	0.0000	24.6203
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	3.2000e-004	3.7000e-003	1.0000e-005	1.4400e-003	1.0000e-005	1.4500e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.1151	1.1151	2.0000e-005	0.0000	1.1156
Total	**2.2600e-003**	**0.0577**	**0.0157**	**2.7000e-004**	**0.0170**	**1.2000e-004**	**0.0171**	**4.3600e-003**	**1.1000e-004**	**4.4700e-003**	**0.0000**	**25.7212**	**25.7212**	**5.9000e-004**	**0.0000**	**25.7359**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.0200e-003	0.0000	1.0200e-003	1.5000e-004	0.0000	1.5000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0398	0.3405	0.4926	8.5000e-004		0.0164	0.0164		0.0162	0.0162	0.0000	73.1521	73.1521	7.4200e-003	0.0000	73.3375
Total	**0.0398**	**0.3405**	**0.4926**	**8.5000e-004**	**1.0200e-003**	**0.0164**	**0.0174**	**1.5000e-004**	**0.0162**	**0.0163**	**0.0000**	**73.1521**	**73.1521**	**7.4200e-003**	**0.0000**	**73.3375**

3.4 Infiltration Gallery Installation - 2023

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.7400e-003	0.0574	0.0120	2.6000e-004	0.0155	1.1000e-004	0.0156	3.9800e-003	1.0000e-004	4.0800e-003	0.0000	24.6062	24.6062	5.7000e-004	0.0000	24.6203
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2000e-004	3.2000e-004	3.7000e-003	1.0000e-005	1.4400e-003	1.0000e-005	1.4500e-003	3.8000e-004	1.0000e-005	3.9000e-004	0.0000	1.1151	1.1151	2.0000e-005	0.0000	1.1156
Total	**2.2600e-003**	**0.0577**	**0.0157**	**2.7000e-004**	**0.0170**	**1.2000e-004**	**0.0171**	**4.3600e-003**	**1.1000e-004**	**4.4700e-003**	**0.0000**	**25.7212**	**25.7212**	**5.9000e-004**	**0.0000**	**25.7359**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Unmitigated	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	9.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0420					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	9.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0420					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 2
Placer-Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	14.90	Acre	14.90	649,044.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 2 timing and duration per Section 2.0, Project Description

Off-road Equipment - Equipment per Section 2.0, Project Description

Off-road Equipment - 'Industrial Saws' used for Project Chainsaws. 'Rough Terrain Forklifts' used for Project Manlift.

Off-road Equipment - Material haul trucks represented in "Trip and VMT" Tab.

Off-road Equipment - Ibid

Grading -

Demolition -

Trips and VMT - Worker commutes derived from Section 2.0, Project Description.

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	21.00
tblConstructionPhase	NumDays	10.00	45.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	5/30/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	5/2/2022
tblGrading	MaterialExported	0.00	3,200.00
tblGrading	MaterialExported	0.00	3,300.00
tblGrading	MaterialExported	0.00	9,000.00
tblOffRoadEquipment	LoadFactor	0.40	0.40
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.42	0.42
tblOffRoadEquipment	LoadFactor	0.29	0.29
tblOffRoadEquipment	LoadFactor	0.38	0.38

tblOffRoadEquipment	OffRoadEquipmentType		Concrete/Industrial Saws
tblOffRoadEquipment	OffRoadEquipmentType		Rough Terrain Forklifts
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Other Construction Equipment
tblOffRoadEquipment	OffRoadEquipmentType		Cranes
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	13.00	24.00
tblTripsAndVMT	WorkerTripNumber	0.00	24.00
tblTripsAndVMT	WorkerTripNumber	8.00	24.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0894	1.0255	1.0067	2.8500e-003	0.1565	0.0334	0.1899	0.0295	0.0313	0.0608	0.0000	258.2481	258.2481	0.0389	0.0000	259.2206
Maximum	**0.0894**	**1.0255**	**1.0067**	**2.8500e-003**	**0.1565**	**0.0334**	**0.1899**	**0.0295**	**0.0313**	**0.0608**	**0.0000**	**258.2481**	**258.2481**	**0.0389**	**0.0000**	**259.2206**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.0894	1.0255	1.0067	2.8500e-003	0.1565	0.0334	0.1899	0.0295	0.0313	0.0608	0.0000	258.2479	258.2479	0.0389	0.0000	259.2205
Maximum	**0.0894**	**1.0255**	**1.0067**	**2.8500e-003**	**0.1565**	**0.0334**	**0.1899**	**0.0295**	**0.0313**	**0.0608**	**0.0000**	**258.2479**	**258.2479**	**0.0389**	**0.0000**	**259.2205**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
5	**3-8-2022**	**6-7-2022**	0.2202	0.2202
6	**6-8-2022**	**9-7-2022**	0.5275	0.5275
7	**9-8-2022**	**9-30-2022**	0.2126	0.2126
		Highest	0.5275	0.5275

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Phase 1 - Vegetation Clearing	Site Preparation	5/2/2022	5/30/2022	5	21	
2	Phase 2 - Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Phase 2 - Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	
4	Phase 3 - Diversion Ditch Installation	Site Preparation	8/15/2022	10/15/2022	5	45	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 14.9

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Phase 2 - Material Import	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Excavators	2	8.00	158	0.38
Phase 2 - Diversion Structure Removal	Concrete/Industrial Saws	0	8.00	81	0.73
Phase 3 - Diversion Ditch Installation	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Material Import	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 3 - Diversion Ditch Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Concrete/Industrial Saws	4	8.00	81	0.73
Phase 1 - Vegetation Clearing	Rough Terrain Forklifts	1	8.00	100	0.40
Phase 2 - Diversion Structure Removal	Skid Steer Loaders	2	8.00	65	0.37
Phase 2 - Diversion Structure Removal	Rubber Tired Dozers	0	8.00	247	0.40
Phase 2 - Diversion Structure Removal	Other Construction Equipment	1	8.00	172	0.42
Phase 3 - Diversion Ditch Installation	Cranes	1	8.00	231	0.29
Phase 3 - Diversion Ditch Installation	Excavators	1	8.00	158	0.38
Phase 3 - Diversion Ditch Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Phase 1 - Vegetation Clearing	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Phase 1 - Vegetation Clearing	Rubber Tired Dozers	0	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Phase 2 - Material Import	0	24.00	0.00	413.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 3 - Diversion Ditch Installation	3	24.00	0.00	1,125.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 2 - Diversion Structure Removal	5	24.00	0.00	989.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Phase 1 - Vegetation Clearing	5	24.00	0.00	400.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Phase 1 - Vegetation Clearing - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.8000e-004	0.0000	1.8000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0162	0.1333	0.1781	3.0000e-004		6.8500e-003	6.8500e-003		6.8100e-003	6.8100e-003	0.0000	25.7766	25.7766	2.2700e-003	0.0000	25.8333
Total	**0.0162**	**0.1333**	**0.1781**	**3.0000e-004**	**1.8000e-004**	**6.8500e-003**	**7.0300e-003**	**3.0000e-005**	**6.8100e-003**	**6.8400e-003**	**0.0000**	**25.7766**	**25.7766**	**2.2700e-003**	**0.0000**	**25.8333**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4200e-003	0.0466	8.2800e-003	1.6000e-004	3.3600e-003	1.4000e-004	3.5000e-003	9.3000e-004	1.3000e-004	1.0600e-003	0.0000	15.2101	15.2101	4.7000e-004	0.0000	15.2219
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	7.3000e-004	7.9700e-003	3.0000e-005	3.0800e-003	2.0000e-005	3.1000e-003	8.2000e-004	2.0000e-005	8.4000e-004	0.0000	2.4431	2.4431	5.0000e-005	0.0000	2.4444
Total	**2.4900e-003**	**0.0473**	**0.0163**	**1.9000e-004**	**6.4400e-003**	**1.6000e-004**	**6.6000e-003**	**1.7500e-003**	**1.5000e-004**	**1.9000e-003**	**0.0000**	**17.6532**	**17.6532**	**5.2000e-004**	**0.0000**	**17.6663**

3.2 Phase 1 - Vegetation Clearing - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.8000e-004	0.0000	1.8000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0162	0.1333	0.1781	3.0000e-004		6.8500e-003	6.8500e-003		6.8100e-003	6.8100e-003	0.0000	25.7766	25.7766	2.2700e-003	0.0000	25.8332
Total	**0.0162**	**0.1333**	**0.1781**	**3.0000e-004**	**1.8000e-004**	**6.8500e-003**	**7.0300e-003**	**3.0000e-005**	**6.8100e-003**	**6.8400e-003**	**0.0000**	**25.7766**	**25.7766**	**2.2700e-003**	**0.0000**	**25.8332**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4200e-003	0.0466	8.2800e-003	1.6000e-004	3.3600e-003	1.4000e-004	3.5000e-003	9.3000e-004	1.3000e-004	1.0600e-003	0.0000	15.2101	15.2101	4.7000e-004	0.0000	15.2219
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.0700e-003	7.3000e-004	7.9700e-003	3.0000e-005	3.0800e-003	2.0000e-005	3.1000e-003	8.2000e-004	2.0000e-005	8.4000e-004	0.0000	2.4431	2.4431	5.0000e-005	0.0000	2.4444
Total	**2.4900e-003**	**0.0473**	**0.0163**	**1.9000e-004**	**6.4400e-003**	**1.6000e-004**	**6.6000e-003**	**1.7500e-003**	**1.5000e-004**	**1.9000e-003**	**0.0000**	**17.6532**	**17.6532**	**5.2000e-004**	**0.0000**	**17.6663**

3.3 Phase 2 - Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9000e-004	0.0000	1.9000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4600e-003	0.0481	8.5500e-003	1.7000e-004	3.4700e-003	1.4000e-004	3.6200e-003	9.6000e-004	1.4000e-004	1.0900e-003	0.0000	15.7044	15.7044	4.9000e-004	0.0000	15.7166
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.1000e-004	3.5000e-004	3.7900e-003	1.0000e-005	1.4700e-003	1.0000e-005	1.4700e-003	3.9000e-004	1.0000e-005	4.0000e-004	0.0000	1.1634	1.1634	2.0000e-005	0.0000	1.1640
Total	**1.9700e-003**	**0.0484**	**0.0123**	**1.8000e-004**	**4.9400e-003**	**1.5000e-004**	**5.0900e-003**	**1.3500e-003**	**1.5000e-004**	**1.4900e-003**	**0.0000**	**16.8678**	**16.8678**	**5.1000e-004**	**0.0000**	**16.8806**

3.3 Phase 2 - Material Import - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9000e-004	0.0000	1.9000e-004	3.0000e-005	0.0000	3.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**1.9000e-004**	**0.0000**	**1.9000e-004**	**3.0000e-005**	**0.0000**	**3.0000e-005**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.4600e-003	0.0481	8.5500e-003	1.7000e-004	3.4700e-003	1.4000e-004	3.6200e-003	9.6000e-004	1.4000e-004	1.0900e-003	0.0000	15.7044	15.7044	4.9000e-004	0.0000	15.7166
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.1000e-004	3.5000e-004	3.7900e-003	1.0000e-005	1.4700e-003	1.0000e-005	1.4700e-003	3.9000e-004	1.0000e-005	4.0000e-004	0.0000	1.1634	1.1634	2.0000e-005	0.0000	1.1640
Total	**1.9700e-003**	**0.0484**	**0.0123**	**1.8000e-004**	**4.9400e-003**	**1.5000e-004**	**5.0900e-003**	**1.3500e-003**	**1.5000e-004**	**1.4900e-003**	**0.0000**	**16.8678**	**16.8678**	**5.1000e-004**	**0.0000**	**16.8806**

3.4 Phase 2 - Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1070	0.0000	0.1070	0.0162	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0403	0.4038	0.5830	9.0000e-004		0.0193	0.0193		0.0177	0.0177	0.0000	79.4717	79.4717	0.0257	0.0000	80.1142
Total	**0.0403**	**0.4038**	**0.5830**	**9.0000e-004**	**0.1070**	**0.0193**	**0.1263**	**0.0162**	**0.0177**	**0.0339**	**0.0000**	**79.4717**	**79.4717**	**0.0257**	**0.0000**	**80.1142**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-003	0.1151	0.0205	4.0000e-004	8.3200e-003	3.5000e-004	8.6600e-003	2.2900e-003	3.3000e-004	2.6200e-003	0.0000	37.6070	37.6070	1.1700e-003	0.0000	37.6362
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4800e-003	3.0500e-003	0.0334	1.1000e-004	0.0129	8.0000e-005	0.0130	3.4300e-003	7.0000e-005	3.5000e-003	0.0000	10.2378	10.2378	2.1000e-004	0.0000	10.2431
Total	**7.9800e-003**	**0.1182**	**0.0539**	**5.1000e-004**	**0.0212**	**4.3000e-004**	**0.0216**	**5.7200e-003**	**4.0000e-004**	**6.1200e-003**	**0.0000**	**47.8448**	**47.8448**	**1.3800e-003**	**0.0000**	**47.8793**

3.4 Phase 2 - Diversion Structure Removal - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.1070	0.0000	0.1070	0.0162	0.0000	0.0162	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0403	0.4038	0.5830	9.0000e-004		0.0193	0.0193		0.0177	0.0177	0.0000	79.4716	79.4716	0.0257	0.0000	80.1141
Total	**0.0403**	**0.4038**	**0.5830**	**9.0000e-004**	**0.1070**	**0.0193**	**0.1263**	**0.0162**	**0.0177**	**0.0339**	**0.0000**	**79.4716**	**79.4716**	**0.0257**	**0.0000**	**80.1141**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-003	0.1151	0.0205	4.0000e-004	8.3200e-003	3.5000e-004	8.6600e-003	2.2900e-003	3.3000e-004	2.6200e-003	0.0000	37.6070	37.6070	1.1700e-003	0.0000	37.6362
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	4.4800e-003	3.0500e-003	0.0334	1.1000e-004	0.0129	8.0000e-005	0.0130	3.4300e-003	7.0000e-005	3.5000e-003	0.0000	10.2378	10.2378	2.1000e-004	0.0000	10.2431
Total	**7.9800e-003**	**0.1182**	**0.0539**	**5.1000e-004**	**0.0212**	**4.3000e-004**	**0.0216**	**5.7200e-003**	**4.0000e-004**	**6.1200e-003**	**0.0000**	**47.8448**	**47.8448**	**1.3800e-003**	**0.0000**	**47.8793**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1000e-004	0.0000	5.1000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0142	0.1420	0.1229	2.6000e-004		6.1500e-003	6.1500e-003		5.6800e-003	5.6800e-003	0.0000	22.6202	22.6202	7.0900e-003	0.0000	22.7975
Total	**0.0142**	**0.1420**	**0.1229**	**2.6000e-004**	**5.1000e-004**	**6.1500e-003**	**6.6600e-003**	**8.0000e-005**	**5.6800e-003**	**5.7600e-003**	**0.0000**	**22.6202**	**22.6202**	**7.0900e-003**	**0.0000**	**22.7975**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.9900e-003	0.1310	0.0233	4.5000e-004	9.4600e-003	3.9000e-004	9.8600e-003	2.6000e-003	3.8000e-004	2.9800e-003	0.0000	42.7784	42.7784	1.3300e-003	0.0000	42.8116
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2900e-003	1.5600e-003	0.0171	6.0000e-005	6.5900e-003	4.0000e-005	6.6300e-003	1.7500e-003	4.0000e-005	1.7900e-003	0.0000	5.2353	5.2353	1.1000e-004	0.0000	5.2379
Total	**6.2800e-003**	**0.1325**	**0.0404**	**5.1000e-004**	**0.0161**	**4.3000e-004**	**0.0165**	**4.3500e-003**	**4.2000e-004**	**4.7700e-003**	**0.0000**	**48.0137**	**48.0137**	**1.4400e-003**	**0.0000**	**48.0496**

3.5 Phase 3 - Diversion Ditch Installation - 2022

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					5.1000e-004	0.0000	5.1000e-004	8.0000e-005	0.0000	8.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0142	0.1420	0.1229	2.6000e-004		6.1500e-003	6.1500e-003		5.6800e-003	5.6800e-003	0.0000	22.6202	22.6202	7.0900e-003	0.0000	22.7974
Total	**0.0142**	**0.1420**	**0.1229**	**2.6000e-004**	**5.1000e-004**	**6.1500e-003**	**6.6600e-003**	**8.0000e-005**	**5.6800e-003**	**5.7600e-003**	**0.0000**	**22.6202**	**22.6202**	**7.0900e-003**	**0.0000**	**22.7974**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.9900e-003	0.1310	0.0233	4.5000e-004	9.4600e-003	3.9000e-004	9.8600e-003	2.6000e-003	3.8000e-004	2.9800e-003	0.0000	42.7784	42.7784	1.3300e-003	0.0000	42.8116
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.2900e-003	1.5600e-003	0.0171	6.0000e-005	6.5900e-003	4.0000e-005	6.6300e-003	1.7500e-003	4.0000e-005	1.7900e-003	0.0000	5.2353	5.2353	1.1000e-004	0.0000	5.2379
Total	**6.2800e-003**	**0.1325**	**0.0404**	**5.1000e-004**	**0.0161**	**4.3000e-004**	**0.0165**	**4.3500e-003**	**4.2000e-004**	**4.7700e-003**	**0.0000**	**48.0137**	**48.0137**	**1.4400e-003**	**0.0000**	**48.0496**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Unmitigated	0.0510	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	9.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0420					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	9.0300e-003					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0420					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	1.0000e-005	0.0000	1.4000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	2.7000e-004	2.7000e-004	0.0000	0.0000	2.8000e-004
Total	**0.0510**	**0.0000**	**1.4000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**2.7000e-004**	**2.7000e-004**	**0.0000**	**0.0000**	**2.8000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Hemphill Diversion Structure - Alternative 3

Placer-Sacramento County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Other Non-Asphalt Surfaces	20.35	Acre	20.35	886,446.00	0

1.2 Other Project Characteristics

Urbanization	Rural	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	74
Climate Zone	2			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use -

Construction Phase - Alternative 3 timing and duration per Section 2.0, Project Description

Off-road Equipment -

Off-road Equipment - Equipment per Section 2.0, Project Description

Grading -

Demolition -

Trips and VMT - Worker commute trips derived from Section 2.0, Project Description

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	20.00	88.00
tblConstructionPhase	NumDays	10.00	133.00
tblConstructionPhase	PhaseEndDate	4/2/2021	10/15/2022
tblConstructionPhase	PhaseEndDate	4/16/2021	6/14/2022
tblConstructionPhase	PhaseStartDate	3/8/2021	6/15/2022
tblConstructionPhase	PhaseStartDate	4/3/2021	6/1/2022
tblGrading	MaterialExported	0.00	1,930.00
tblGrading	MaterialImported	0.00	4,630.00
tblGrading	MaterialImported	0.00	3,300.00
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.37	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	LoadFactor	0.38	0.38
tblOffRoadEquipment	OffRoadEquipmentType		Excavators
tblOffRoadEquipment	OffRoadEquipmentType		Skid Steer Loaders
tblOffRoadEquipment	OffRoadEquipmentType		Rollers
tblOffRoadEquipment	OffRoadEquipmentType		Cement and Mortar Mixers
tblOffRoadEquipment	OffRoadEquipmentType		Off-Highway Trucks
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblProjectCharacteristics	UrbanizationLevel	Urban	Rural
tblTripsAndVMT	WorkerTripNumber	20.00	28.00
tblTripsAndVMT	WorkerTripNumber	15.00	28.00
tblTripsAndVMT	WorkerTripNumber	18.00	28.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2718	2.4862	2.3431	5.6900e-003	0.1514	0.1065	0.2578	0.0647	0.0986	0.1633	0.0000	502.9548	502.9548	0.1323	0.0000	506.2622
Maximum	**0.2718**	**2.4862**	**2.3431**	**5.6900e-003**	**0.1514**	**0.1065**	**0.2578**	**0.0647**	**0.0986**	**0.1633**	**0.0000**	**502.9548**	**502.9548**	**0.1323**	**0.0000**	**506.2622**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2022	0.2718	2.4862	2.3431	5.6900e-003	0.1514	0.1065	0.2578	0.0647	0.0986	0.1633	0.0000	502.9543	502.9543	0.1323	0.0000	506.2617
Maximum	**0.2718**	**2.4862**	**2.3431**	**5.6900e-003**	**0.1514**	**0.1065**	**0.2578**	**0.0647**	**0.0986**	**0.1633**	**0.0000**	**502.9543**	**502.9543**	**0.1323**	**0.0000**	**506.2617**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
5	**3-8-2022**	**6-7-2022**	0.6885	0.6885
6	**6-8-2022**	**9-7-2022**	1.6108	1.6108
7	**9-8-2022**	**9-30-2022**	0.2911	0.2911
		Highest	1.6108	1.6108

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0696	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0696**	**0.0000**	**1.9000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.6000e-004**	**3.6000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	0.0696	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Waste						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0696**	**0.0000**	**1.9000e-004**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**3.6000e-004**	**3.6000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Pipeline Installation	Site Preparation	3/15/2022	9/15/2022	5	133	
2	Material Import	Site Preparation	6/1/2022	6/14/2022	5	10	
3	Diversion Structure Removal	Demolition	6/15/2022	10/15/2022	5	88	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 20.35

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Pipeline Installation	Rubber Tired Dozers	0	8.00	247	0.40
Diversion Structure Removal	Excavators	3	8.00	158	0.38
Diversion Structure Removal	Concrete/Industrial Saws	1	8.00	81	0.73
Pipeline Installation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Pipeline Installation	Excavators	2	8.00	158	0.38
Pipeline Installation	Skid Steer Loaders	2	8.00	65	0.37
Pipeline Installation	Rollers	1	8.00	80	0.38
Pipeline Installation	Cement and Mortar Mixers	1	8.00	9	0.56
Pipeline Installation	Off-Highway Trucks	2	8.00	402	0.38
Diversion Structure Removal	Rubber Tired Dozers	2	8.00	247	0.40
Material Import	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Material Import	Rubber Tired Dozers	3	8.00	247	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Pipeline Installation	8	28.00	0.00	820.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Diversion Structure Removal	6	28.00	0.00	99.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT
Material Import	7	28.00	0.00	326.00	16.80	6.60	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Pipeline Installation - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.7000e-004	0.0000	3.7000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1217	1.0348	1.2105	2.9500e-003		0.0431	0.0431		0.0397	0.0397	0.0000	257.9833	257.9833	0.0828	0.0000	260.0525
Total	**0.1217**	**1.0348**	**1.2105**	**2.9500e-003**	**3.7000e-004**	**0.0431**	**0.0434**	**6.0000e-005**	**0.0397**	**0.0397**	**0.0000**	**257.9833**	**257.9833**	**0.0828**	**0.0000**	**260.0525**

3.2 Pipeline Installation - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.9000e-003	0.0955	0.0170	3.3000e-004	6.9000e-003	2.9000e-004	7.1800e-003	1.9000e-003	2.8000e-004	2.1700e-003	0.0000	31.1807	31.1807	9.7000e-004	0.0000	31.2049
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9000e-003	5.3800e-003	0.0589	2.0000e-004	0.0227	1.4000e-004	0.0229	6.0500e-003	1.3000e-004	6.1800e-003	0.0000	18.0520	18.0520	3.7000e-004	0.0000	18.0612
Total	**0.0108**	**0.1009**	**0.0759**	**5.3000e-004**	**0.0296**	**4.3000e-004**	**0.0301**	**7.9500e-003**	**4.1000e-004**	**8.3500e-003**	**0.0000**	**49.2327**	**49.2327**	**1.3400e-003**	**0.0000**	**49.2661**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					3.7000e-004	0.0000	3.7000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1217	1.0348	1.2105	2.9500e-003		0.0431	0.0431		0.0397	0.0397	0.0000	257.9830	257.9830	0.0828	0.0000	260.0522
Total	**0.1217**	**1.0348**	**1.2105**	**2.9500e-003**	**3.7000e-004**	**0.0431**	**0.0434**	**6.0000e-005**	**0.0397**	**0.0397**	**0.0000**	**257.9830**	**257.9830**	**0.0828**	**0.0000**	**260.0522**

3.2 Pipeline Installation - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	2.9000e-003	0.0955	0.0170	3.3000e-004	6.9000e-003	2.9000e-004	7.1800e-003	1.9000e-003	2.8000e-004	2.1700e-003	0.0000	31.1807	31.1807	9.7000e-004	0.0000	31.2049
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.9000e-003	5.3800e-003	0.0589	2.0000e-004	0.0227	1.4000e-004	0.0229	6.0500e-003	1.3000e-004	6.1800e-003	0.0000	18.0520	18.0520	3.7000e-004	0.0000	18.0612
Total	**0.0108**	**0.1009**	**0.0759**	**5.3000e-004**	**0.0296**	**4.3000e-004**	**0.0301**	**7.9500e-003**	**4.1000e-004**	**8.3500e-003**	**0.0000**	**49.2327**	**49.2327**	**1.3400e-003**	**0.0000**	**49.2661**

3.3 Material Import - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1654	0.0985	1.9000e-004		8.0600e-003	8.0600e-003		7.4200e-003	7.4200e-003	0.0000	16.7197	16.7197	5.4100e-003	0.0000	16.8549
Total	**0.0159**	**0.1654**	**0.0985**	**1.9000e-004**	**0.0903**	**8.0600e-003**	**0.0984**	**0.0497**	**7.4200e-003**	**0.0571**	**0.0000**	**16.7197**	**16.7197**	**5.4100e-003**	**0.0000**	**16.8549**

3.3 Material Import - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.1500e-003	0.0380	6.7500e-003	1.3000e-004	2.7400e-003	1.1000e-004	2.8600e-003	7.5000e-004	1.1000e-004	8.6000e-004	0.0000	12.3962	12.3962	3.8000e-004	0.0000	12.4059
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.9000e-004	4.0000e-004	4.4300e-003	2.0000e-005	1.7100e-003	1.0000e-005	1.7200e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.3573	1.3573	3.0000e-005	0.0000	1.3580
Total	**1.7400e-003**	**0.0384**	**0.0112**	**1.5000e-004**	**4.4500e-003**	**1.2000e-004**	**4.5800e-003**	**1.2000e-003**	**1.2000e-004**	**1.3200e-003**	**0.0000**	**13.7535**	**13.7535**	**4.1000e-004**	**0.0000**	**13.7638**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0903	0.0000	0.0903	0.0497	0.0000	0.0497	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0159	0.1654	0.0985	1.9000e-004		8.0600e-003	8.0600e-003		7.4200e-003	7.4200e-003	0.0000	16.7197	16.7197	5.4100e-003	0.0000	16.8549
Total	**0.0159**	**0.1654**	**0.0985**	**1.9000e-004**	**0.0903**	**8.0600e-003**	**0.0984**	**0.0497**	**7.4200e-003**	**0.0571**	**0.0000**	**16.7197**	**16.7197**	**5.4100e-003**	**0.0000**	**16.8549**

3.3 Material Import - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	1.1500e-003	0.0380	6.7500e-003	1.3000e-004	2.7400e-003	1.1000e-004	2.8600e-003	7.5000e-004	1.1000e-004	8.6000e-004	0.0000	12.3962	12.3962	3.8000e-004	0.0000	12.4059
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.9000e-004	4.0000e-004	4.4300e-003	2.0000e-005	1.7100e-003	1.0000e-005	1.7200e-003	4.5000e-004	1.0000e-005	4.6000e-004	0.0000	1.3573	1.3573	3.0000e-005	0.0000	1.3580
Total	**1.7400e-003**	**0.0384**	**0.0112**	**1.5000e-004**	**4.4500e-003**	**1.2000e-004**	**4.5800e-003**	**1.2000e-003**	**1.2000e-004**	**1.3200e-003**	**0.0000**	**13.7535**	**13.7535**	**4.1000e-004**	**0.0000**	**13.7638**

3.4 Diversion Structure Removal - 2022

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0107	0.0000	0.0107	1.6200e-003	0.0000	1.6200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1161	1.1317	0.9061	1.7100e-003		0.0547	0.0547		0.0508	0.0508	0.0000	149.5570	149.5570	0.0420	0.0000	150.6072
Total	**0.1161**	**1.1317**	**0.9061**	**1.7100e-003**	**0.0107**	**0.0547**	**0.0654**	**1.6200e-003**	**0.0508**	**0.0525**	**0.0000**	**149.5570**	**149.5570**	**0.0420**	**0.0000**	**150.6072**

3.4 Diversion Structure Removal - 2022

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-004	0.0115	2.0500e-003	4.0000e-005	8.3000e-004	3.0000e-005	8.7000e-004	2.3000e-004	3.0000e-005	2.6000e-004	0.0000	3.7645	3.7645	1.2000e-004	0.0000	3.7674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2300e-003	3.5600e-003	0.0390	1.3000e-004	0.0150	9.0000e-005	0.0151	4.0000e-003	8.0000e-005	4.0900e-003	0.0000	11.9442	11.9442	2.4000e-004	0.0000	11.9503
Total	**5.5800e-003**	**0.0151**	**0.0410**	**1.7000e-004**	**0.0159**	**1.2000e-004**	**0.0160**	**4.2300e-003**	**1.1000e-004**	**4.3500e-003**	**0.0000**	**15.7087**	**15.7087**	**3.6000e-004**	**0.0000**	**15.7177**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.0107	0.0000	0.0107	1.6200e-003	0.0000	1.6200e-003	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.1161	1.1317	0.9061	1.7100e-003		0.0547	0.0547		0.0508	0.0508	0.0000	149.5568	149.5568	0.0420	0.0000	150.6071
Total	**0.1161**	**1.1317**	**0.9061**	**1.7100e-003**	**0.0107**	**0.0547**	**0.0654**	**1.6200e-003**	**0.0508**	**0.0525**	**0.0000**	**149.5568**	**149.5568**	**0.0420**	**0.0000**	**150.6071**

3.4 Diversion Structure Removal - 2022

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	3.5000e-004	0.0115	2.0500e-003	4.0000e-005	8.3000e-004	3.0000e-005	8.7000e-004	2.3000e-004	3.0000e-005	2.6000e-004	0.0000	3.7645	3.7645	1.2000e-004	0.0000	3.7674
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.2300e-003	3.5600e-003	0.0390	1.3000e-004	0.0150	9.0000e-005	0.0151	4.0000e-003	8.0000e-005	4.0900e-003	0.0000	11.9442	11.9442	2.4000e-004	0.0000	11.9503
Total	**5.5800e-003**	**0.0151**	**0.0410**	**1.7000e-004**	**0.0159**	**1.2000e-004**	**0.0160**	**4.2300e-003**	**1.1000e-004**	**4.3500e-003**	**0.0000**	**15.7087**	**15.7087**	**3.6000e-004**	**0.0000**	**15.7177**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Other Non-Asphalt Surfaces	14.70	6.60	6.60	0.00	0.00	0.00	0	0	0

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Other Non-Asphalt Surfaces	0.504187	0.038691	0.220388	0.121642	0.020356	0.005773	0.031759	0.047089	0.001411	0.001172	0.005719	0.000756	0.001058

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.0696	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Unmitigated	0.0696	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0123					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0573					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Total	**0.0697**	**0.0000**	**1.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.6000e-004**	**3.6000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0123					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.0573					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-005	0.0000	1.9000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	3.6000e-004	3.6000e-004	0.0000	0.0000	3.9000e-004
Total	**0.0697**	**0.0000**	**1.9000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**3.6000e-004**	**3.6000e-004**	**0.0000**	**0.0000**	**3.9000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Other Non-Asphalt Surfaces	0 / 0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	0.0000	0.0000	0.0000	0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX 3.8

Hydrology and Water Quality Appendices

APPENDIX 3.8 A

Sediment Characterization Report for Hemphill Diversion Structure
(Holdrege & Kull 2017);

SEDIMENT CHARACTERIZATION REPORT

FOR

HEMPHILL DIVERSION STRUCTURE
PLACER COUNTY, CALIFORNIA

JUNE 2017

PREPARED ON BEHALF OF

NID

NEVADA IRRIGATION DISTRICT
1036 WEST MAIN STREET
GRASS VALLEY, CALIFORNIA

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue
Nevada City, California 95959

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Project No. 4794-01
June 2, 2017

Kleinschmidt Associates
P.O. Box 650
Pittsfield, ME 04967

Attention: Mike Schimpff

Reference: ***Hemphill Diversion Structure***
Placer County, California

Subject: ***Sediment Characterization Report***

Dear Mr. Schimpff:

Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results of sediment characterization at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

H&K appreciates the opportunity to provide environmental engineering services for the Hemphill Diversion Structure project. Please contact the undersigned with any questions or comments regarding H&K's investigation.

Sincerely,

HOLDREGE & KULL

Bryan Botsford
Staff Geologist

Jason W. Muir, C.E. 60167
Associate Engineer

REGISTERED PROFESSIONAL ENGINEER
JASON W. MUIR
No. 60167
Exp. 06/18
CIVIL
STATE OF CALIFORNIA

F:\1 Projects\4794 Hemphill Diversion Structure\10 Chemical Characterizatoin Report\01 Letter\4794-01 Sediment Characterization Report, Hemphill Diversion Structure.docx

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APPENDICES

Appendix A Analytical Laboratory Reports and Chain of Custody Documentation

Appendix B Laboratory Reports for Particle Size Analysis

ABBREVIATIONS AND ACRONYMS

APN	assessor's parcel number
ATL	Advanced Technology Laboratories, Inc.
bgs	below ground surface
CAM	California Assessment Manual
CalEPA	California Environmental Protection Agency
Caltest	Caltest Laboratory, Inc.
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
COPC	constituent of potential concern
CrVI	hexavalent chromium
CTR	California Toxics Rule
CVAA	cold-vapor atomic absorption
CVAFS	cold vapor atomic fluorescence spectrometry
CWA	Clean Water Act
CWC	California Water Code
DI	deionized water
DQI	data quality indicators
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
DTSC-SL	DTSC Screening Level
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
GIS	geographic information system
GPS	global positioning system
HSC	California Health and Safety Code
H&K	Holdrege & Kull
HCl	hydrochloric acid
ICP-AES	inductively coupled plasma atomic emission spectroscopy
MDL	method detection limit
MeHg	methylmercury
mg/kg	milligrams per kilogram
MCL	Maximum Contaminant Level
MQO	measurement quality objective
MS	matrix spike

ABBREVIATIONS AND ACRONYMS

MSD	matrix spike duplicate
MSL	mean sea level
mybp	million years before present
ng/L	nanogram per liter
Non 15	Non Chapter 15 Program
NID	Nevada Irrigation District
PCEHD	Placer County Environmental Health Division
PQL	practical quantitation limit
OEHHA	CalEPA Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QC	quality control
RL	laboratory reporting limit
RPD	relative percent difference
RSL	Regional Screening Level
RWQCB	California Regional Water Quality Control Board
SL	screening level
SP	poorly graded sand
SSP	Site Safety Plan
STLC	Soluble Threshold Limit Concentration
SWRCB	State Water Resources Control Board
THg	total recoverable mercury
Title 22	Title 22 of the California Code of Regulations
TTLC	Total Threshold Limit Concentration
UCL	upper confidence limit
ug/kg	microgram per kilogram
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USCS	Unified Soil Classification System
USGS	United States Geological Survey
WET	Waste Extraction Test
WDR	Waste Discharge Requirement
°C	degrees Celsius
%REC	percent recovery

1 INTRODUCTION

On behalf of Kleinschmidt, Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results of sediment characterization at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

1.1 PURPOSE

The purpose of H&K's investigation was to characterize sediment within the impoundment to inform future permitting and sediment removal activities associated with the project. The investigation in not intended to satisfy all permitting requirements associated with the project; rather, the findings are intended to help scope management alternatives for dam and sediment removal.

1.2 SITE DESCRIPTION

The Nevada Irrigation District (NID) Hemphill Diversion Structure has been utilized by NID dating back to 1933 when the property was purchased. The concrete diversion structure is approximately 8 feet tall, and is periodically fitted with 3-foot-tall flashboards during the irrigation season (April to October) to increase surface water elevation upstream and direct flow into the Hemphill Canal.

The investigation area consists of an approximately 1.5-acre impoundment upstream of the diversion structure where sediment collects. A location map, vicinity map, and site map are presented as Figures 1, 2, and 3, respectively. The site was accessed by traveling northwest on Virginiatown Road, and then driving south approximately 400 feet along an unnamed dirt road to the investigation area.

1.3 RATIONALE FOR SAMPLING STRATEGY

The purpose of H&K's investigation was to characterize sediment within the study area, to evaluate approximate sediment volume within the impoundment, and perform particle size and moisture content analysis for composite sediment samples.

Two composite samples were analyzed for organic and inorganic constituents listed in Section 2. The California Regional Water Quality Control Board (RWQCB) General Order for Maintenance Dredging (R5-2009-0085) typically requires that one composite sample be prepared for each 10,000 cubic yards of material to be dredged, although the actual sampling frequency is subject to change by the reviewing agency. The investigation area comprises approximately 1.5 acres and contains approximately 8,000 cubic yards of sediment. This volume measurement is based on depth measurements determined by dynamic cone penetrometer (DCP) testing and hand-level measurements as described in Section 4.2. Based on this volume estimate, two composite samples were prepared for analysis from the eight sediment sampling locations depicted on Figure 3.

1.4 REGULATORY FRAMEWORK

The California EPA (CalEPA), including the State Water Resources Control Board (SWRCB) and the Department of Toxic Substances Control (DTSC), is responsible for protection of public health and the environment. The SWRCB and its nine Regional Water Quality Control Boards (RWQCBs) have the responsibility for the coordination and control of water quality, including the protection of the beneficial uses of the waters of the State. The site is located within the SWRCB's Central Valley Region. DTSC has the responsibility of managing the State's hazardous waste program to protect public health and the environment.

1.4.1 Water Quality

The regulatory framework governing protection of water quality in California is described in the Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California, which is also known as the State Implementation Policy (SWRCB, 2005). Pursuant to the State Implementation Policy, the following water quality objectives and criteria are potentially applicable based on state and federal regulation.

Federal Water Quality Criteria

Federal water quality criteria are set forth in the National Toxics Rule (NTR; EPA 1995) and in the California Toxics Rule (CTR; EPA 2000), which is promulgated by the EPA in 40 CFR 131.38.

Basin Plan Objectives

Water quality objectives are identified in the Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and the San Joaquin River Basin (RWQCB; 2016). The Basin Plan does not identify any existing and potential beneficial uses specifically for Auburn Ravine. However, the following existing and potential beneficial uses are defined for the downstream Sacramento River (Colusa Basin to the "I" Street Bridge):

- Municipal and domestic supply;
- Agricultural water supply;
- Water contact and non-contact recreation;

- Warm and cold freshwater habitat;
- Spawning, reproduction and/or early development of fish; and
- Wildlife habitat.

Water quality objectives corresponding to these beneficial uses include Maximum Contaminant Levels (MCLs) for drinking water specified in Title 22 of the California Code of Regulations (22 CCR), CTR values for protection of human health and aquatic life, and agricultural water quality objectives. The Basin Plan defines water quality objectives for metals as dissolved concentrations except for selenium, molybdenum, and boron, which are defined as total concentrations.

Ambient Water Quality Criteria

EPA ambient water quality recommended criteria and other criteria are commonly used by the RWQCB to interpret narrative objectives in the Basin Plan, such as Office of Environmental Health Hazard Assessment (OEHHA) fish consumption benchmarks, federal and state antidegradation requirements, and waterway-specific benchmarks.

Waste Disposal to Land

The California Water Code (CWC), Division 7, Chapter 4, Article 4, Sections 13260 through 13274, pertains to Waste Discharge Requirements (WDRs) issued by the RWQCB. State regulations pertaining to the treatment, storage, processing, or disposal of solid waste are found in California Code of Regulations (CCR) Title 27, beginning with Section 20005. Pursuant to Title 27 Section 20090, certain activities are exempt from Title 27. For example, discharges of wastewater to land, including evaporation ponds and percolation ponds, are exempt provided that:

- The RWQCB has issued or waived WDRs;
- The discharge complies with the applicable water quality control plan; and
- The wastewater does not need to be managed as a hazardous waste.

The RWQCB Non Chapter 15 (Non 15) Program regulates point discharges that are exempt from Title 27 pursuant to Subsection 20090 and are not subject to the Federal Water Pollution Control Act. The Non 15 Program also regulates the discharge of wastes classified as inert pursuant to Section 20230 of Title 27. Section 20230 defines inert waste as solid waste that:

- Does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives; and
- Does not contain significant quantities of decomposable waste.

Inert wastes do not need to be discharged at classified waste disposal units, and the RWQCB can prescribe individual or general WDRs for discharges of inert wastes.

General Order for Maintenance Dredging (R5-2009-0085)

The General Order for Maintenance Dredging specifies general WDRs regulating maintenance dredging projects within the Central Valley Region that remove and/or place up to 100,000 cubic yards of material.

1.4.2 Human Health

Screening levels related to protection of human health in the case of routine, long term exposure by direct pathways (i.e., ingestion, inhalation and dermal contact) commonly include EPA Regional Screening Levels (RSLs) and DTSC Screening Levels (DTSC-SLs). For inorganics, background concentrations are also used as a basis for comparison.

RSLs and DTSC-SLs include inorganic constituent concentrations that are based on the protection of public health. In California, DTSC-SLs are commonly used in lieu of RSLs when DTSC uses toxicity criteria that are different than the toxicity criteria used by EPA.

The RSLs and DTSC-SLs are considered conservative. Under most circumstances, the presence of a chemical in media at concentrations less than the corresponding RSL or DTSC-SL can be assumed not to pose a significant, long-term (chronic) threat to human health. The presence of a chemical or inorganic constituent at a concentration in excess of a screening level does not necessarily indicate that adverse impacts to human health are occurring or will occur; however, further evaluation of potential human health concerns are generally appropriate if screening values are exceeded.

1.5 LIMITATIONS AND EXCEPTIONS

The information presented in this report is not meant to be comprehensive, to identify all potential concerns, or to eliminate the risk associated with environmental conditions. H&K used professional judgment and experience to arrive at the conclusions presented herein. Therefore, the conclusions are not to be considered scientific certainties. The recommendations provided herein are contingent upon H&K's review of future sampling results and any other pertinent information that becomes available.

No environmental assessment can eliminate all uncertainty. H&K does not warrant the accuracy of information supplied by others, or the use of segregated portions of this plan. Furthermore, the concentrations detected in the samples collected during the site investigation may not be representative of conditions between the locations sampled. Other forms of contamination may be present within the site that the investigation did not detect. Professional judgment and interpretation are inherent in the process and uncertainty is inevitable. Therefore, the findings presented in this report may need to be revised based on the results of future sampling and analysis.

H&K prepared and issued this plan for the exclusive use of our client. Any reliance on this plan by a third party is at the party's sole risk. H&K is not responsible for any other party's interpretations of the reported information.

H&K performed this work in accordance with present, regional, generally accepted standards of care. This report does not represent a legal opinion. No warranty, expressed or implied, including any implied warranty of merchantability or fitness for the purpose is made or intended in connection with the work.

The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. Changes in regulations, interpretations, and/or enforcement policies may occur at any time.

2 INVESTIGATION METHODOLOGY

H&K performed the sediment sampling on March 28 and 29, 2017. The investigation methodology is summarized below, and sample locations are depicted on Figure 3.

2.1 SEDIMENT SAMPLING

Sediment samples were collected as grab samples (independent, discrete samples) from eight locations (HD-SS-1 through HD-SS-8) within the impoundment using a hand-actuated slide hammer fitted with a 4-foot long stainless steel sampling shoe lined with 1.5-inch diameter pre-cleaned, acetate sleeves. Discrete samples were then transferred to laboratory supplied 8-ounce glass jars, placed in thermally-insulated containers, and were transported to H&K's Nevada City office.

Discrete sediment samples HD-SS-1 through HD-SS-4 were composited at H&K's Nevada City laboratory into sample HD-SS-1-4. Discrete sediment samples HD-SS-5 through HD-SS-8 were composited into sample HD-SS-5-8. Composite samples to be analyzed for methylmercury (MeHg) were placed in a thermally-insulated container on dry ice and were transported to Caltest Analytical Laboratories (Caltest, ELAP certification number 1664) of Napa, California. Samples to be analyzed for the remaining constituents were placed in a thermally-insulated container on wet ice and were transported to Advanced Technology Laboratories (ATL, ELAP certification number 1809) of Signal Hill, California.

Sample handling and shipment was performed under chain-of-custody documentation. Equipment decontamination procedures are described in the following section. MeHg sampling and compositing were performed using the clean hands procedure, pursuant to EPA Method 1669.

2.2 DECONTAMINATION

The laboratory testing program contained analysis of organics and metals. Therefore, acetate sample liners were decontaminated as follows, pursuant to methodology set forth by the United States Geological Survey (USGS; personal communication with Charlie Alpers, October 11, 2016). Prior to sampling, acetate sample liners were:

1. Rinsed with de-ionized (DI) water, using a dilute laboratory-grade liquid soap (Liquinox™);
2. Rinsed with 5 percent (%) hydrochloric acid (HCl) solution; and
3. Triple-rinsed with DI water.

The steel sampling equipment was decontaminated before first use and between sample locations.

2.3 LABORATORY ANALYSIS

The laboratory testing program included analysis of the two composite sediment samples HD-SS-1-4 and HD-SS-5-8 for organics, inorganics, and physical properties as described in the following sections.

2.3.1 Inorganics Analysis

The composite sediment samples were analyzed for the heavy metals listed in the RWQCB General Order for Maintenance Dredging (R5-2009-0085), including total CAM 17 (Title 22) metals, total aluminum, and hexavalent chromium. These samples were also analyzed for soluble CAM 17 (Title 22) metals by the Toxicity Characteristic Leaching Procedure (TCLP) and by the Title 22 Waste Extraction Test (WET). The samples were tested for moisture content by ASTM Method D2216 to facilitate dry-weight conversion of constituent concentrations. Inorganics analysis is summarized below.

Table 2.3.1 – Laboratory Testing Program, Inorganics

Analysis	Method
Total CAM 17 (Title 22) Metals	EPA 6010B/7471A
Total Aluminum	EPA 6010B
Total Hexavalent Chromium	EPA 3060A/7199A
Soluble CAM 17 (Title 22) Metals by TCLP	TCLP/EPA 6010B/7471A
Soluble CAM 17 (Title 22) Metals by Standard WET	WET/EPA 6010B/7471A

Notes:
CAM = California Assessment Manual
EPA = United States Environmental Protection Agency
TCLP = Toxicity Characteristic Leaching Procedure
WET = Waste Extraction Test

2.3.2 Organics Analysis

Organics analysis consisted of methylmercury (MeHg) by cold vapor atomic fluorescence spectrometry (CVAFS; EPA Method 1630) and was performed by Caltest Analytical Laboratories. MeHg sampling was performed using the clean hands procedure, pursuant to EPA Method 1669. The laboratory reporting limit (RL) is 0.1 micrograms per kilogram (ug/kg), and the method detection limit (MDL) is 0.05 ug/kg. Organics analysis is summarized below.

Table 2.3.2 – Laboratory Testing Program, Organics

Analysis	Method
Methylmercury	EPA 1630
Semi-volatile organic compounds	EPA 8270C
Carbon Chain	EPA 8015
Polychlorinated biphenyls (PCBs)	EPA 8082
Polycyclic aromatic hydrocarbons (PAHs)	EPA 8310

Notes:
EPA = United States Environmental Protection Agency

2.3.3 Physical Properties

Testing for physical properties included particle size analysis and moisture content determination. Particle size analysis was performed on discrete sediment samples HD-SS-1, HD-SS-2, HD-SS-3, HD-SS-6, and HD-SS-7 for sand-size particles (i.e., all particle sizes retained on the No. 200 sieve) using ASTM Method D422. Moisture content was determined for composite samples HD-SS-1-4 and HD-SS-5-8 using ASTM Method D2216. The frequency of testing for physical properties is summarized below.

Table 2.3.3 – Laboratory Testing Program, Physical Properties

Analysis	Method	Quantity
Particle Size Analysis, Full Sieve	ASTM D422	5
Moisture Content	ASTM D2216	2

Notes:
ASTM = American Society for Testing of Materials

3 DATA QUALITY OBJECTIVES

3.1 MEASUREMENT QUALITY OBJECTIVES

Measurement Quality Objectives (MQOs) are established for field and laboratory measurements to define criteria for calibration and quality control. MQOs are used to assess the viability and usability of data, considering the following Data Quality Indicators (DQIs): precision, accuracy, representativeness, completeness, comparability, and sensitivity.

3.1.1 Laboratory Measurement Quality Objectives

Analysis was performed by the following laboratories:

- Sediment samples were submitted to ATL for analysis of inorganic and organic constituents.
- Sediment samples were submitted to Caltest for analysis of MeHg.

Laboratory MQOs are defined by the contract laboratories. Quality control (QC) reports are included in the laboratory reports presented in Appendix A.

3.2 DATA REVIEW AND VALIDATION

Field personnel were responsible for following H&K's sampling and documentation procedures to facilitate the collection of defensible and justifiable data. Responsibilities for data review and validation are outlined below:

- Field data review and validation was performed by Bryan Botsford, project geologist, and was overseen by Jason Muir, the project manager.
- Laboratory data review and validation was performed by a chemist or laboratory analyst as described in the laboratory quality assurance programs, as summarized in the laboratory reports (Appendix A). Data failing to meet the laboratory acceptance criteria were flagged with a qualifier identifying the associated problem in the laboratory report.
- Secondary validation for field data and review of laboratory quality control reports was performed by the project geologist.
- The project manager is responsible for overall verification and final approval of all data.

Procedures and criteria for review of laboratory data are summarized below.

3.2.1 Precision

H&K assessed the precision of laboratory analysis by comparing the analytical results with matrix spike/matrix spike duplicate (MS/MSD) results for organic analysis, and laboratory duplicate results for inorganic analysis. For laboratory precision, H&K's general MQOs are:

- Relative percent difference (RPD) between duplicate blank spikes less than or equal to 20%.
- RPD between laboratory duplicate samples less than or equal to 30% for analyte concentrations greater than or equal to five times the MDL, and the absolute concentration difference less than or equal to the MDL for analyte concentrations less than five times the MDL.
- RPD between MSDs less than or equal to 40%.

ATL reported RPD exceedances for soluble thallium and antimony analysis by Standard WET, and for soluble cadmium, cobalt, and vanadium by TCLP. The calculations for these constituents are based on raw values. The RPD exceedances are likely attributable to the low concentrations of the constituents. In general, these constituents were detected at trace concentrations or were not detected.

3.2.2 Accuracy

H&K assessed the accuracy of laboratory results by reviewing method blank, reagent and preparation blank, and MS/MSD. The percent recovery (%REC or %R as shown in the following equation) of MS samples was calculated using the following equation:

$$\%R_i = \left(\frac{Y_i}{X_i}\right) \times 100$$

where:

$\%R_i$ = percent recovery for compound i
Y_i = measured analyte concentration in sample i (measured - original sample concentration)
X_i = known analyte concentration in sample i

For matrix spikes, the %REC calculation typically takes into account correcting the matrix spike concentration for the naturally occurring amounts (as measured in the unspiked sample). The calculation may be represented by the following equation:

$$\%R = \frac{(A - B)}{K} \times 100$$

where:

$\%R$ = percent recovery
A = measured value or concentration in the matrix spike
B = measured value or concentration in the unspiked sample
K = known or accepted/true value or concentration in the matrix spike without native amounts present

For laboratory accuracy, the MQOs are:

- Detections less than the RL for field blanks.
- Detections less than ½ the RL for laboratory blanks.
- %REC between 80 and 120%.

Laboratory quality control flags are summarized below. These flags did not signify a negative impact on data usability.

Advanced Technology Laboratories (Work Order 1701344)

- Matrix spike B7C1078-MS1 for soluble cobalt, silver, and antimony by Standard WET was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- Matrix spike B7D0186-MS2 for total hexavalent chromium was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- Matrix spike B7D0044-MS1 for seven EPA 8270C constituents was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- The laboratory control sample B7D0044-BS1 for one EPA 8270C constituent was outside of the control limit but was within the Marginal Exceedance (ME) limit.
- Sample dilution was required for soluble metals analysis by TCLP and Standard WET due to possible matrix interference.

Caltest Analytical Laboratory (Work Order S031204)

Caltest reported no QC flags for MeHg analysis.

3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in parameters at a sampling point, or an environmental condition that they are intended to represent. H&K and the contract laboratories addressed the representativeness of data by consistent application of established field and laboratory procedures.

Sample holding times were verified and chain-of-custody forms were checked for completeness. Temperature of samples was measured upon receipt by the laboratory, when applicable. Laboratory blank samples were evaluated for the presence of contaminants. No significant discrepancies were identified.

3.2.4 Comparability

The comparability objective determines whether analytical conditions are sufficiently uniform for each analytical run to ensure that all reported data will be consistent. Comparability is addressed by using similar analytical methods from one investigation to the next.

3.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. H&K considers the data set for this investigation complete based on the sampling rationale presented in Section 1.3.

3.2.6 Sensitivity

The laboratory method detection limit (MDL) is the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The reporting limit (RL), or practical quantitation limit (PQL), represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a sample matrix. The screening levels described in Section 3.1 are typically several times the MDL to allow for reproducibility. H&K verified the sensitivity of laboratory analysis by comparing the RLs and MDLs reported by the laboratory to the associated screening levels.

4 INVESTIGATION RESULTS

The subsurface conditions described in the following paragraphs are generalized based on H&K's observation of sediment conditions revealed during the subsurface investigation. Sediment within the impoundment was generally described as dark brown (Munsel color 10YR 3/3), saturated, loose, poorly graded sand with gravel (United States Soil Classification System [USCS] symbol SP). The sample locations are depicted on Figure 3.

4.1 LABORATORY RESULTS

4.1.1 Inorganics Analysis

Total CAM 17 Metals

Total metals concentrations detected in the sediment samples are compared to the screening levels described in Section 3.1. The total metals concentrations are below the corresponding DTSC-SLs and RSLs for commercial and residential soil, with the exception of arsenic.

The detected total arsenic concentrations in samples HD-SS-1-4 and HD-SS-5-8 were 2.7 milligrams per kilogram (mg/kg) and 3.0 mg/kg, respectively. These concentrations are within the range of background soil arsenic concentrations for the region (typically up to 17 mg/kg), as determined by H&K's statistical analysis of over 200 data points obtained by H&K from sites in the region as part of DTSC's Voluntary Cleanup Program. Additional information regarding regional background concentrations can be provided upon request.

The total metals concentrations detected in the sediment samples are below the corresponding Total Threshold Limit Concentration (TTLC) values for designation of hazardous waste in California. Results of total metals analysis are presented in Table 1. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

Soluble CAM 17 Metals by Standard WET and TCLP

Soluble metals concentrations by Standard WET and TCLP were below their respective screening levels for designation of hazardous waste. Results of soluble metals analysis by Standard WET and TCLP are presented in Tables 3 and 4. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

4.1.2 Organics Analysis

MeHg concentrations detected in sediment on a wet-weight basis ranged from 0.11 micrograms per kilogram (ug/kg) to 0.13 ug/kg. Converting to dry weight, the concentrations are estimated to range from 0.13 ug/kg to 0.16 ug/kg. The MeHg concentrations detected in sediment samples are below the corresponding screening levels (RSLs) for commercial soil (120 mg/kg) and residential soil (7.8 mg/kg). A milligram per kilogram (mg/kg) is equal to 1,000 micrograms per kilogram (ug/kg). Results of methylmercury (MeHg) analysis are presented in Table 2. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

4.1.3 Physical Properties

Percent Moisture

Percent moisture for samples HD-SS-1-4 and HD-SS-5-8 were 17 and 15 percent, respectively.

Particle Size Analysis

Particle size analysis (ASTM D422) is summarized in Table 5. Laboratory reports are presented in Appendix B.

As listed in Table 5, the average gravel content (average percent retained on a No. 4 sieve) for the five locations was 26.5%. The average sand content (average percent passing the No. 4 sieve and retained on the No. 200 sieve) was 71.9%. The average fines (silt and clay) content (average percent passing the No. 200 sieve) was 1.6%. In general, the sediment samples were described as poorly graded sand with gravel (SP).

4.2 SEDIMENT DEPTH AND VOLUME

Sediment depths within the impoundment were estimated using a dynamic cone penetrometer (DCP) and hand level. Sediment depth measurements within the impoundment ranged from 1 to 8 feet. These measurements were used to estimate average sediment volumes within specific sections of the impoundment. The average sediment depth along the flow line of Auburn Ravine was estimated to be 1 foot, and average sediment depths for low-energy, depositional areas of the impoundment ranged from 3 to 6 feet.

Based on these values and an estimated surface area of 1.5 acres, the impoundment contained approximately 8,000 cubic yards of sediment at the time of the investigation. Approximate sediment depths at each sample location are summarized in Table 6.

5 FINDINGS AND CONCLUSIONS

H&K's opinion is that the investigation was performed in general accordance with our proposal dated November 14, 2016.

The chemical characterization of the sediment did not detect organic or inorganic constituent concentrations that were notably elevated with respect to background conditions. Additionally, the physical characterization of the sediment indicates that the sediment is predominantly coarse-grained (sand and gravel), with only 1.6% on average passing the No. 200 sieve.

H&K concludes that sediment management practices associated with the impoundment are not likely to have a significant impact on water quality given the chemical and physical characterization described herein.

6 REFERENCES

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FIGURES

Figure 1 Location Map

Figure 2 Vicinity Map

Figure 3 Site Map

BASE MAP FROM PLACER COUNTY GIS (HTTP://GIS-PLACERCOUNTY.OPENDATA.ARCGIS.COM/); MAY 2017

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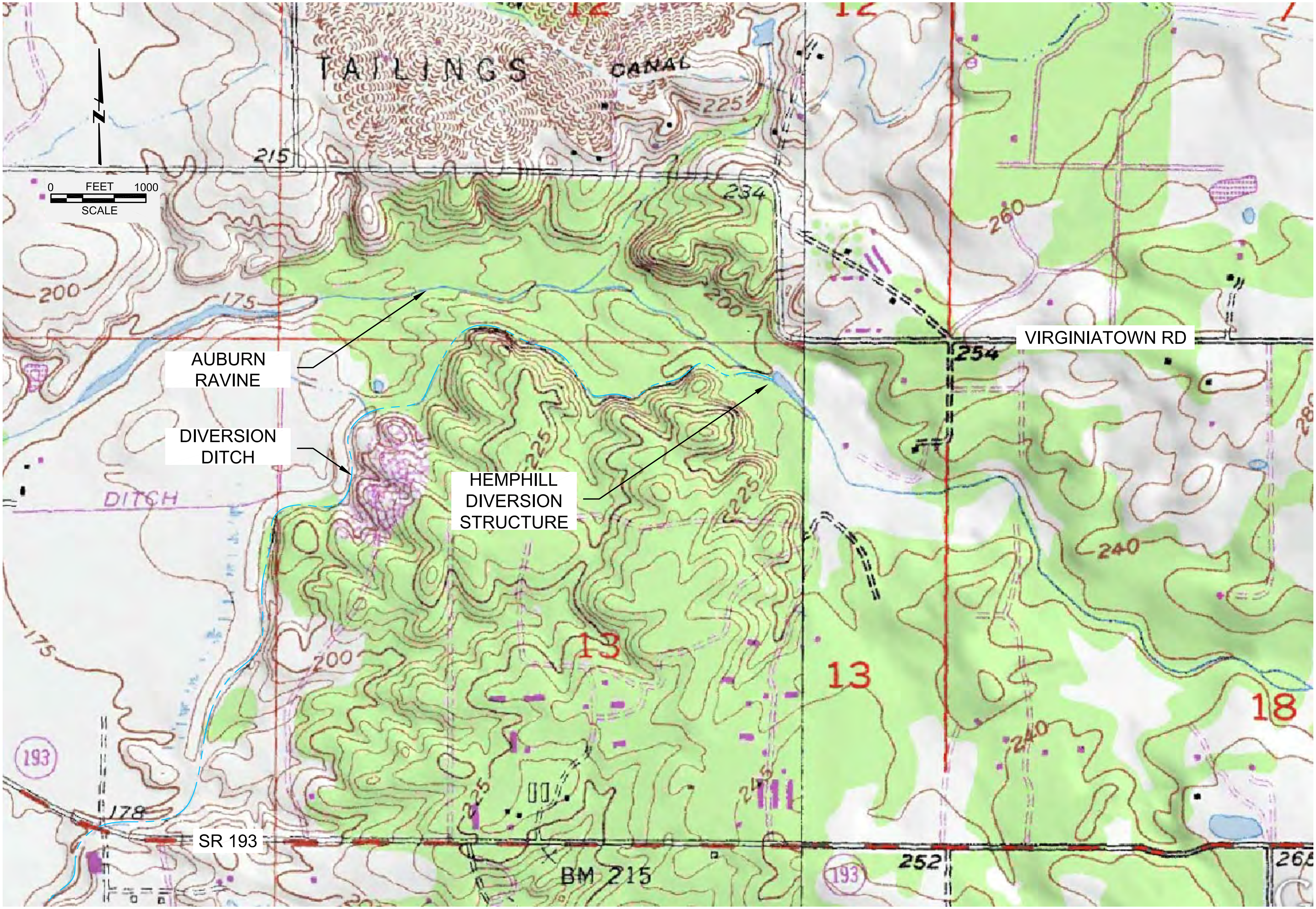
LOCATION MAP
HEMPHILL DIVERSION STRUCTURE
LINCOLN, PLACER COUNTY, CALIFORNIA

DRAWN BY:	BOTSFORD
CHECKED BY:	MUIR
H&K PROJECT:	4794-01
DATE:	JUNE 2017

FIGURE 1



BASE MAP FROM USGS 7.5-MINUTE TOPOGRAPHIC MAPS OF GOLD HILL AND LINCOLN , CALIFORNIA (1973, 1981)

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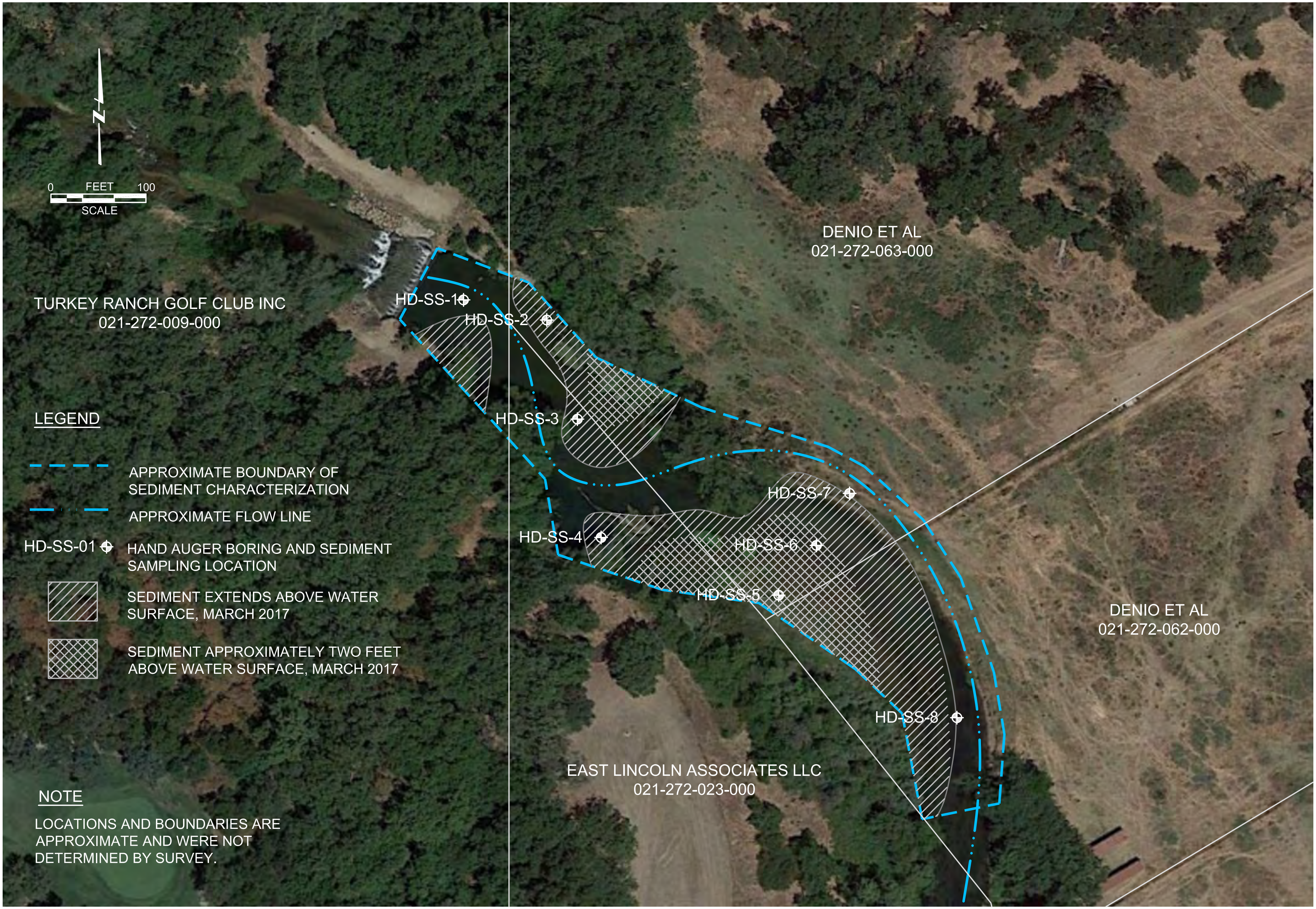
VICINITY MAP
HEMPHILL DIVERSION STRUCTURE
LINCOLN, PLACER COUNTY, CALIFORNIA

DRAWN BY:	BOTSFORD
CHECKED BY:	MUIR
H&K PROJECT:	4794-01
DATE:	JUNE 2017

FIGURE
2



AERIAL IMAGE FROM GOOGLE EARTH, IMAGE DATE JULY 10, 2016

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SITE MAP
HEMPHILL DIVERSION STRUCTURE
LINCOLN, PLACER COUNTY, CALIFORNIA

DRAWN BY:	BOTSFORD
CHECKED BY:	MUIR
H&K PROJECT:	4794-01
DATE:	JUNE 2017

FIGURE
3

TABLES

Table 1	Total Metals in Sediment Samples
Table 2	Methylmercury in Sediment Samples
Table 3	Soluble Metals by Standard WET in Sediment Samples
Table 4	Soluble Metals by TCLP in Sediment Samples
Table 5	Particle Size Analysis
Table 6	Sediment Depth

Table 1 - Total Metals in Sediment Samples
Hemphill Diversion Structure
Placer County, California

Sample ID	Sample Date	Unit	Results: Aluminum	Antimony, metallic	Arsenic, inorganic	Barium	Beryllium and compounds	Cadmium	Chromium, total (1)	Chromium, hexavalent	Cobalt	Copper	Lead and compounds	Mercury, elemental	Molybdenum	Nickel, soluble salts	Selenium	Silver	Thallium, soluble salts	Vanadium and compounds	Zinc and compounds
USEPA Method			*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*3060A/7199*	*6010B*	*6010B*	*6010B*	*7471A*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*
CAS No.			*7429-90-5*	*7440-36-0*	*7440-38-2*	*7440-39-3*	*7440-41-7*	*7440-43-9*	*16065-83-1*	*18540-29-9*	*7440-48-4*	*7440-50-8*	*7439-92-1*	*7439-97-6*	*7439-98-7*	*7440-02-0*	*7782-49-2*	*7440-22-4*	*7440-28-0*	*7440-62-2*	*7440-66-6*
Method Detection Limit			*2.9*	*0.32*	*0.70*	*0.10*	*0.04*	*0.09*	*0.12*	*0.30*	*0.10*	*0.11*	*0.11*	*0.02*	*0.13*	*0.10*	*0.88*	*0.04*	*0.42*	*0.19*	*0.18*
Reporting Limit			*25*	*2.0*	*1.0*	*0.1*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*0.10*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
Screening Levels	*Residential Soil*		*7.70E+04*	*31*	*0.11*	*15,000*	*15*	*5.2*	*36,000*	*0.3*	*23*	*3,100*	*80*	*1.0*	*390*	*490*	*390*	*390*	*0.78*	*390*	*23,000*
	Commercial Soil		*1.10E+06*	*470*	*0.36*	*2.2E+05*	*210*	*7.3*	*2.7E+05*	*6.3*	*350*	*47,000*	*320*	*4.5*	*5,800*	*3,100*	*5,800*	*1,500*	*12*	*1,000*	*3.5E+05*
	Basis for Screening Level		*RSL*	*RSL*	*DTSC-SL*	*RSL*	*DTSC-SL*	*DTSC-SL*	*DTSC-SL*	*RSL*	*RSL*	*RSL*	*DTSC-SL*	*DTSC-SL*	*RSL*	*DTSC-SL*	*RSL*	*RSL*	*RSL*	*DTSC-SL*	*RSL*
	TTLC		*NE*	*500*	*500*	*10,000*	*10,000*	*100*	*2,500*	*500*	*2,500*	*18,000*	*1,000*	*20*	*3,500*	*2,000*	*100*	*500*	*700*	*2,400*	*5,000*
HD-SS-1-4	03/29/17	mg/kg	2500	0.43 J	**2.7**	16	ND	ND	11	ND	3.9	5.7	2.3	0.04 J	ND	7.8	ND	ND	ND	13	10
HD-SS-5-8	03/29/17	mg/kg	1700	0.39 J	**3.0**	11	ND	ND	8.5	ND	2.4	3.9	1.9	0.02 J	ND	5.1	ND	ND	ND	9.3	7.0

Notes:
1 Total chromium (CAS No. 7440-47-3) results compared to RSLs for Chromium III (CAS No. 16065-83-1)
CAS = Chemical Abstracts Service registry number
DTSC-SL = California Department of Toxic Substances Control (DTSC) Screening Level (SL), as set forth in Human Health Risk Assessment (HHRA) Note 3 (DTSC; June 2016)
J = value was detected between MDL and RL and is an estimated value
mg/kg = milligrams per kilogram
ND = Analyte not detected at or below the Method Detection Limit
RSL = USEPA Region 9 Regional Screening Level
TTLC = Total Threshold Limit Concentration

Table 2 - Methylmercury in Sediment Samples
Hemphill Diversion Structure
Placer County, California

				Results	
Sample ID	**Sample Date**	**Unit**	**Moisture Content** (%)	**Methylmercury** (ug/kg, wet weight)	**Methylmercury** (ug/kg, dry weight[1])
USEPA Method				*1630*	
CAS No.				*22967-92-6*	
Method Detection Limit				*0.05*	
Reporting Limit				*0.10*	
Screening Levels	*Residential Soil*			*7,800*	
	Commercial Soil			*1,200,000*	
	Basis for Screening Level			*RSL*	
HD-SS-1-4	3/29/2017	ug/kg	17	0.13	0.16
HD-SS-5-8	3/29/2017	ug/kg	15	0.11	0.13

Notes:
1 Dry weight estimated from wet weight laboratory result based on listed moisture content.
CAS = Chemical Abstracts Service
RSL = USEPA Region 9 Regional Screening Level
ug/kg = micrograms per kilogram
USEPA = United States Environmental Protection Agency

Table 3 - Soluble Metals in Sediment Samples by Standard WET
Hemphill Diversion Structure
Placer County, California

Parameter	CAS No.	EPA Method	Unit	MDL	RL	Results		Benchmark Value
						HD-SS-1-4	HD-SS-1-5	*STLC*
Date Sampled						*03/29/17*	*03/29/17*	
Antimony, metallic	7440-36-0	WET/6010B	mg/L	0.043	2.0	ND	ND	*15*
Arsenic, inorganic	7440-38-2	WET/6010B	mg/L	0.13	1.0	ND	ND	*5*
Barium	7440-39-3	WET/6010B	mg/L	0.016	1.0	0.93	0.77	*100*
Beryllium and compounds	7440-41-7	WET/6010B	mg/L	0.009	1.0	ND	ND	*0.75*
Cadmium	7440-43-9	WET/6010B	mg/L	0.0030	1.0	ND	ND	*1*
Chromium, total (1)	16065-83-1	WET/6010B	mg/L	0.033	1.0	0.081	ND	*5 (560)**
Cobalt	7440-48-4	WET/6010B	mg/L	0.014	1.0	0.11	0.11	*80*
Copper	7440-50-8	WET/6010B	mg/L	0.046	1.0	0.11	0.069	*25*
Lead and compounds	7439-92-1	WET/6010B	mg/L	0.057	1.0	0.099	ND	*5*
Mercury, elemental	7439-97-6	WET/6010B	mg/L	6.70E-04	0.001	ND	ND	*0.2*
Molybdenum	7439-98-7	WET/6010B	mg/L	0.014	1.0	ND	ND	*350*
Nickel, soluble salts	7440-02-0	WET/6010B	mg/L	0.048	1.0	0.16	0.12	*20*
Selenium	7782-49-2	WET/6010B	mg/L	0.068	1.0	ND	ND	*1*
Silver	7440-22-4	WET/6010B	mg/L	0.012	1.0	0.018	ND	*5*
Thallium, soluble salts	7440-28-0	WET/6010B	mg/L	0.051	1.0	0.063	ND	*7*
Vanadium and compounds	7440-62-2	WET/6010B	mg/L	0.022	1.0	0.17	0.096	*24*
Zinc and compounds	7440-66-6	WET/6010B	mg/L	0.041	1.0	0.28	0.22	*250*

Notes:
CAS = Chemical Abstracts Service registry number
MDL = method detection limit
mg/L = milligrams per liter
ND = not detected above listed MDL
RL = laboratory reporting limit
STLC = Soluble Threshold Limit Concentration
J = value was detected between MDL and RL and is an estimated value
1 If the soluble chromium as determined by TCLP is less than 5 mg/L, and the soluble chromium as determined by the STLC test equals or exceeds 560 mg/L, and the waste is not otherwise identified as a RCRA hazardous waste, then the waste is a non-RCRA hazardous waste.
WET = Title 22 Waste Extraction Test using citrate buffer extractant solution

Table 4 - Soluble Metals in Sediment Samples by TCLP
Hemphill Diversion Structure
Placer County, California

Parameter	CAS No.	EPA Method	Unit	MDL	RL	Results		Benchmark Value
						HD-SS-1-4	HD-SS-1-5	*TCLP*
Date Sampled						*03/29/17*	*03/29/17*	
Antimony, metallic	7440-36-0	TCLP/6010B	mg/L	0.011	0.5	ND	ND	*NE*
Arsenic, inorganic	7440-38-2	TCLP/6010B	mg/L	0.033	0.25	ND	ND	*5*
Barium	7440-39-3	TCLP/6010B	mg/L	0.0040	0.25	0.3	0.23 J	*100*
Beryllium and compounds	7440-41-7	TCLP/6010B	mg/L	0.0022	0.25	ND	ND	*NE*
Cadmium	7440-43-9	TCLP/6010B	mg/L	0.0008	0.25	0.0008 J	ND	*1*
Chromium, total (1)	16065-83-1	TCLP/6010B	mg/L	0.0082	0.25	0.013 J	ND	*5*
Cobalt	7440-48-4	TCLP/6010B	mg/L	0.0036	0.25	0.012 J	0.0094 J	*80*
Copper	7440-50-8	TCLP/6010B	mg/L	0.011	0.25	ND	ND	*NE*
Lead and compounds	7439-92-1	TCLP/6010B	mg/L	0.014	0.25	ND	ND	*5*
Mercury, elemental	7439-97-6	TCLP/ 7470A	mg/L	1.30E-04	2.50E-04	ND	ND	*0.2*
Molybdenum	7439-98-7	TCLP/6010B	mg/L	0.0034	0.25	ND	ND	*NE*
Nickel, soluble salts	7440-02-0	TCLP/6010B	mg/L	0.012	0.25	0.016 J	ND	*NE*
Selenium	7782-49-2	TCLP/6010B	mg/L	0.017	0.25	ND	ND	*1*
Silver	7440-22-4	TCLP/6010B	mg/L	0.0031	0.25	ND	ND	*5*
Thallium, soluble salts	7440-28-0	TCLP/6010B	mg/L	0.013	0.25	ND	ND	*NE*
Vanadium and compounds	7440-62-2	TCLP/6010B	mg/L	0.0056	0.25	ND	ND	*NE*
Zinc and compounds	7440-66-6	TCLP/6010B	mg/L	0.01	0.25	0.087 J	0.062 J	*NE*

Notes:
CAS = Chemical Abstracts Service registry number
J = value was detected between MDL and RL and is an estimated value
MDL = method detection limit
mg/L = milligrams per liter
ND = not detected above listed MDL
NE = not established
RL = laboratory reporting limit
TCLP = Toxicity Characteristic Leaching Procedure

Table 5 - Summary of Particle Size Analysis
Hemphill Diversion Structure
Placer County, California

Sample No.	Date	Percent Passing[1] (% by mass)							
		3/8 in	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
HD-SS-1	03/29/17	97.9	87.7	68.9	41.4	18.2	4.8	0.9	0.1
HD-SS-2	03/29/17	95.6	90.2	73.9	38.1	16.5	9.7	6.4	4.1
HD-SS-3	03/29/17	79.9	68.4	54.7	40.1	21.4	8.4	2.9	1.2
HD-SS-6	03/29/17	70.7	57	43.2	23.3	7.4	3.3	2	1.4
HD-SS-7	03/29/17	69.9	64.2	47	35	23.1	10.4	2.7	1.0
Average Percent Passing		82.8	73.5	57.5	35.6	17.3	7.3	3.0	1.6
Average Percent Retained		17.2	26.5	42.5	64.4	82.7	92.7	97.0	98.4
Average gravel[2] content (average percent retained on No. 4 sieve)									**26.5**
Average sand content (average percent passing No. 4 sieve and retained on No. 200 sieve)									**71.9**
Average fines content (silt and clay; average percent passing No. 200 sieve)									**1.6**

Notes:
1 Results are based on ASTM D422 particle size analysis of 1.5-inch diameter sediment column obtained by direct push.
2 Gravel content may be under-represented based on the sampling tools (1.5-inch inside diameter direct push core barrel)
USCS = Unified Soil Classification System

Table 6 - Sediment Depth
Hemphill Diversion Structure
Placer County, California

Location	Date	**Sediment Depth** (feet)
HD-SS-1	03/29/17	2
HD-SS-2	03/29/17	3.5
HD-SS-3	03/29/17	7
HD-SS-4	03/29/17	3.5
HD-SS-5	03/29/17	8
HD-SS-6	03/29/17	2
HD-SS-7	03/29/17	1
HD-SS-8	03/29/17	3

Notes:

1 Measurements were approximated using a Dynamic Cone Penotrometer (DCP) testing and hand level.

APPENDIX A

Analytical Laboratory Reports and Chain of Custody Documentation

April 20, 2017

Bryan Botsford
Holdrege & Kull Consulting Engineers & Geologist
792 Searls Avenue
Nevada City, CA 95959
Tel: (530) 478-1305
Fax:(530) 478-1019

ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003
TCEQ No. : T104704502

Re: ATL Work Order Number : 1701344

Client Reference : HEMPHILL DIVERSION, 4794-01

Enclosed are the results for sample(s) received on March 30, 2017 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and its absence renders the report invalid. Test results contained within this data package meet the requirements of applicable state-specific certification programs. The report cannot be reproduced without written permission from the client and Advanced Technology Laboratories.

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HD-SS-1-4	1701344-01	Soil	3/29/17 16:00	3/30/17 9:11
HD-SS-5-8	1701344-02	Soil	3/29/17 15:45	3/30/17 9:11

CASE NARRATIVE

Samples for EPA 8310 were subcontracted to AETL with ELAP Cert.# 1541.

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4

Lab ID: 1701344-01

Percent Moisture — **Analyst: BL**

Analyte	Result (% by Weight)	PQL (% by Weight)	MDL (% by Weight)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Percent Moisture	**17**	0.10	0.10	1	B7D0096	04/04/2017	04/05/17 08:45	

Total Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aluminum	**2500**	25	2.9	1	B7D0065	04/04/2017	04/05/17 10:15	

Title 22 Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	**0.43**	2.0	0.32	1	B7D0065	04/04/2017	04/05/17 10:15	J
Arsenic	**2.7**	1.0	0.70	1	B7D0065	04/04/2017	04/05/17 10:15	
Barium	**16**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Beryllium	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:15	
Cadmium	ND	1.0	0.09	1	B7D0065	04/04/2017	04/05/17 10:15	
Chromium	**11**	1.0	0.12	1	B7D0065	04/04/2017	04/05/17 10:15	
Cobalt	**3.9**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Copper	**5.7**	2.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:15	
Lead	**2.3**	1.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:15	
Molybdenum	ND	1.0	0.13	1	B7D0065	04/04/2017	04/05/17 10:15	
Nickel	**7.8**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Selenium	ND	1.0	0.88	1	B7D0065	04/04/2017	04/05/17 10:15	
Silver	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:15	
Thallium	ND	1.0	0.42	1	B7D0065	04/04/2017	04/05/17 10:15	
Vanadium	**13**	1.0	0.19	1	B7D0065	04/04/2017	04/05/17 10:15	
Zinc	**10**	1.0	0.18	1	B7D0065	04/04/2017	04/05/17 10:15	

TCLP Metals by ICP-AES EPA 6010B — **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.50	0.011	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Arsenic	ND	0.25	0.033	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Barium	**0.30**	0.25	0.0040	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Beryllium	ND	0.25	0.0022	5	B7D0101	04/05/2017	04/05/17 18:23	D1

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

TCLP Metals by ICP-AES EPA 6010B **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Cadmium	**0.0008**	0.25	0.0008	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Chromium	**0.013**	0.25	0.0082	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Cobalt	**0.012**	0.25	0.0036	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Copper	ND	0.25	0.011	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Lead	ND	0.25	0.014	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Molybdenum	ND	0.25	0.0034	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Nickel	**0.016**	0.25	0.012	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Selenium	ND	0.25	0.017	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Silver	ND	0.25	0.0031	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Thallium	ND	0.25	0.013	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Vanadium	ND	0.25	0.0056	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Zinc	**0.087**	0.25	0.010	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J

STLC Metals by ICP-AES by EPA 6010B **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	0.043	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Arsenic	ND	1.0	0.13	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Barium	**0.93**	1.0	0.016	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Beryllium	ND	1.0	0.0090	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Cadmium	ND	1.0	0.0030	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Chromium	**0.081**	1.0	0.033	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Cobalt	**0.11**	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Copper	**0.11**	1.0	0.046	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Lead	**0.099**	1.0	0.057	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Molybdenum	ND	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Nickel	**0.16**	1.0	0.048	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Selenium	ND	1.0	0.068	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Silver	**0.018**	1.0	0.012	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Thallium	**0.063**	1.0	0.051	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Vanadium	**0.17**	1.0	0.022	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Zinc	**0.28**	1.0	0.041	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Hexavalent Chromium by EPA 7196A/3060A

Analyst: LV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Hexavalent Chromium	ND	1.0	0.30	1	B7D0186	04/07/2017	04/07/17 16:31	

Mercury by AA (Cold Vapor) EPA 7471A

Analyst: KEK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.04**	0.10	0.02	1	B7D0067	04/04/2017	04/05/17 11:14	J

STLC Mercury by AA (Cold Vapor) EPA 7470A

Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	1.0	0.67	1	B7D0117	04/05/2017	04/06/17 12:28	

TCLP Mercury by AA (Cold Vapor) by EPA 7470A

Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	0.13	1	B7D0104	04/05/2017	04/06/17 10:56	

Hydrocarbon Chain Distribution by EPA 8015B (Modified)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
C8-C10	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C10-C18	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C18-C28	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C28-C36	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C36-C40	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C8-C40 Total	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
Surrogate: p-Terphenyl	*101 %*	*47 - 157*			B7C1043	03/31/2017	*04/03/17 10:45*	

Polychlorinated Biphenyls by EPA 8082

Analyst: RL

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1016	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4

Lab ID: 1701344-01

Polychlorinated Biphenyls by EPA 8082 **Analyst: RL**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1221	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1232	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1242	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1248	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1254	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1260	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1262	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1268	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Surrogate: Decachlorobiphenyl	*93.9 %*		*26 - 137*		B7C1049	03/31/2017	*03/31/17 12:22*	
Surrogate: Tetrachloro-m-xylene	*87.3 %*		*28 - 102*		B7C1049	03/31/2017	*03/31/17 12:22*	

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,2,4-Trichlorobenzene	ND	330	71	1	B7D0044	04/03/2017	04/04/17 01:46	
1,2-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
1,3-Dichlorobenzene	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	
1,4-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4,5-Trichlorophenol	ND	330	61	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4,6-Trichlorophenol	ND	330	220	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dichlorophenol	ND	1600	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dimethylphenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dinitrophenol	ND	1600	86	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dinitrotoluene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
2,6-Dinitrotoluene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Chloronaphthalene	ND	330	59	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Chlorophenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Methylnaphthalene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Methylphenol	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Nitroaniline	ND	1600	200	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Nitrophenol	ND	330	110	1	B7D0044	04/03/2017	04/04/17 01:46	
3,3´-Dichlorobenzidine	ND	660	280	1	B7D0044	04/03/2017	04/04/17 01:46	
3-Nitroaniline	ND	1600	44	1	B7D0044	04/03/2017	04/04/17 01:46	
4,6-Dinitro-2-methyphenol	ND	1600	300	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Bromophenyl-phenylether	ND	330	50	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Chloro-3-methylphenol	ND	660	110	1	B7D0044	04/03/2017	04/04/17 01:46	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4

Lab ID: 1701344-01

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
4-Chloroaniline	ND	660	53	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Chlorophenyl-phenylether	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Methylphenol	ND	330	66	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Nitroaniline	ND	1600	290	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Nitrophenol	ND	330	150	1	B7D0044	04/03/2017	04/04/17 01:46	
Acenaphthene	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Acenaphthylene	ND	330	51	1	B7D0044	04/03/2017	04/04/17 01:46	
Anthracene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzidine (M)	ND	1600	1400	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(a)anthracene	ND	330	39	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(a)pyrene	ND	330	45	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(b)fluoranthene	ND	330	55	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(g,h,i)perylene	ND	330	38	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(k)fluoranthene	ND	330	52	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzoic acid	ND	1600	890	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzyl alcohol	ND	660	67	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-chloroethoxy)methane	ND	330	59	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-Chloroethyl)ether	ND	330	57	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-chloroisopropyl)ether	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-ethylhexyl)phthalate	ND	330	83	1	B7D0044	04/03/2017	04/04/17 01:46	
Butylbenzylphthalate	ND	330	250	1	B7D0044	04/03/2017	04/04/17 01:46	
Chrysene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 01:46	
Di-n-butylphthalate	ND	330	230	1	B7D0044	04/03/2017	04/04/17 01:46	
Di-n-octylphthalate	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Dibenz(a,h)anthracene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 01:46	
Dibenzofuran	ND	330	55	1	B7D0044	04/03/2017	04/04/17 01:46	
Diethyl phthalate	ND	330	47	1	B7D0044	04/03/2017	04/04/17 01:46	
Dimethyl phthalate	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
Fluoranthene	ND	330	47	1	B7D0044	04/03/2017	04/04/17 01:46	
Fluorene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorobenzene	ND	330	41	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorobutadiene	ND	660	61	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorocyclopentadiene	ND	660	64	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachloroethane	ND	330	71	1	B7D0044	04/03/2017	04/04/17 01:46	
Indeno(1,2,3-cd)pyrene	ND	330	44	1	B7D0044	04/03/2017	04/04/17 01:46	
Isophorone	ND	330	57	1	B7D0044	04/03/2017	04/04/17 01:46	
N-Nitroso-di-n propylamine	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4

Lab ID: 1701344-01

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
N-Nitrosodiphenylamine	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Naphthalene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
Nitrobenzene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
Pentachlorophenol	ND	1600	190	1	B7D0044	04/03/2017	04/04/17 01:46	
Phenanthrene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
Phenol	ND	330	130	1	B7D0044	04/03/2017	04/04/17 01:46	
Pyrene	ND	330	53	1	B7D0044	04/03/2017	04/04/17 01:46	
Pyridine	ND	1600	270	1	B7D0044	04/03/2017	04/04/17 01:46	
Surrogate: 1,2-Dichlorobenzene-d4	*44.6 %*	*22 - 107*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2,4,6-Tribromophenol	*65.1 %*	*12 - 129*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Chlorophenol-d4	*44.8 %*	*34 - 102*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Fluorobiphenyl	*54.1 %*	*25 - 116*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Fluorophenol	*39.1 %*	*32 - 101*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 4-Terphenyl-d14	*82.5 %*	*34 - 125*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: Nitrobenzene-d5	*38.3 %*	*30 - 115*			B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: Phenol-d5	*40.5 %*	*34 - 104*			B7D0044	04/03/2017	*04/04/17 01:46*	

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Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Percent Moisture
Analyst: BL

Analyte	Result (% by Weight)	PQL (% by Weight)	MDL (% by Weight)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Percent Moisture	**15**	0.10	0.10	1	B7D0096	04/04/2017	04/05/17 08:45	

Total Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aluminum	**1700**	25	2.9	1	B7D0065	04/04/2017	04/05/17 10:18	

Title 22 Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	**0.39**	2.0	0.32	1	B7D0065	04/04/2017	04/05/17 10:18	J
Arsenic	**3.0**	1.0	0.70	1	B7D0065	04/04/2017	04/05/17 10:18	
Barium	**11**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Beryllium	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:18	
Cadmium	ND	1.0	0.09	1	B7D0065	04/04/2017	04/05/17 10:18	
Chromium	**8.5**	1.0	0.12	1	B7D0065	04/04/2017	04/05/17 10:18	
Cobalt	**2.4**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Copper	**3.9**	2.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:18	
Lead	**1.9**	1.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:18	
Molybdenum	ND	1.0	0.13	1	B7D0065	04/04/2017	04/05/17 10:18	
Nickel	**5.1**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Selenium	ND	1.0	0.88	1	B7D0065	04/04/2017	04/05/17 10:18	
Silver	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:18	
Thallium	ND	1.0	0.42	1	B7D0065	04/04/2017	04/05/17 10:18	
Vanadium	**9.3**	1.0	0.19	1	B7D0065	04/04/2017	04/05/17 10:18	
Zinc	**7.0**	1.0	0.18	1	B7D0065	04/04/2017	04/05/17 10:18	

TCLP Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.50	0.011	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Arsenic	ND	0.25	0.033	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Barium	**0.23**	0.25	0.0040	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J
Beryllium	ND	0.25	0.0022	5	B7D0101	04/05/2017	04/05/17 18:25	D1

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Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8

Lab ID: 1701344-02

TCLP Metals by ICP-AES EPA 6010B **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Cadmium	ND	0.25	0.0008	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Chromium	ND	0.25	0.0082	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Cobalt	**0.0094**	0.25	0.0036	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J
Copper	ND	0.25	0.011	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Lead	ND	0.25	0.014	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Molybdenum	ND	0.25	0.0034	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Nickel	ND	0.25	0.012	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Selenium	ND	0.25	0.017	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Silver	ND	0.25	0.0031	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Thallium	ND	0.25	0.013	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Vanadium	ND	0.25	0.0056	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Zinc	**0.062**	0.25	0.010	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J

STLC Metals by ICP-AES by EPA 6010B **Analyst: GO**

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	0.043	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Arsenic	ND	1.0	0.13	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Barium	**0.77**	1.0	0.016	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Beryllium	ND	1.0	0.0090	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Cadmium	ND	1.0	0.0030	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Chromium	ND	1.0	0.033	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Cobalt	**0.11**	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Copper	**0.069**	1.0	0.046	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Lead	ND	1.0	0.057	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Molybdenum	ND	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Nickel	**0.12**	1.0	0.048	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Selenium	ND	1.0	0.068	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Silver	ND	1.0	0.012	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Thallium	ND	1.0	0.051	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Vanadium	**0.096**	1.0	0.022	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Zinc	**0.22**	1.0	0.041	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J

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Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Hexavalent Chromium by EPA 7196A/3060A
Analyst: LV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Hexavalent Chromium	ND	1.0	0.30	1	B7D0186	04/07/2017	04/07/17 16:31	

Mercury by AA (Cold Vapor) EPA 7471A
Analyst: KEK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.02**	0.10	0.02	1	B7D0067	04/04/2017	04/05/17 11:16	J

STLC Mercury by AA (Cold Vapor) EPA 7470A
Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	1.0	0.67	1	B7D0117	04/05/2017	04/06/17 12:38	

TCLP Mercury by AA (Cold Vapor) by EPA 7470A
Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	0.13	1	B7D0104	04/05/2017	04/06/17 11:05	

Hydrocarbon Chain Distribution by EPA 8015B (Modified)
Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
C8-C10	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C10-C18	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C18-C28	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C28-C36	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C36-C40	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C8-C40 Total	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
Surrogate: p-Terphenyl	*105 %*	*47 - 157*			B7C1043	03/31/2017	*04/03/17 11:02*	

Polychlorinated Biphenyls by EPA 8082
Analyst: RL

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1016	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Polychlorinated Biphenyls by EPA 8082 **Analyst: RL**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1221	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1232	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1242	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1248	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1254	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1260	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1262	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1268	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Surrogate: Decachlorobiphenyl	*89.3 %*		*26 - 137*		B7C1049	03/31/2017	*03/31/17 12:41*	
Surrogate: Tetrachloro-m-xylene	*86.7 %*		*28 - 102*		B7C1049	03/31/2017	*03/31/17 12:41*	

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,2,4-Trichlorobenzene	ND	330	71	1	B7D0044	04/03/2017	04/04/17 02:13	
1,2-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
1,3-Dichlorobenzene	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	
1,4-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4,5-Trichlorophenol	ND	330	61	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4,6-Trichlorophenol	ND	330	220	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dichlorophenol	ND	1600	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dimethylphenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dinitrophenol	ND	1600	86	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dinitrotoluene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
2,6-Dinitrotoluene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Chloronaphthalene	ND	330	59	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Chlorophenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Methylnaphthalene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Methylphenol	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Nitroaniline	ND	1600	200	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Nitrophenol	ND	330	110	1	B7D0044	04/03/2017	04/04/17 02:13	
3,3´-Dichlorobenzidine	ND	660	280	1	B7D0044	04/03/2017	04/04/17 02:13	
3-Nitroaniline	ND	1600	44	1	B7D0044	04/03/2017	04/04/17 02:13	
4,6-Dinitro-2-methyphenol	ND	1600	300	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Bromophenyl-phenylether	ND	330	50	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Chloro-3-methylphenol	ND	660	110	1	B7D0044	04/03/2017	04/04/17 02:13	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8

Lab ID: 1701344-02

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
4-Chloroaniline	ND	660	53	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Chlorophenyl-phenylether	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Methylphenol	ND	330	66	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Nitroaniline	ND	1600	290	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Nitrophenol	ND	330	150	1	B7D0044	04/03/2017	04/04/17 02:13	
Acenaphthene	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Acenaphthylene	ND	330	51	1	B7D0044	04/03/2017	04/04/17 02:13	
Anthracene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzidine (M)	ND	1600	1400	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(a)anthracene	ND	330	39	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(a)pyrene	ND	330	45	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(b)fluoranthene	ND	330	55	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(g,h,i)perylene	ND	330	38	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(k)fluoranthene	ND	330	52	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzoic acid	ND	1600	890	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzyl alcohol	ND	660	67	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-chloroethoxy)methane	ND	330	59	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-Chloroethyl)ether	ND	330	57	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-chloroisopropyl)ether	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-ethylhexyl)phthalate	ND	330	83	1	B7D0044	04/03/2017	04/04/17 02:13	
Butylbenzylphthalate	ND	330	250	1	B7D0044	04/03/2017	04/04/17 02:13	
Chrysene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 02:13	
Di-n-butylphthalate	ND	330	230	1	B7D0044	04/03/2017	04/04/17 02:13	
Di-n-octylphthalate	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Dibenz(a,h)anthracene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 02:13	
Dibenzofuran	ND	330	55	1	B7D0044	04/03/2017	04/04/17 02:13	
Diethyl phthalate	ND	330	47	1	B7D0044	04/03/2017	04/04/17 02:13	
Dimethyl phthalate	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
Fluoranthene	ND	330	47	1	B7D0044	04/03/2017	04/04/17 02:13	
Fluorene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorobenzene	ND	330	41	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorobutadiene	ND	660	61	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorocyclopentadiene	ND	660	64	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachloroethane	ND	330	71	1	B7D0044	04/03/2017	04/04/17 02:13	
Indeno(1,2,3-cd)pyrene	ND	330	44	1	B7D0044	04/03/2017	04/04/17 02:13	
Isophorone	ND	330	57	1	B7D0044	04/03/2017	04/04/17 02:13	
N-Nitroso-di-n propylamine	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

Client Sample ID HD-SS-5-8

Lab ID: 1701344-02

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
N-Nitrosodiphenylamine	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Naphthalene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
Nitrobenzene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
Pentachlorophenol	ND	1600	190	1	B7D0044	04/03/2017	04/04/17 02:13	
Phenanthrene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
Phenol	ND	330	130	1	B7D0044	04/03/2017	04/04/17 02:13	
Pyrene	ND	330	53	1	B7D0044	04/03/2017	04/04/17 02:13	
Pyridine	ND	1600	270	1	B7D0044	04/03/2017	04/04/17 02:13	
Surrogate: 1,2-Dichlorobenzene-d4	*58.1 %*	*22 - 107*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2,4,6-Tribromophenol	*72.1 %*	*12 - 129*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Chlorophenol-d4	*58.6 %*	*34 - 102*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Fluorobiphenyl	*65.0 %*	*25 - 116*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Fluorophenol	*51.0 %*	*32 - 101*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 4-Terphenyl-d14	*87.3 %*	*34 - 125*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: Nitrobenzene-d5	*50.0 %*	*30 - 115*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: Phenol-d5	*51.8 %*	*34 - 104*			B7D0044	04/03/2017	*04/04/17 02:13*	

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Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
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QUALITY CONTROL SECTION

Percent Moisture - Quality Control

Analyte	Result % by Weight	PQL % by Weight	MDL % by Weight	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0096 - No_Prep_WC1_S										
Duplicate (B7D0096-DUP1)			**Source: 1701378-48**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Percent Moisture	17.0407	0.10	0.10		16.5787			2.75	30	

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Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S										
Blank (B7D0065-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	ND	25	2.9							
LCS (B7D0065-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	935.432	25	2.9	1000.00		93.5	80 - 120			
Matrix Spike (B7D0065-MS1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	4179.73	25	2.9	1000.00	2510.67	167	0 - 256			
Matrix Spike Dup (B7D0065-MSD1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	4212.62	25	2.9	1000.00	2510.67	170	0 - 256	0.784	20	

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Title 22 Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S										
Blank (B7D0065-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	ND	2.0	0.32							
Arsenic	ND	1.0	0.70							
Barium	ND	1.0	0.10							
Beryllium	ND	1.0	0.04							
Cadmium	ND	1.0	0.09							
Chromium	ND	1.0	0.12							
Cobalt	ND	1.0	0.10							
Copper	ND	2.0	0.11							
Lead	0.295674	1.0	0.11							J
Molybdenum	ND	1.0	0.13							
Nickel	ND	1.0	0.10							
Selenium	ND	1.0	0.88							
Silver	ND	1.0	0.04							
Thallium	ND	1.0	0.42							
Vanadium	ND	1.0	0.19							
Zinc	ND	1.0	0.18							
LCS (B7D0065-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	45.6765	2.0	0.32	50.0000		91.4	80 - 120			
Arsenic	44.7096	1.0	0.70	50.0000		89.4	80 - 120			
Barium	48.3258	1.0	0.10	50.0000		96.7	80 - 120			
Beryllium	45.9726	1.0	0.04	50.0000		91.9	80 - 120			
Cadmium	45.1568	1.0	0.09	50.0000		90.3	80 - 120			
Chromium	48.3751	1.0	0.12	50.0000		96.8	80 - 120			
Cobalt	47.5870	1.0	0.10	50.0000		95.2	80 - 120			
Copper	48.3351	2.0	0.11	50.0000		96.7	80 - 120			
Lead	45.7866	1.0	0.11	50.0000		91.6	80 - 120			
Molybdenum	45.7345	1.0	0.13	50.0000		91.5	80 - 120			
Nickel	48.2670	1.0	0.10	50.0000		96.5	80 - 120			
Selenium	43.8344	1.0	0.88	50.0000		87.7	80 - 120			
Silver	47.1694	1.0	0.04	50.0000		94.3	80 - 120			
Thallium	46.8958	1.0	0.42	50.0000		93.8	80 - 120			
Vanadium	48.0524	1.0	0.19	50.0000		96.1	80 - 120			
Zinc	44.0427	1.0	0.18	50.0000		88.1	80 - 120			
Matrix Spike (B7D0065-MS1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	94.7916	2.0	0.32	125.000	0.430838	75.5	34 - 103			
Arsenic	99.9034	1.0	0.70	125.000	2.71269	77.8	59 - 103			
Barium	125.834	1.0	0.10	125.000	16.2192	87.7	30 - 134			
Beryllium	101.406	1.0	0.04	125.000	ND	81.1	62 - 105			
Cadmium	98.9064	1.0	0.09	125.000	ND	79.1	53 - 102			
Chromium	121.696	1.0	0.12	125.000	11.1892	88.4	51 - 111			

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Title 22 Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S (continued)										
Matrix Spike (B7D0065-MS1) - Continued			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Cobalt	100.965	1.0	0.10	125.000	3.85307	77.7	55 - 105			
Copper	115.870	2.0	0.11	125.000	5.69214	88.1	53 - 126			
Lead	104.715	1.0	0.11	125.000	2.25476	82.0	34 - 129			
Molybdenum	96.3304	1.0	0.13	125.000	ND	77.1	57 - 105			
Nickel	108.170	1.0	0.10	125.000	7.80796	80.3	49 - 109			
Selenium	96.8726	1.0	0.88	125.000	ND	77.5	57 - 99			
Silver	104.231	1.0	0.04	125.000	ND	83.4	64 - 105			
Thallium	99.3931	1.0	0.42	125.000	ND	79.5	46 - 105			
Vanadium	123.571	1.0	0.19	125.000	13.1716	88.3	60 - 109			
Zinc	107.197	1.0	0.18	125.000	10.1497	77.6	29 - 122			
Matrix Spike Dup (B7D0065-MSD1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	96.2474	2.0	0.32	125.000	0.430838	76.7	34 - 103	1.52	20	
Arsenic	101.601	1.0	0.70	125.000	2.71269	79.1	59 - 103	1.69	20	
Barium	130.328	1.0	0.10	125.000	16.2192	91.3	30 - 134	3.51	20	
Beryllium	103.615	1.0	0.04	125.000	ND	82.9	62 - 105	2.16	20	
Cadmium	101.696	1.0	0.09	125.000	ND	81.4	53 - 102	2.78	20	
Chromium	131.130	1.0	0.12	125.000	11.1892	96.0	51 - 111	7.46	20	
Cobalt	104.713	1.0	0.10	125.000	3.85307	80.7	55 - 105	3.64	20	
Copper	124.350	2.0	0.11	125.000	5.69214	94.9	53 - 126	7.06	20	
Lead	106.246	1.0	0.11	125.000	2.25476	83.2	34 - 129	1.45	20	
Molybdenum	98.3335	1.0	0.13	125.000	ND	78.7	57 - 105	2.06	20	
Nickel	113.129	1.0	0.10	125.000	7.80796	84.3	49 - 109	4.48	20	
Selenium	96.9952	1.0	0.88	125.000	ND	77.6	57 - 99	0.126	20	
Silver	106.747	1.0	0.04	125.000	ND	85.4	64 - 105	2.39	20	
Thallium	100.058	1.0	0.42	125.000	ND	80.0	46 - 105	0.666	20	
Vanadium	133.509	1.0	0.19	125.000	13.1716	96.3	60 - 109	7.73	20	
Zinc	112.302	1.0	0.18	125.000	10.1497	81.7	29 - 122	4.65	20	

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TCLP Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S										
Blank (B7D0101-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Antimony	ND	0.10	0.0021							
Arsenic	ND	0.050	0.0067							
Barium	ND	0.050	0.0008							
Beryllium	ND	0.050	0.0004							
Cadmium	ND	0.050	0.0002							
Chromium	ND	0.050	0.0016							
Cobalt	ND	0.050	0.0007							
Copper	ND	0.050	0.0023							
Lead	ND	0.050	0.0028							
Molybdenum	ND	0.050	0.0007							
Nickel	ND	0.050	0.0024							
Selenium	ND	0.050	0.0034							
Silver	ND	0.050	0.0006							
Thallium	0.003550	0.050	0.0026							J
Vanadium	ND	0.050	0.0011							
Zinc	2.7952E-3	0.050	0.0021							J
Blank (B7D0101-BLK2)					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.10	0.0021							
Arsenic	ND	0.050	0.0067							
Barium	0.000847	0.050	0.0008							J
Beryllium	ND	0.050	0.0004							
Cadmium	ND	0.050	0.0002							
Chromium	ND	0.050	0.0016							
Cobalt	0.001349	0.050	0.0007							J
Copper	ND	0.050	0.0023							
Lead	3.0343E-3	0.050	0.0028							J
Molybdenum	ND	0.050	0.0007							
Nickel	ND	0.050	0.0024							
Selenium	0.004733	0.050	0.0034							J
Silver	ND	0.050	0.0006							
Thallium	ND	0.050	0.0026							
Vanadium	ND	0.050	0.0011							
Zinc	0.048844	0.050	0.0021							J
LCS (B7D0101-BS1)					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	0.877537	0.10	0.0021	1.00000		87.8	80 - 120			
Arsenic	0.890416	0.050	0.0067	1.00000		89.0	80 - 120			
Barium	0.957112	0.050	0.0008	1.00000		95.7	80 - 120			
Beryllium	0.926064	0.050	0.0004	1.00000		92.6	80 - 120			
Cadmium	0.887194	0.050	0.0002	1.00000		88.7	80 - 120			
Chromium	0.942946	0.050	0.0016	1.00000		94.3	80 - 120			

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TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S (continued)										
LCS (B7D0101-BS1) - Continued					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Cobalt	0.935314	0.050	0.0007	1.00000		93.5	80 - 120			
Copper	0.945332	0.050	0.0023	1.00000		94.5	80 - 120			
Lead	0.887995	0.050	0.0028	1.00000		88.8	80 - 120			
Molybdenum	0.900678	0.050	0.0007	1.00000		90.1	80 - 120			
Nickel	0.903059	0.050	0.0024	1.00000		90.3	80 - 120			
Selenium	0.868501	0.050	0.0034	1.00000		86.9	80 - 120			
Silver	0.945697	0.050	0.0006	1.00000		94.6	80 - 120			
Thallium	0.927058	0.050	0.0026	1.00000		92.7	80 - 120			
Vanadium	0.938949	0.050	0.0011	1.00000		93.9	80 - 120			
Zinc	0.879988	0.050	0.0021	1.00000		88.0	80 - 120			
Duplicate (B7D0101-DUP1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.50	0.011		ND			NR	20	
Arsenic	ND	0.25	0.033		ND			NR	20	
Barium	0.701242	0.25	0.0040		0.632801			10.3	20	
Beryllium	ND	0.25	0.0022		ND			NR	20	
Cadmium	0.003651	0.25	0.0008		0.004074			11.0	20	J
Chromium	0.009419	0.25	0.0082		8.4779E-3			10.5	20	J
Cobalt	0.008144	0.25	0.0036		0.007607			6.81	20	J
Copper	0.048419	0.25	0.011		0.041762			14.8	20	J
Lead	0.041521	0.25	0.014		0.043901			5.57	20	J
Molybdenum	ND	0.25	0.0034		ND			NR	20	
Nickel	0.014367	0.25	0.012		ND			NR	20	J
Selenium	ND	0.25	0.017		0.025140			NR	20	
Silver	ND	0.25	0.0031		ND			NR	20	
Thallium	ND	0.25	0.013		ND			NR	20	
Vanadium	0.011755	0.25	0.0056		0.011783			0.241	20	J
Zinc	1.17649	0.25	0.010		1.08018			8.54	20	
Duplicate (B7D0101-DUP2)			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.50	0.011		ND			NR	20	
Arsenic	ND	0.25	0.033		ND			NR	20	
Barium	0.690250	0.25	0.0040		0.664084			3.86	20	
Beryllium	ND	0.25	0.0022		ND			NR	20	
Cadmium	0.005997	0.25	0.0008		0.004592			26.5	20	R, J
Chromium	0.045520	0.25	0.0082		0.048918			7.20	20	J
Cobalt	0.016187	0.25	0.0036		0.008873			58.4	20	R, J
Copper	0.082036	0.25	0.011		0.089933			9.18	20	J
Lead	0.157194	0.25	0.014		0.168966			7.22	20	J
Molybdenum	ND	0.25	0.0034		ND			NR	20	
Nickel	0.026704	0.25	0.012		0.028330			5.91	20	J
Selenium	ND	0.25	0.017		0.018021			NR	20	

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TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S (continued)										
Duplicate (B7D0101-DUP2) - Continued			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Silver	ND	0.25	0.0031		ND			NR	20	
Thallium	ND	0.25	0.013		ND			NR	20	
Vanadium	0.032269	0.25	0.0056		0.025254			24.4	20	R, J
Zinc	1.42586	0.25	0.010		1.46978			3.03	20	
Matrix Spike (B7D0101-MS1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	2.23725	0.50	0.011	2.50000	ND	89.5	76 - 118			
Arsenic	2.37185	0.25	0.033	2.50000	ND	94.9	74 - 123			
Barium	3.15683	0.25	0.0040	2.50000	0.632801	101	76 - 117			
Beryllium	2.33279	0.25	0.0022	2.50000	ND	93.3	84 - 114			
Cadmium	2.37203	0.25	0.0008	2.50000	0.004074	94.7	73 - 115			
Chromium	2.41100	0.25	0.0082	2.50000	8.4779E-3	96.1	76 - 117			
Cobalt	2.23307	0.25	0.0036	2.50000	0.007607	89.0	78 - 113			
Copper	2.43788	0.25	0.011	2.50000	0.041762	95.8	70 - 132			
Lead	2.34773	0.25	0.014	2.50000	0.043901	92.2	78 - 109			
Molybdenum	2.27022	0.25	0.0034	2.50000	ND	90.8	84 - 111			
Nickel	2.32620	0.25	0.012	2.50000	ND	93.0	66 - 125			
Selenium	2.36662	0.25	0.017	2.50000	0.025140	93.7	76 - 117			
Silver	2.43570	0.25	0.0031	2.50000	ND	97.4	64 - 133			
Thallium	2.27173	0.25	0.013	2.50000	ND	90.9	63 - 118			
Vanadium	2.42603	0.25	0.0056	2.50000	0.011783	96.6	76 - 119			
Zinc	3.44803	0.25	0.010	2.50000	1.08018	94.7	56 - 131			
Matrix Spike (B7D0101-MS2)			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	2.13711	0.50	0.011	2.50000	ND	85.5	76 - 118			
Arsenic	2.25333	0.25	0.033	2.50000	ND	90.1	74 - 123			
Barium	3.00116	0.25	0.0040	2.50000	0.664084	93.5	76 - 117			
Beryllium	2.21807	0.25	0.0022	2.50000	ND	88.7	84 - 114			
Cadmium	2.17569	0.25	0.0008	2.50000	0.004592	86.8	73 - 115			
Chromium	2.28514	0.25	0.0082	2.50000	0.048918	89.4	76 - 117			
Cobalt	2.13008	0.25	0.0036	2.50000	0.008873	84.8	78 - 113			
Copper	2.32860	0.25	0.011	2.50000	0.089933	89.5	70 - 132			
Lead	2.35472	0.25	0.014	2.50000	0.168966	87.4	78 - 109			
Molybdenum	2.12916	0.25	0.0034	2.50000	ND	85.2	84 - 111			
Nickel	2.17806	0.25	0.012	2.50000	0.028330	86.0	66 - 125			
Selenium	2.24266	0.25	0.017	2.50000	0.018021	89.0	76 - 117			
Silver	2.26939	0.25	0.0031	2.50000	ND	90.8	64 - 133			
Thallium	2.17857	0.25	0.013	2.50000	ND	87.1	63 - 118			
Vanadium	2.26794	0.25	0.0056	2.50000	0.025254	89.7	76 - 119			
Zinc	3.56060	0.25	0.010	2.50000	1.46978	83.6	56 - 131			
Matrix Spike Dup (B7D0101-MSD1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					

TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Batch B7D0101 - EPA 3010A_S (continued)

Matrix Spike Dup (B7D0101-MSD1) - Continued **Source: 1701285-11** Prepared: 4/5/2017 Analyzed: 4/5/2017

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Antimony	2.23153	0.50	0.011	2.50000	ND	89.3	76 - 118	0.256	20	
Arsenic	2.37364	0.25	0.033	2.50000	ND	94.9	74 - 123	0.0755	20	
Barium	3.13436	0.25	0.0040	2.50000	0.632801	100	76 - 117	0.714	20	
Beryllium	2.35294	0.25	0.0022	2.50000	ND	94.1	84 - 114	0.860	20	
Cadmium	2.36156	0.25	0.0008	2.50000	0.004074	94.3	73 - 115	0.443	20	
Chromium	2.41288	0.25	0.0082	2.50000	8.4779E-3	96.2	76 - 117	0.0777	20	
Cobalt	2.23208	0.25	0.0036	2.50000	0.007607	89.0	78 - 113	0.0442	20	
Copper	2.44283	0.25	0.011	2.50000	0.041762	96.0	70 - 132	0.203	20	
Lead	2.35137	0.25	0.014	2.50000	0.043901	92.3	78 - 109	0.155	20	
Molybdenum	2.27123	0.25	0.0034	2.50000	ND	90.8	84 - 111	0.0443	20	
Nickel	2.32229	0.25	0.012	2.50000	ND	92.9	66 - 125	0.168	20	
Selenium	2.34901	0.25	0.017	2.50000	0.025140	93.0	76 - 117	0.747	20	
Silver	2.44514	0.25	0.0031	2.50000	ND	97.8	64 - 133	0.387	20	
Thallium	2.28912	0.25	0.013	2.50000	ND	91.6	63 - 118	0.762	20	
Vanadium	2.42256	0.25	0.0056	2.50000	0.011783	96.4	76 - 119	0.143	20	
Zinc	3.40212	0.25	0.010	2.50000	1.08018	92.9	56 - 131	1.34	20	

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STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction										
Blank (B7C1078-BLK1)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.050151	2.0	0.043							J
Arsenic	ND	1.0	0.13							
Barium	ND	1.0	0.016							
Beryllium	ND	1.0	0.0090							
Cadmium	ND	1.0	0.0030							
Chromium	ND	1.0	0.033							
Cobalt	ND	1.0	0.014							
Copper	ND	1.0	0.046							
Lead	ND	1.0	0.057							
Molybdenum	ND	1.0	0.014							
Nickel	0.063914	1.0	0.048							J
Selenium	ND	1.0	0.068							
Silver	0.013944	1.0	0.012							J
Thallium	ND	1.0	0.051							
Vanadium	0.040634	1.0	0.022							J
Zinc	0.122525	1.0	0.041							J
Blank (B7C1078-BLK2)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.059868	2.0	0.043							J
Arsenic	ND	1.0	0.13							
Barium	ND	1.0	0.016							
Beryllium	ND	1.0	0.0090							
Cadmium	ND	1.0	0.0030							
Chromium	ND	1.0	0.033							
Cobalt	ND	1.0	0.014							
Copper	ND	1.0	0.046							
Lead	ND	1.0	0.057							
Molybdenum	ND	1.0	0.014							
Nickel	0.067941	1.0	0.048							J
Selenium	ND	1.0	0.068							
Silver	ND	1.0	0.012							
Thallium	0.060929	1.0	0.051							J
Vanadium	ND	1.0	0.022							
Zinc	0.078381	1.0	0.041							J
LCS (B7C1078-BS1)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	1.82798			2.00000		91.4	80 - 120			
Arsenic	1.98034			2.00000		99.0	80 - 120			
Barium	1.88523			2.00000		94.3	80 - 120			
Beryllium	1.73779			2.00000		86.9	80 - 120			
Cadmium	1.84265			2.00000		92.1	80 - 120			
Chromium	1.86322			2.00000		93.2	80 - 120			

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STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)		Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction (continued)										
LCS (B7C1078-BS1) - Continued					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Cobalt	1.88571			2.00000		94.3	80 - 120			
Copper	1.84467			2.00000		92.2	80 - 120			
Lead	1.85836			2.00000		92.9	80 - 120			
Molybdenum	1.78079			2.00000		89.0	80 - 120			
Nickel	1.91425			2.00000		95.7	80 - 120			
Selenium	1.89227			2.00000		94.6	80 - 120			
Silver	1.78646			2.00000		89.3	80 - 120			
Thallium	1.85673			2.00000		92.8	80 - 120			
Vanadium	1.93004			2.00000		96.5	80 - 120			
Zinc	2.04736			2.00000		102	80 - 120			
Duplicate (B7C1078-DUP1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	ND	2.0	0.043		ND			NR	20	
Arsenic	0.161800	1.0	0.13		ND			NR	20	J
Barium	4.92183	1.0	0.016		5.02878			2.15	20	
Beryllium	ND	1.0	0.0090		ND			NR	20	
Cadmium	ND	1.0	0.0030		ND			NR	20	
Chromium	0.078292	1.0	0.033		0.073157			6.78	20	J
Cobalt	0.145718	1.0	0.014		0.145591			0.0872	20	J
Copper	0.329341	1.0	0.046		0.325014			1.32	20	J
Lead	7.61916	1.0	0.057		7.64520			0.341	20	
Molybdenum	ND	1.0	0.014		ND			NR	20	
Nickel	0.262102	1.0	0.048		0.244437			6.97	20	J
Selenium	ND	1.0	0.068		ND			NR	20	
Silver	ND	1.0	0.012		ND			NR	20	
Thallium	0.058605	1.0	0.051		0.115567			65.4	20	R, J
Vanadium	0.123607	1.0	0.022		0.114256			7.86	20	J
Zinc	1.67097	1.0	0.041		1.65464			0.982	20	
Duplicate (B7C1078-DUP2)			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.088438	2.0	0.043		0.112024			23.5	20	R, J
Arsenic	0.143204	1.0	0.13		ND			NR	20	J
Barium	4.62679	1.0	0.016		4.44828			3.93	20	
Beryllium	ND	1.0	0.0090		ND			NR	20	
Cadmium	ND	1.0	0.0030		ND			NR	20	
Chromium	0.152154	1.0	0.033		0.125246			19.4	20	J
Cobalt	0.147372	1.0	0.014		0.152264			3.27	20	J
Copper	2.79652	1.0	0.046		2.67873			4.30	20	
Lead	4.88944	1.0	0.057		4.83917			1.03	20	
Molybdenum	0.074684	1.0	0.014		0.072496			2.97	20	J
Nickel	0.316865	1.0	0.048		0.311014			1.86	20	J
Selenium	ND	1.0	0.068		ND			NR	20	

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STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction (continued)										
Duplicate (B7C1078-DUP2) - Continued			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Silver	ND	1.0	0.012		ND			NR	20	
Thallium	0.098560	1.0	0.051		ND			NR	20	J
Vanadium	0.203791	1.0	0.022		0.192608			5.64	20	J
Zinc	21.9967	1.0	0.041		21.2374			3.51	20	
Matrix Spike (B7C1078-MS1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	2.34603			2.50000	-0.025343	93.8	88 - 107			
Arsenic	2.55466			2.50000	0.101013	98.1	90 - 110			
Barium	7.02859			2.50000	5.02878	80.0	62 - 113			
Beryllium	2.21040			2.50000	0.003286	88.3	74 - 118			
Cadmium	2.44139			2.50000	-3.1588E-3	97.7	74 - 121			
Chromium	2.37048			2.50000	0.073157	91.9	74 - 121			
Cobalt	2.40564			2.50000	0.145591	90.4	92 - 112			M1
Copper	2.52468			2.50000	0.325014	88.0	62 - 129			
Lead	9.27105			2.50000	7.64520	65.0	44 - 130			
Molybdenum	2.25636			2.50000	0.005667	90.0	76 - 123			
Nickel	2.53496			2.50000	0.244437	91.6	83 - 116			
Selenium	2.20189			2.50000	-0.107188	88.1	84 - 114			
Silver	1.84361			2.50000	0.005043	73.5	78 - 115			M1
Thallium	2.26490			2.50000	0.115567	86.0	67 - 123			
Vanadium	2.47731			2.50000	0.114256	94.5	86 - 109			
Zinc	3.94691			2.50000	1.65464	91.7	34 - 149			
Matrix Spike (B7C1078-MS2)			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	2.26085			2.50000	0.112024	86.0	88 - 107			M1
Arsenic	2.43135			2.50000	0.111184	92.8	90 - 110			
Barium	6.53784			2.50000	4.44828	83.6	62 - 113			
Beryllium	2.19160			2.50000	0.003797	87.5	74 - 118			
Cadmium	2.43835			2.50000	0.000232	97.5	74 - 121			
Chromium	2.40197			2.50000	0.125246	91.1	74 - 121			
Cobalt	2.38915			2.50000	0.152264	89.5	92 - 112			M1
Copper	4.73455			2.50000	2.67873	82.2	62 - 129			
Lead	6.72464			2.50000	4.83917	75.4	44 - 130			
Molybdenum	2.29002			2.50000	0.072496	88.7	76 - 123			
Nickel	2.56251			2.50000	0.311014	90.1	83 - 116			
Selenium	2.25139			2.50000	-0.116243	90.1	84 - 114			
Silver	2.23158			2.50000	-0.008342	89.3	78 - 115			
Thallium	2.23273			2.50000	-0.014281	89.3	67 - 123			
Vanadium	2.56846			2.50000	0.192608	95.0	86 - 109			
Zinc	22.2568			2.50000	21.2374	40.8	34 - 149			
Matrix Spike Dup (B7C1078-MSD1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					

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STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Batch B7C1078 - STLC_S Extraction (continued)

Matrix Spike Dup (B7C1078-MSD1) - Continued **Source: 1701046-IDRE1** Prepared: 4/2/2017 Analyzed: 4/3/2017

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Antimony	2.26470		2.50000	-0.025343	90.6	88 - 107	3.53	20	
Arsenic	2.47403		2.50000	0.101013	94.9	90 - 110	3.21	20	
Barium	7.23567		2.50000	5.02878	88.3	62 - 113	2.90	20	
Beryllium	2.26184		2.50000	0.003286	90.3	74 - 118	2.30	20	
Cadmium	2.36964		2.50000	-3.1588E-3	94.8	74 - 121	2.98	20	
Chromium	2.43216		2.50000	0.073157	94.4	74 - 121	2.57	20	
Cobalt	2.45051		2.50000	0.145591	92.2	92 - 112	1.85	20	
Copper	2.59431		2.50000	0.325014	90.8	62 - 129	2.72	20	
Lead	9.50332		2.50000	7.64520	74.3	44 - 130	2.47	20	
Molybdenum	2.30132		2.50000	0.005667	91.8	76 - 123	1.97	20	
Nickel	2.56762		2.50000	0.244437	92.9	83 - 116	1.28	20	
Selenium	2.32381		2.50000	-0.107188	93.0	84 - 114	5.39	20	
Silver	2.12041		2.50000	0.005043	84.6	78 - 115	14.0	20	
Thallium	2.30100		2.50000	0.115567	87.4	67 - 123	1.58	20	
Vanadium	2.53893		2.50000	0.114256	97.0	86 - 109	2.46	20	
Zinc	3.98240		2.50000	1.65464	93.1	34 - 149	0.895	20	

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Hexavalent Chromium by EPA 7196A/3060A - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0186 - EPA 3060A_S (WC)										
Blank (B7D0186-BLK1)					Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	ND	1.0	0.30							
LCS (B7D0186-BS1)					Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	47.4000	1.0	0.30	50.0000		94.8	80 - 120			
Matrix Spike (B7D0186-MS1)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	46.9000	1.0	0.30	50.0000	ND	93.8	75 - 125			
Matrix Spike (B7D0186-MS2)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	855.000	50	15	1608.00	ND	53.2	75 - 125			M2
Matrix Spike Dup (B7D0186-MSD1)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	48.0000	1.0	0.30	50.0000	ND	96.0	75 - 125	2.32	20	

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Mercury by AA (Cold Vapor) EPA 7471A - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0067 - EPA 7471_S										
Blank (B7D0067-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	ND	0.10	0.02							
LCS (B7D0067-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.804973	0.10	0.02	0.833333		96.6	80 - 120			
Matrix Spike (B7D0067-MS1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.896547	0.10	0.02	0.833333	0.017073	106	70 - 130			
Matrix Spike Dup (B7D0067-MSD1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.894267	0.10	0.02	0.833333	0.017073	105	70 - 130	0.255	20	
Post Spike (B7D0067-PS1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.005565			5.00000E-3	0.000205	107	85 - 115			

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STLC Mercury by AA (Cold Vapor) EPA 7470A - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0117 - EPA 245.1/7470_S										
Blank (B7D0117-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	ND	0.20	0.13							
LCS (B7D0117-BS1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.3773	0.20	0.13	10.0000		104	80 - 120			
Matrix Spike (B7D0117-MS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	48.1666	1.0	0.67	50.0000	ND	96.3	70 - 130			
Matrix Spike Dup (B7D0117-MSD1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	44.9584	1.0	0.67	50.0000	ND	89.9	70 - 130	6.89	20	
Post Spike (B7D0117-PS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	4.96628			5.00000	0.006231	99.2	85 - 115			

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TCLP Mercury by AA (Cold Vapor) by EPA 7470A - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0104 - EPA 245.1/7470_S										
Blank (B7D0104-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	ND	0.20	0.13							
LCS (B7D0104-BS1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	9.87486	0.20	0.13	10.0000		98.7	80 - 120			
Matrix Spike (B7D0104-MS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.2618	0.20	0.13	10.0000	ND	103	70 - 130			
Matrix Spike Dup (B7D0104-MSD1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.3470	0.20	0.13	10.0000	ND	103	70 - 130	0.827	20	
Post Spike (B7D0104-PS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	4.81955			5.00000	-6.5049E-3	96.4	85 - 115			

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Hydrocarbon Chain Distribution by EPA 8015B (Modified) - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1043 - GCSEMI_DRO_S										
Blank (B7C1043-BLK1)					Prepared: 3/31/2017 Analyzed: 4/3/2017					
C8-C10	ND	10	10							
C10-C18	ND	10	10							
C18-C28	ND	10	10							
C28-C36	ND	10	10							
C36-C40	ND	10	10							
C8-C40 Total	ND	10	10							
Surrogate: p-Terphenyl	*79.82*			*80.0000*		*99.8*	*47 - 157*			
LCS (B7C1043-BS1)					Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1188.25	10	10	1000.00		119	36 - 164			
Surrogate: p-Terphenyl	*79.34*			*80.0000*		*99.2*	*47 - 157*			
Matrix Spike (B7C1043-MS1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1177.06	10	10	1000.00	ND	118	21 - 179			
Surrogate: p-Terphenyl	*78.09*			*80.0000*		*97.6*	*47 - 157*			
Matrix Spike Dup (B7C1043-MSD1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1142.11	10	10	1000.00	ND	114	21 - 179	3.01	20	
Surrogate: p-Terphenyl	*76.51*			*80.0000*		*95.6*	*47 - 157*			

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Polychlorinated Biphenyls by EPA 8082 - Quality Control

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1049 - GCSEMI_PCB/PEST_S										
Blank (B7C1049-BLK1)					Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	ND	16	1.5							
Aroclor 1221	ND	16	1.5							
Aroclor 1232	ND	16	1.5							
Aroclor 1242	ND	16	1.5							
Aroclor 1248	ND	16	1.5							
Aroclor 1254	ND	16	1.5							
Aroclor 1260	ND	16	1.5							
Aroclor 1262	ND	16	1.5							
Aroclor 1268	ND	16	1.5							
Surrogate: Decachlorobiphenyl	*14.73*			*16.6667*		*88.4*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*14.26*			*16.6667*		*85.6*	*28 - 102*			
LCS (B7C1049-BS1)					Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	158.877	16	1.5	166.667		95.3	70 - 107			
Aroclor 1260	171.249	16	1.5	166.667		103	69 - 120			
Surrogate: Decachlorobiphenyl	*15.88*			*16.6667*		*95.3*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*16.84*			*16.6667*		*101*	*28 - 102*			
Matrix Spike (B7C1049-MS1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	143.238	16	1.5	166.667	ND	85.9	34 - 120			
Aroclor 1260	159.156	16	1.5	166.667	ND	95.5	39 - 128			
Surrogate: Decachlorobiphenyl	*14.83*			*16.6667*		*89.0*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*14.57*			*16.6667*		*87.4*	*28 - 102*			
Matrix Spike Dup (B7C1049-MSD1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	138.398	16	1.5	166.667	ND	83.0	34 - 120	3.44	20	
Aroclor 1260	154.396	16	1.5	166.667	ND	92.6	39 - 128	3.04	20	
Surrogate: Decachlorobiphenyl	*14.47*			*16.6667*		*86.8*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*13.87*			*16.6667*		*83.2*	*28 - 102*			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S										
Blank (B7D0044-BLK1)					Prepared: 4/3/2017 Analyzed: 4/3/2017					
1,2,4-Trichlorobenzene	ND	330	71							
1,2-Dichlorobenzene	ND	330	60							
1,3-Dichlorobenzene	ND	330	65							
1,4-Dichlorobenzene	ND	330	60							
2,4,5-Trichlorophenol	ND	330	61							
2,4,6-Trichlorophenol	ND	330	220							
2,4-Dichlorophenol	ND	1600	120							
2,4-Dimethylphenol	ND	330	120							
2,4-Dinitrophenol	ND	1600	86							
2,4-Dinitrotoluene	ND	330	46							
2,6-Dinitrotoluene	ND	330	49							
2-Chloronaphthalene	ND	330	59							
2-Chlorophenol	ND	330	120							
2-Methylnaphthalene	ND	330	67							
2-Methylphenol	ND	330	67							
2-Nitroaniline	ND	1600	200							
2-Nitrophenol	ND	330	110							
3,3´-Dichlorobenzidine	ND	660	280							
3-Nitroaniline	ND	1600	44							
4,6-Dinitro-2-methyphenol	ND	1600	300							
4-Bromophenyl-phenylether	ND	330	50							
4-Chloro-3-methylphenol	ND	660	110							
4-Chloroaniline	ND	660	53							
4-Chlorophenyl-phenylether	ND	330	48							
4-Methylphenol	ND	330	66							
4-Nitroaniline	ND	1600	290							
4-Nitrophenol	ND	330	150							
Acenaphthene	ND	330	48							
Acenaphthylene	ND	330	51							
Anthracene	ND	330	49							
Benzidine (M)	ND	1600	1400							
Benzo(a)anthracene	ND	330	39							
Benzo(a)pyrene	ND	330	45							
Benzo(b)fluoranthene	ND	330	55							
Benzo(g,h,i)perylene	ND	330	38							
Benzo(k)fluoranthene	ND	330	52							
Benzoic acid	ND	1600	890							
Benzyl alcohol	ND	660	67							
bis(2-chloroethoxy)methane	ND	330	59							
bis(2-Chloroethyl)ether	ND	330	57							
bis(2-chloroisopropyl)ether	ND	330	65							

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
Blank (B7D0044-BLK1) - Continued					Prepared: 4/3/2017 Analyzed: 4/3/2017					
bis(2-ethylhexyl)phthalate	ND	330	83							
Butylbenzylphthalate	ND	330	250							
Chrysene	ND	330	43							
Di-n-butylphthalate	ND	330	230							
Di-n-octylphthalate	ND	330	48							
Dibenz(a,h)anthracene	ND	330	43							
Dibenzofuran	ND	330	55							
Diethyl phthalate	ND	330	47							
Dimethyl phthalate	ND	330	46							
Fluoranthene	ND	330	47							
Fluorene	ND	330	49							
Hexachlorobenzene	ND	330	41							
Hexachlorobutadiene	ND	660	61							
Hexachlorocyclopentadiene	ND	660	64							
Hexachloroethane	ND	330	71							
Indeno(1,2,3-cd)pyrene	ND	330	44							
Isophorone	ND	330	57							
N-Nitroso-di-n propylamine	ND	330	65							
N-Nitrosodiphenylamine	ND	330	48							
Naphthalene	ND	330	60							
Nitrobenzene	ND	330	67							
Pentachlorophenol	ND	1600	190							
Phenanthrene	ND	330	46							
Phenol	ND	330	130							
Pyrene	ND	330	53							
Pyridine	ND	1600	270							
Surrogate: 1,2-Dichlorobenzene-d	*2134*			*3333.33*		*64.0*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2441*			*3333.33*		*73.2*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2140*			*3333.33*		*64.2*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2331*			*3333.33*		*69.9*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1909*			*3333.33*		*57.3*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2886*			*3333.33*		*86.6*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1820*			*3333.33*		*54.6*	*30 - 115*			
Surrogate: Phenol-d5	*1911*			*3333.33*		*57.3*	*34 - 104*			
LCS (B7D0044-BS1)					Prepared: 4/3/2017 Analyzed: 4/4/2017					
1,2,4-Trichlorobenzene	2889.67	330	71	3333.33		86.7	58 - 105			
1,2-Dichlorobenzene	2795.67	330	60	3333.33		83.9	58 - 99			
1,3-Dichlorobenzene	2740.67	330	65	3333.33		82.2	57 - 100			
1,4-Dichlorobenzene	2697.67	330	60	3333.33		80.9	57 - 93			
2,4,5-Trichlorophenol	2950.33	330	61	3333.33		88.5	63 - 128			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
LCS (B7D0044-BS1) - Continued						Prepared: 4/3/2017 Analyzed: 4/4/2017				
2,4,6-Trichlorophenol	2662.00	330	220	3333.33		79.9	51 - 156			
2,4-Dichlorophenol	2520.00	1600	120	3333.33		75.6	56 - 140			
2,4-Dimethylphenol	2215.67	330	120	3333.33		66.5	47 - 134			
2,4-Dinitrophenol	2799.67	1600	86	3333.33		84.0	49 - 159			
2,4-Dinitrotoluene	3672.67	330	46	3333.33		110	66 - 132			
2,6-Dinitrotoluene	3616.00	330	49	3333.33		108	65 - 130			
2-Chloronaphthalene	3157.33	330	59	3333.33		94.7	65 - 112			
2-Chlorophenol	2116.33	330	120	3333.33		63.5	47 - 132			
2-Methylnaphthalene	3158.33	330	67	3333.33		94.8	62 - 118			
2-Methylphenol	2189.33	330	67	3333.33		65.7	54 - 113			
2-Nitroaniline	2305.00	1600	200	3333.33		69.2	53 - 152			
2-Nitrophenol	2497.33	330	110	3333.33		74.9	46 - 149			
3,3´-Dichlorobenzidine	2920.33	660	280	3333.33		87.6	45 - 155			
3-Nitroaniline	3078.00	1600	44	3333.33		92.3	58 - 126			
4,6-Dinitro-2-methyphenol	3209.00	1600	300	3333.33		96.3	55 - 175			
4-Bromophenyl-phenylether	3113.33	330	50	3333.33		93.4	62 - 118			
4-Chloro-3-methylphenol	2517.33	660	110	3333.33		75.5	61 - 145			
4-Chloroaniline	2537.67	660	53	3333.33		76.1	57 - 115			
4-Chlorophenyl-phenylether	2780.33	330	48	3333.33		83.4	60 - 117			
4-Methylphenol	2379.33	330	66	3333.33		71.4	58 - 120			
4-Nitroaniline	3063.33	1600	290	3333.33		91.9	62 - 132			
4-Nitrophenol	2018.67	330	150	3333.33		60.6	46 - 181			
Acenaphthene	2634.33	330	48	3333.33		79.0	53 - 120			
Acenaphthylene	2538.67	330	51	3333.33		76.2	57 - 112			
Anthracene	2887.33	330	49	3333.33		86.6	63 - 122			
Benzidine (M)	3996.67	1600	1400	3333.33		120	0 - 204			
Benzo(a)anthracene	2665.33	330	39	3333.33		80.0	59 - 120			
Benzo(a)pyrene	2875.33	330	45	3333.33		86.3	60 - 132			
Benzo(b)fluoranthene	2609.00	330	55	3333.33		78.3	59 - 128			
Benzo(g,h,i)perylene	2871.00	330	38	3333.33		86.1	56 - 122			
Benzo(k)fluoranthene	2760.33	330	52	3333.33		82.8	53 - 130			
Benzoic acid	2224.33	1600	890	3333.33		66.7	11 - 132			
Benzyl alcohol	2959.67	660	67	3333.33		88.8	64 - 120			
bis(2-chloroethoxy)methane	1989.67	330	59	3333.33		59.7	55 - 101			
bis(2-Chloroethyl)ether	1939.00	330	57	3333.33		58.2	55 - 100			
bis(2-chloroisopropyl)ether	1640.67	330	65	3333.33		49.2	30 - 126			
bis(2-ethylhexyl)phthalate	2530.67	330	83	3333.33		75.9	62 - 130			
Butylbenzylphthalate	2880.33	330	250	3333.33		86.4	61 - 136			
Chrysene	2960.33	330	43	3333.33		88.8	54 - 122			
Di-n-butylphthalate	2716.33	330	230	3333.33		81.5	68 - 126			
Di-n-octylphthalate	2568.33	330	48	3333.33		77.0	57 - 145			
Dibenz(a,h)anthracene	2753.33	330	43	3333.33		82.6	52 - 136			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
LCS (B7D0044-BS1) - Continued					Prepared: 4/3/2017 Analyzed: 4/4/2017					
Dibenzofuran	3490.33	330	55	3333.33		105	66 - 118			
Diethyl phthalate	2836.00	330	47	3333.33		85.1	66 - 127			
Dimethyl phthalate	2688.33	330	46	3333.33		80.6	65 - 121			
Fluoranthene	2871.00	330	47	3333.33		86.1	60 - 120			
Fluorene	2597.33	330	49	3333.33		77.9	55 - 119			
Hexachlorobenzene	3717.33	330	41	3333.33		112	64 - 119			
Hexachlorobutadiene	2549.33	660	61	3333.33		76.5	48 - 101			
Hexachlorocyclopentadiene	3206.67	660	64	3333.33		96.2	46 - 123			
Hexachloroethane	2616.33	330	71	3333.33		78.5	57 - 104			
Indeno(1,2,3-cd)pyrene	2905.33	330	44	3333.33		87.2	60 - 140			
Isophorone	1879.00	330	57	3333.33		56.4	49 - 118			
N-Nitroso-di-n propylamine	1838.33	330	65	3333.33		55.2	56 - 118			L4
N-Nitrosodiphenylamine	2874.00	330	48	3333.33		86.2	66 - 126			
Naphthalene	2318.67	330	60	3333.33		69.6	51 - 103			
Nitrobenzene	2278.67	330	67	3333.33		68.4	62 - 111			
Pentachlorophenol	2748.67	1600	190	3333.33		82.5	54 - 144			
Phenanthrene	2790.00	330	46	3333.33		83.7	58 - 120			
Phenol	1987.67	330	130	3333.33		59.6	46 - 139			
Pyrene	2820.67	330	53	3333.33		84.6	59 - 122			
Pyridine	1546.33	1600	270	3333.33		46.4	26 - 90			J
Surrogate: 1,2-Dichlorobenzene-d	*2049*			*3333.33*		*61.5*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2680*			*3333.33*		*80.4*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2076*			*3333.33*		*62.3*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2264*			*3333.33*		*67.9*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1817*			*3333.33*		*54.5*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2751*			*3333.33*		*82.5*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1775*			*3333.33*		*53.3*	*30 - 115*			
Surrogate: Phenol-d5	*1825*			*3333.33*		*54.8*	*34 - 104*			
Matrix Spike (B7D0044-MS1)			**Source: 1701386-03**		Prepared: 4/3/2017 Analyzed: 4/4/2017					
1,2,4-Trichlorobenzene	2178.00	330	71	3333.33	ND	65.3	53 - 106			
1,2-Dichlorobenzene	2028.00	330	60	3333.33	ND	60.8	52 - 99			
1,3-Dichlorobenzene	1987.67	330	65	3333.33	ND	59.6	52 - 98			
1,4-Dichlorobenzene	1952.00	330	60	3333.33	ND	58.6	48 - 96			
2,4,5-Trichlorophenol	2218.00	330	61	3333.33	ND	66.5	51 - 138			
2,4,6-Trichlorophenol	2035.00	330	220	3333.33	ND	61.1	46 - 162			
2,4-Dichlorophenol	1903.33	1600	120	3333.33	ND	57.1	49 - 141			
2,4-Dimethylphenol	1732.33	330	120	3333.33	ND	52.0	39 - 138			
2,4-Dinitrophenol	2033.33	1600	86	3333.33	ND	61.0	4 - 170			
2,4-Dinitrotoluene	2839.00	330	46	3333.33	ND	85.2	57 - 132			
2,6-Dinitrotoluene	2792.33	330	49	3333.33	ND	83.8	45 - 146			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

Matrix Spike (B7D0044-MS1) - Continued **Source: 1701386-03** Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
2-Chloronaphthalene	2457.67	330	59	3333.33	ND	73.7	59 - 115			
2-Chlorophenol	1516.33	330	120	3333.33	ND	45.5	46 - 126			M2
2-Methylnaphthalene	2434.00	330	67	3333.33	ND	73.0	58 - 116			
2-Methylphenol	1600.33	330	67	3333.33	ND	48.0	50 - 112			M2
2-Nitroaniline	1732.67	1600	200	3333.33	ND	52.0	44 - 156			
2-Nitrophenol	1891.00	330	110	3333.33	ND	56.7	39 - 153			
3,3´-Dichlorobenzidine	2303.33	660	280	3333.33	ND	69.1	24 - 165			
3-Nitroaniline	2359.67	1600	44	3333.33	ND	70.8	47 - 135			
4,6-Dinitro-2-methyphenol	2439.00	1600	300	3333.33	ND	73.2	17 - 199			
4-Bromophenyl-phenylether	2415.33	330	50	3333.33	ND	72.5	57 - 119			
4-Chloro-3-methylphenol	1925.00	660	110	3333.33	ND	57.8	47 - 157			
4-Chloroaniline	1955.00	660	53	3333.33	ND	58.7	42 - 120			
4-Chlorophenyl-phenylether	2155.00	330	48	3333.33	ND	64.7	56 - 116			
4-Methylphenol	1781.00	330	66	3333.33	ND	53.4	52 - 119			
4-Nitroaniline	2320.33	1600	290	3333.33	ND	69.6	41 - 153			
4-Nitrophenol	1553.00	330	150	3333.33	ND	46.6	31 - 186			
Acenaphthene	1989.00	330	48	3333.33	ND	59.7	46 - 119			
Acenaphthylene	1921.67	330	51	3333.33	ND	57.7	51 - 114			
Anthracene	2266.67	330	49	3333.33	ND	68.0	55 - 126			
Benzidine (M)	3051.33	1600	1400	3333.33	ND	91.5	0 - 179			
Benzo(a)anthracene	2101.67	330	39	3333.33	ND	63.1	52 - 120			
Benzo(a)pyrene	2228.00	330	45	3333.33	ND	66.8	52 - 129			
Benzo(b)fluoranthene	2058.67	330	55	3333.33	ND	61.8	49 - 128			
Benzo(g,h,i)perylene	2235.00	330	38	3333.33	ND	67.1	45 - 123			
Benzo(k)fluoranthene	2131.67	330	52	3333.33	ND	64.0	44 - 127			
Benzoic acid	1202.67	1600	890	3333.33	ND	36.1	0 - 159			J
Benzyl alcohol	2207.33	660	67	3333.33	ND	66.2	53 - 124			
bis(2-chloroethoxy)methane	1497.67	330	59	3333.33	ND	44.9	47 - 105			M2
bis(2-Chloroethyl)ether	1426.67	330	57	3333.33	ND	42.8	49 - 101			M2
bis(2-chloroisopropyl)ether	1223.00	330	65	3333.33	ND	36.7	30 - 122			
bis(2-ethylhexyl)phthalate	2003.67	330	83	3333.33	ND	60.1	37 - 153			
Butylbenzylphthalate	2260.33	330	250	3333.33	ND	67.8	49 - 151			
Chrysene	2341.33	330	43	3333.33	ND	70.2	50 - 119			
Di-n-butylphthalate	2167.00	330	230	3333.33	ND	65.0	55 - 138			
Di-n-octylphthalate	2071.67	330	48	3333.33	ND	62.2	46 - 153			
Dibenz(a,h)anthracene	2178.67	330	43	3333.33	ND	65.4	42 - 139			
Dibenzofuran	2683.00	330	55	3333.33	ND	80.5	56 - 125			
Diethyl phthalate	2218.33	330	47	3333.33	ND	66.6	60 - 126			
Dimethyl phthalate	2028.33	330	46	3333.33	ND	60.8	58 - 123			
Fluoranthene	2223.67	330	47	3333.33	ND	66.7	53 - 121			
Fluorene	1960.00	330	49	3333.33	ND	58.8	49 - 120			
Hexachlorobenzene	2928.00	330	41	3333.33	ND	87.8	60 - 119			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
Matrix Spike (B7D0044-MS1) - Continued			Source: 1701386-03		Prepared: 4/3/2017 Analyzed: 4/4/2017					
Hexachlorobutadiene	1950.00	660	61	3333.33	ND	58.5	48 - 98			
Hexachlorocyclopentadiene	2394.33	660	64	3333.33	ND	71.8	33 - 123			
Hexachloroethane	1888.33	330	71	3333.33	ND	56.6	52 - 103			
Indeno(1,2,3-cd)pyrene	2266.00	330	44	3333.33	ND	68.0	47 - 141			
Isophorone	1451.33	330	57	3333.33	ND	43.5	43 - 117			
N-Nitroso-di-n propylamine	1429.67	330	65	3333.33	ND	42.9	43 - 125			M2
N-Nitrosodiphenylamine	2291.67	330	48	3333.33	ND	68.8	49 - 142			
Naphthalene	1747.00	330	60	3333.33	ND	52.4	41 - 111			
Nitrobenzene	1718.33	330	67	3333.33	ND	51.6	55 - 114			M2
Pentachlorophenol	2190.67	1600	190	3333.33	ND	65.7	40 - 163			
Phenanthrene	2224.00	330	46	3333.33	ND	66.7	49 - 125			
Phenol	1440.33	330	130	3333.33	ND	43.2	43 - 134			
Pyrene	2215.00	330	53	3333.33	ND	66.5	52 - 124			
Pyridine	1126.00	1600	270	3333.33	ND	33.8	31 - 90			J
Surrogate: 1,2-Dichlorobenzene-d	*1497*			*3333.33*		*44.9*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2048*			*3333.33*		*61.4*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*1507*			*3333.33*		*45.2*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*1784*			*3333.33*		*53.5*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1291*			*3333.33*		*38.7*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2152*			*3333.33*		*64.6*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1333*			*3333.33*		*40.0*	*30 - 115*			
Surrogate: Phenol-d5	*1338*			*3333.33*		*40.1*	*34 - 104*			
Matrix Spike Dup (B7D0044-MSD1)			Source: 1701386-03		Prepared: 4/3/2017 Analyzed: 4/4/2017					
1,2,4-Trichlorobenzene	3268.33	330	71	3333.33	ND	98.0	53 - 106	40.0	20	R
1,2-Dichlorobenzene	3022.67	330	60	3333.33	ND	90.7	52 - 99	39.4	20	R
1,3-Dichlorobenzene	2951.00	330	65	3333.33	ND	88.5	52 - 98	39.0	20	R
1,4-Dichlorobenzene	2924.00	330	60	3333.33	ND	87.7	48 - 96	39.9	20	R
2,4,5-Trichlorophenol	3294.67	330	61	3333.33	ND	98.8	51 - 138	39.1	20	R
2,4,6-Trichlorophenol	2975.67	330	220	3333.33	ND	89.3	46 - 162	37.5	20	R
2,4-Dichlorophenol	2940.00	1600	120	3333.33	ND	88.2	49 - 141	42.8	20	R
2,4-Dimethylphenol	2560.00	330	120	3333.33	ND	76.8	39 - 138	38.6	20	R
2,4-Dinitrophenol	2627.67	1600	86	3333.33	ND	78.8	4 - 170	25.5	20	R
2,4-Dinitrotoluene	4002.00	330	46	3333.33	ND	120	57 - 132	34.0	20	R
2,6-Dinitrotoluene	3995.67	330	49	3333.33	ND	120	45 - 146	35.5	20	R
2-Chloronaphthalene	3549.00	330	59	3333.33	ND	106	59 - 115	36.3	20	R
2-Chlorophenol	2325.33	330	120	3333.33	ND	69.8	46 - 126	42.1	20	R
2-Methylnaphthalene	3609.33	330	67	3333.33	ND	108	58 - 116	38.9	20	R
2-Methylphenol	2500.67	330	67	3333.33	ND	75.0	50 - 112	43.9	20	R
2-Nitroaniline	2534.67	1600	200	3333.33	ND	76.0	44 - 156	37.6	20	R
2-Nitrophenol	2893.33	330	110	3333.33	ND	86.8	39 - 153	41.9	20	R

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

Matrix Spike Dup (B7D0044-MSD1) - Continued **Source: 1701386-03** Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
3,3´-Dichlorobenzidine	3272.67	660	280	3333.33	ND	98.2	24 - 165	34.8	20	R
3-Nitroaniline	3349.00	1600	44	3333.33	ND	100	47 - 135	34.7	20	R
4,6-Dinitro-2-methyphenol	3503.33	1600	300	3333.33	ND	105	17 - 199	35.8	20	R
4-Bromophenyl-phenylether	3494.33	330	50	3333.33	ND	105	57 - 119	36.5	20	R
4-Chloro-3-methylphenol	2899.67	660	110	3333.33	ND	87.0	47 - 157	40.4	20	R
4-Chloroaniline	2925.00	660	53	3333.33	ND	87.8	42 - 120	39.8	20	R
4-Chlorophenyl-phenylether	3021.67	330	48	3333.33	ND	90.7	56 - 116	33.5	20	R
4-Methylphenol	2724.33	330	66	3333.33	ND	81.7	52 - 119	41.9	20	R
4-Nitroaniline	3329.67	1600	290	3333.33	ND	99.9	41 - 153	35.7	20	R
4-Nitrophenol	2146.00	330	150	3333.33	ND	64.4	31 - 186	32.1	20	R
Acenaphthene	2899.00	330	48	3333.33	ND	87.0	46 - 119	37.2	20	R
Acenaphthylene	2829.00	330	51	3333.33	ND	84.9	51 - 114	38.2	20	R
Anthracene	3144.33	330	49	3333.33	ND	94.3	55 - 126	32.4	20	R
Benzidine (M)	4363.00	1600	1400	3333.33	ND	131	0 - 179	35.4	20	R
Benzo(a)anthracene	2940.33	330	39	3333.33	ND	88.2	52 - 120	33.3	20	R
Benzo(a)pyrene	3127.67	330	45	3333.33	ND	93.8	52 - 129	33.6	20	R
Benzo(b)fluoranthene	2923.67	330	55	3333.33	ND	87.7	49 - 128	34.7	20	R
Benzo(g,h,i)perylene	3159.00	330	38	3333.33	ND	94.8	45 - 123	34.3	20	R
Benzo(k)fluoranthene	2895.00	330	52	3333.33	ND	86.9	44 - 127	30.4	20	R
Benzoic acid	1262.00	1600	890	3333.33	ND	37.9	0 - 159	4.81	20	J
Benzyl alcohol	3386.67	660	67	3333.33	ND	102	53 - 124	42.2	20	R
bis(2-chloroethoxy)methane	2276.33	330	59	3333.33	ND	68.3	47 - 105	41.3	20	R
bis(2-Chloroethyl)ether	2142.33	330	57	3333.33	ND	64.3	49 - 101	40.1	20	R
bis(2-chloroisopropyl)ether	1820.00	330	65	3333.33	ND	54.6	30 - 122	39.2	20	R
bis(2-ethylhexyl)phthalate	2886.33	330	83	3333.33	ND	86.6	37 - 153	36.1	20	R
Butylbenzylphthalate	3240.67	330	250	3333.33	ND	97.2	49 - 151	35.6	20	R
Chrysene	3281.67	330	43	3333.33	ND	98.5	50 - 119	33.4	20	R
Di-n-butylphthalate	3093.67	330	230	3333.33	ND	92.8	55 - 138	35.2	20	R
Di-n-octylphthalate	2902.67	330	48	3333.33	ND	87.1	46 - 153	33.4	20	R
Dibenz(a,h)anthracene	3103.67	330	43	3333.33	ND	93.1	42 - 139	35.0	20	R
Dibenzofuran	3843.33	330	55	3333.33	ND	115	56 - 125	35.6	20	R
Diethyl phthalate	3082.33	330	47	3333.33	ND	92.5	60 - 126	32.6	20	R
Dimethyl phthalate	2976.33	330	46	3333.33	ND	89.3	58 - 123	37.9	20	R
Fluoranthene	3112.67	330	47	3333.33	ND	93.4	53 - 121	33.3	20	R
Fluorene	2785.00	330	49	3333.33	ND	83.6	49 - 120	34.8	20	R
Hexachlorobenzene	4109.67	330	41	3333.33	ND	123	60 - 119	33.6	20	M2
Hexachlorobutadiene	2898.00	660	61	3333.33	ND	86.9	48 - 98	39.1	20	R
Hexachlorocyclopentadiene	3616.33	660	64	3333.33	ND	108	33 - 123	40.7	20	R
Hexachloroethane	2816.33	330	71	3333.33	ND	84.5	52 - 103	39.5	20	R
Indeno(1,2,3-cd)pyrene	3249.00	330	44	3333.33	ND	97.5	47 - 141	35.6	20	R
Isophorone	2238.00	330	57	3333.33	ND	67.1	43 - 117	42.6	20	R
N-Nitroso-di-n propylamine	2153.00	330	65	3333.33	ND	64.6	43 - 125	40.4	20	R

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

Matrix Spike Dup (B7D0044-MSD1) - Continued **Source: 1701386-03** Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
N-Nitrosodiphenylamine	3229.67	330	48	3333.33	ND	96.9	49 - 142	34.0	20	R
Naphthalene	2605.00	330	60	3333.33	ND	78.2	41 - 111	39.4	20	R
Nitrobenzene	2568.67	330	67	3333.33	ND	77.1	55 - 114	39.7	20	R
Pentachlorophenol	3124.67	1600	190	3333.33	ND	93.7	40 - 163	35.1	20	R
Phenanthrene	3065.67	330	46	3333.33	ND	92.0	49 - 125	31.8	20	R
Phenol	2180.00	330	130	3333.33	ND	65.4	43 - 134	40.9	20	R
Pyrene	3020.00	330	53	3333.33	ND	90.6	52 - 124	30.8	20	R
Pyridine	1733.33	1600	270	3333.33	ND	52.0	31 - 90	42.5	20	R
Surrogate: 1,2-Dichlorobenzene-d	*2252*			*3333.33*		*67.6*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*3001*			*3333.33*		*90.0*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2313*			*3333.33*		*69.4*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2604*			*3333.33*		*78.1*	*25 - 116*			
Surrogate: 2-Fluorophenol	*2013*			*3333.33*		*60.4*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*3058*			*3333.33*		*91.8*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*2071*			*3333.33*		*62.1*	*30 - 115*			
Surrogate: Phenol-d5	*2042*			*3333.33*		*61.3*	*34 - 104*			

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Notes and Definitions

R	RPD value outside acceptance criteria. Calculation is based on raw values.
M2	Matrix spike recovery outside of acceptance limit due to possible matrix interference. The analytical batch was validated by the laboratory control sample.
M1	Matrix spike recovery outside of acceptance limit. The analytical batch was validated by the laboratory control sample.
L4	Laboratory Control Sample outside of control limit but within Marginal Exceedance (ME) limit.
J	Analyte detected below the Practical Quantitation Limit but above or equal to the Method Detection Limit. Result is an estimated concentration.
D1	Sample required dilution due to possible matrix interference.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)
TX1	TX-NELAP (TCEQ)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

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Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Number of Pages	3
Date Received	03/31/2017
Date Reported	04/11/2017

Telephone: (562)989-4045
Attention: Carmen Aguila

Job Number	Order Date	Client
87151	03/31/2017	ATL

Project ID: 1701344
Project Name: PO# SC11455

Enclosed please find results of analyses of 2 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: ____________

Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

American Environmental Testing Laboratory Inc.

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Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attention: Carmen Aguila

Project ID: 1701344
Date Received 03/31/2017
Date Reported 04/11/2017

Job Number	Order Date	Client
87151	03/31/2017	ATL

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

AETL received 2 samples with the following specification on 03/31/2017.

Lab ID	Sample ID	Sample Date	Matrix	Quantity Of Containers
87151.01	1701344-01	03/29/2017	Soil	1
87151.02	1701344-02	03/29/2017	Soil	1

Method ^ Submethod	*Req Date*	*Priority*	*TAT*	*Units*
(8310)	04/07/2017	2	Normal	mg/Kg

The samples were analyzed as specified on the enclosed chain of custody.
No analytical non-conformances were encountered.

Unless otherwise noted, all results of soil and solid samples are based on wet weight.

Checked By: ________________

Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

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ANALYTICAL RESULTS

Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attn: Carmen Aguila
Page: 2

Project ID: 1701344
Project Name: PO# SC11455

AETL Job Number	Submitted	Client
87151	03/31/2017	ATL

Method: (8310), Polynuclear Aromatic Hydrocarbons (SW-846)

QC Batch No: 040617IB1

Our Lab I.D.			Method Blank	87151.01	87151.02		
Client Sample I.D.				1701344-01	1701344-02		
Date Sampled				03/29/2017	03/29/2017		
Date Prepared			04/06/2017	04/06/2017	04/06/2017		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			04/06/2017	04/06/2017	04/06/2017		
Matrix			Soil	Soil	Soil		
Units			mg/Kg	mg/Kg	mg/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Benzo(a)anthracene	0.010	0.020	ND	ND	ND		
Benzo(a)pyrene	0.010	0.020	ND	ND	ND		
Benzo(b)fluoranthene	0.010	0.020	ND	ND	ND		
Benzo(k)fluoranthene	0.010	0.020	ND	ND	ND		
Chrysene	0.010	0.020	ND	ND	ND		
Dibenzo(a,h)anthracene	0.010	0.020	ND	ND	ND		
Indeno(1,2,3-cd)pyrene	0.010	0.020	ND	ND	ND		
Acenaphthene	0.010	0.020	ND	ND	ND		
Acenaphthylene	0.010	0.020	ND	ND	ND		
Anthracene	0.010	0.020	ND	ND	ND		
Benzo(g,h,i)perylene	0.010	0.020	ND	ND	ND		
Fluoranthene	0.010	0.020	ND	ND	ND		
Fluorene	0.010	0.020	ND	ND	ND		
Naphthalene	0.010	0.020	ND	ND	ND		
Phenanthrene	0.010	0.020	ND	ND	ND		
Pyrene	0.010	0.020	ND	ND	ND		
Our Lab I.D.			Method Blank	87151.01	87151.02		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
p-Terphenyl-D14	75-125		109	107	108		

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QUALITY CONTROL RESULTS

Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attn: Carmen Aguila
Page: 3
Project ID: 1701344
Project Name: PO# SC11455

AETL Job Number	Submitted	Client
87151	03/31/2017	ATL

Method: (8310), Polynuclear Aromatic Hydrocarbons (SW-846)

QC Batch No: 040617IB1; Dup or Spiked Sample: 87151.02; LCS: Clean Sand; QC Prepared: 04/06/2017; QC Analyzed: 04/06/2017; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzo(a)anthracene	0.00	0.0500	0.0450	90.0	0.0500	0.0430	86.0	4.55	75-125	<20
Benzo(a)pyrene	0.00	0.0500	0.0425	85.0	0.0500	0.0409	81.8	3.84	75-125	<20
Naphthalene	0.00570	0.500	0.476	94.1	0.500	0.468	92.5	1.71	75-125	<20
Surrogates										
p-Terphenyl-D14	0.00	0.400	0.428	107	0.400	0.416	104	2.80	75-125	<20

QC Batch No: 040617IB1; Dup or Spiked Sample: 87151.02; LCS: Clean Sand; QC Prepared: 04/06/2017; QC Analyzed: 04/06/2017; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzo(a)anthracene	0.0500	0.0448	89.6	0.0500	0.0450	90.0	<1	75-125	<20	
Benzo(a)pyrene	0.0500	0.0427	85.4	0.0500	0.0419	83.8	1.89	75-125	<20	
Naphthalene	0.500	0.457	91.4	0.500	0.461	92.2	<1	75-125	<20	
LCS										
Acenaphthene	0.500	0.420	83.4	0.500	0.420	83.0	<1	75-125	<20	
Acenaphthylene	1.00	0.910	90.5	1.00	0.900	90.4	<1	75-125	<20	
Anthracene	0.0500	0.0500	98.8	0.0500	0.0500	99.2	<1	75-125	<20	
Benzo(b)fluoranthene	0.100	0.0900	91.7	0.100	0.0900	91.6	<1	75-125	<20	
Benzo(g,h,i)perylene	0.100	0.0900	94.4	0.100	0.0900	94.3	<1	75-125	<20	
Benzo(k)fluoranthene	0.0500	0.0500	96.2	0.0500	0.0500	96.2	<1	75-125	<20	
Chrysene	0.0500	0.0500	92.2	0.0500	0.0400	78.6	15.9	75-125	<20	
Dibenzo(a,h)anthracene	0.100	0.0900	89.8	0.100	0.0900	87.9	2.14	75-125	<20	
Fluoranthene	0.100	0.0900	86.1	0.100	0.0900	85.4	<1	75-125	<20	
Fluorene	0.100	0.0900	86.8	0.100	0.0900	87.3	<1	75-125	<20	
Indeno(1,2,3-cd)pyrene	0.0500	0.0400	78.6	0.0500	0.0400	81.4	3.50	75-125	<20	
Phenanthrene	0.0500	0.0400	86.6	0.0500	0.0400	86.4	<1	75-125	<20	
Pyrene	0.0500	0.0500	92.8	0.0500	0.0500	92.0	<1	75-125	<20	
Surrogates										
p-Terphenyl-D14	0.400	0.424	106	0.400	0.424	106	<1	75-125	<20	

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Data Qualifiers and Descriptors

Data Qualifier:

#:	Recovery is not within acceptable control limits.
*:	In the QC section, sample results have been taken directly from the ICP reading. No preparation factor has been applied.
B:	Analyte was present in the Method Blank.
D:	Result is from a diluted analysis.
E:	Result is beyond calibration limits and is estimated.
H:	Analysis was performed over the allowed holding time due to circumstances which were beyond laboratory control.
J:	Analyte was detected . However, the analyte concentration is an estimated value, which is between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).
M:	Matrix spike recovery is outside control limits due to matrix interference. Laboratory Control Sample recovery was acceptable.
MCL:	Maximum Contaminant Level
NS:	No Standard Available
S6:	Surrogate recovery is outside control limits due to matrix interference.
S8:	The analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria.
X:	Results represent LCS and LCSD data.

Definition:

%Limi:	Percent acceptable limits.
%REC:	Percent recovery.
Con.L:	Acceptable Control Limits
Conce:	Added concentration to the sample.
LCS:	Laboratory Control Sample
MDL:	Method Detection Limit is a statistically derived number which is specific for each instrument, each method, and each compound. It indicates a distinctively detectable quantity with 99% probability.

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Data Qualifiers and Descriptors

MS:	Matrix Spike
MS DU:	Matrix Spike Duplicate
ND:	Analyte was not detected in the sample at or above MDL.
PQL:	Practical Quantitation Limit or ML (Minimum Level as per RWQCB) is the minimum concentration that can be quantified with more than 99% confidence. Taking into account all aspects of the entire analytical instrumentation and practice.
Recov:	Recovered concentration in the sample.
RPD:	Relative Percent Difference

ADVANCED TECHNOLOGY
LABORATORIES

SUBCONTRACT ORDER

Work Order: 1701344

87151

SENDING LABORATORY:

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755
Phone: 562.989.4045
Fax: 562.989.6348
Project Manager: Carmen Aguila (Carmen@atlglobal.com)
Sampler: BOTSFORD

RECEIVING LABORATORY:

AETL
2834 North Naomi Street
Burbank, CA 91504
Phone :(818) 845-8200
Fax: (818) 845-8840
PO#: SC11455 - STANDARD TAT

IMPORTANT : Please include Work Order # and PO # in your invoice.

Analysis	Due	Expires	Sampled	Comments
ATL Lab#: 1701344-01 / HD-SS-1-4		**Soil**	**03/29/17 16:00**	87151.01
8310_SUB	**04/07/17 17:00**	04/12/17 16:00		
[Polynuclear Aromatic Hydrocarbons]				
1-Glass Jar - 4 oz				
ATL Lab#: 1701344-02 / HD-SS-5-8		**Soil**	03/29/17 15:45	87151.02
8310_SUB	**04/07/17 17:00**	04/12/17 15:45		
[Polynuclear Aromatic Hydrocarbons]				
1-Glass Jar - 4 oz				

Released By	Date	Received By	Date
	3/31/17	Argishti Hovanesian	3/31/17 0800
	3/31/17 0915		03/31/17 0915

Page 1 of 1

American Environmental Testing Laboratory Inc.
2834 North Naomi Street Burbank, CA 91504 • DOHS NO: 1541, LACSD NO: 10181
Tel: (888) 288-AETL • (818) 845-8200 • Fax: (818) 845-8840 • www.aetlab.com

COOLER RECEIPT FORM

Client Name: ATL
Project Name:
AETL Job Number: 87151
Date Received: 03/31/17 Received by: Arlina
Carrier: ☒ AETL Courier ☐ Client ☐ GSO ☐ FedEx ☐ UPS
☐ Others:

Samples were received in: ☒ Cooler (1) ☐ Other (Specify):
Inside temperature of shipping container No 1: 3.3, No 2: ____, No 3: ____
Type of sample containers: ☐ VOA, ☐ Glass bottles, ☒ Wide mouth jars, ☐ HDPE bottles, ☐ Metal sleeves, ☐ Others (Specify):
How are samples preserved: ☐ None, ☐ Ice, ☒ Blue Ice, ☐ Dry Ice
X None, _ HNO_3, _ NaOH, _ ZnOAc, _ HCl, _ $Na_2S_2O_3$, _ MeOH
_ Other (Specify):

	Yes	No, explain below	Name, if client was notified.
1. Are the COCs Correct?	X		
2. Are the Sample labels legible?	X		
3. Do samples match the COC?	X		
4. Are the required analyses clear?	X		
5. Is there enough samples for required analysis?	X		
6. Are samples sealed with evidence tape?		X	
7. Are sample containers in good condition?	X		
8. Are samples preserved?	X		
9. Are samples preserved properly for the intended analysis?	X		
10. Are the VOAs free of headspace?	NA		
11. Are the jars free of headspace?	✓		

Explain all "No" answers for above questions:

ADVANCED TECHNOLOGY LABORATORIES
3275 Walnut Ave., Signal Hill, CA 90755
Tel: (562) 989-4045 ● Fax: (562) 989-4040

CHAIN OF CUSTODY RECORD

Page 1 of 1

Instruction: Complete all shaded areas.

For Laboratory Use Only							ATLCOC Ver:20130715
Method of Transport	Sample Conditions Upon Receipt						
	Condition	Y	N	Condition	Y	N	
☐Client ☐ATL	1. CHILLED	☑	☐	5. # OF SAMPLES MATCH COC	☐	☐	
☑FedEx ☐OnTrac	2. HEADSPACE (VOA)	☐	☐	6. PRESERVED	☐	☐	
☐GSO	3. CONTAINER INTACT	☐	☐	7. COOLER TEMP, deg C: 5.6			
☐Other:	4. SEALED	☐	☐				

CUSTOMER

Company: HOLDREGE & KULL
Address: 792 SEARLS AVENUE
City: NEVADA CITY State: CA Zip: 95959
Tel: (530) 478-1305
Fax: (530) 478-1019

SEND REPORT TO:	SEND INVOICE TO: ☐same as SEND REPORT TO
Attn: BRYAN BOTSFORD Email: BBOTSFORD@HANDK.NET	Attn: CHERYL FISK Email: CFISK@HANDK.NET
Company: HOLDREGE & KULL	Company: "
Address: 792 SEARLS AVENUE	Address: "
City: NEVADA CITY State: CA Zip: 95959	City: " State: " Zip:

PROJECT SAMPLES

Project Name: HEMPHILL DIVERSION
Project No.: 4794-01
Sampler: BOTSFORD
Quote #:
PO #:
Special Instructions/Comments:

Encircle or Write Requested Analysis:
A. 6010 / 7000 (Title 22 Metals)
B. TOTAL MERCURY (7471A) RL 0.0025 mg/kg
C. Select Analysis (×5)
D. Total aluminum
E. hexavalent chromium
F. Soluble T22 metals by WET + TCLP
G. MOISTURE (D2216)
H. SVOCs 8270C
I. carbon chain (8015)
J. PCBs (8082)
K. PAHs (8310)
L. Enter Custom Analysis

Encircle Sample Matrix: Soil / Select Solid Matrix / Select Water Matrix / Select Wastewater Matrix / Select Aqueous Matrix / Enter Custom Matrix

Container: Type: 1=Tube; 2=VOA; 3=Liter; 4=Pint; 5=Jar; 6=Tedlar; 7 = Canister. Material: 1=Glass; 2=Plastic; 3=Metal. Preservative: 1=HCl; 2=HNO3; 3=H2SO4; 4 = 4C; 5=Zn (Ac)2; 6=NaOH; 7=NA2S2O3

QA/QC: ☐Routine ☐Caltrans ☐Legal ☐RWQCB ☐Level IV

ITEM	Lab No.	Sample ID / Location	Date	Time	A	B	D	E	F	G	H	I	J	K	Soil	TAT	#	Type	Material	Preservative	REMARKS
1	1701344-01	HD-SS-1-4	3/29/17	4:00	X	X	X	X	X	X	X	X	X	X	X	5	1		1		
2	↓ -02	HD-SS-5-8	3/29/17	3:45	X	X	X	X	X	X	X	X	X	X	X	5	1		1		
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

TERMS

1. Sample receiving hours: 7:30 AM to 7:30 PM Monday - Friday; Saturday 8:00 AM to 12:00 PM.
2. Samples submitted AFTER 3:00 PM are considered received the following business day at 8:00 AM.
3. The following turnaround time conditions apply:
   - TAT = 0 : 300% Surcharge SAME BUSINESS DAY if received by 9:00 AM
   - TAT = 1 : 100% Surcharge NEXT BUSINESS DAY (COB 5:00 PM)
   - TAT = 2 : 50% Surcharge 2ND BUSINESS DAY (COB 5:00 PM)
   - TAT = 3 : 30% Surcharge 3RD BUSINESS DAY (COB 5:00 PM)
   - TAT = 4 : 20% Surcharge 4TH BUSINESS DAY (COB 5:00 PM)
   - TAT = 5 : NO SURCHARGE 5th BUSINESS DAY (COB 5:00 PM)
4. Weekend, holiday, after-hours work --- ask for quote.
5. Subcontract TAT is 10 - 15 business days. Projects requiring shorter TATs will incur a surcharge respective to the subcontract lab --- ask for quote.
6. Liquid and solid samples will be disposed of after 45 calendar days from receipt of samples; air samples will be disposed of after 14 calendar days after receipt of samples.
7. Electronic records maintained for five (5) years from report date.
8. Hard copy reports will be disposed of after 45 calendar days from report date.
9. Storage and Report Fees:
   - Liquid & solid samples: Complimentary storage for forty-five (45) calendar days from receipt of samples; $2/sample/month if extended storage or hold is requested.
   - Air samples: Complimentary storage for ten (10) calendar days from receipt of samples; $20/ sample/week if extended storage is requested.
   - Hard copy and regenerated reports/EDDs: $17.50 per hard copy report requested; $50.00 per regenerated/reformatted report; $35 per reprocessed EDD.
10. Rush TCLP/STLC samples: add 2 days to analysis TAT for extraction procedure.
11. Unanalyzed samples will incur a disposal fee of $7 per sample.

As the authorized agent of the company above, I hereby purchase laboratory services from ATL as shown above and hereby guarantee payment as quoted.

BRYAN BOTSFORD
Submitter Print Name
Signature

CUSTODY

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
BRYAN BOTSFORD	3/29/17	4:15 pm		3/30/17	09:11

Page 50 of 50

ENVIRONMENTAL ANALYSES

Friday, April 14, 2017

Bryan Botsford
Holdrege & Kull Consulting Engineers and Geologists
792 Searls Avenue
Nevada City, CA 95959

Re	Lab Order:	S031204	Collected By:	BRYAN BOTSFORD
	Project ID:	HEMPHILL DIVERSION STRUCTURE	PO/Contract #:	VISA/$500.00

Dear Bryan Botsford:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, March 30, 2017. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Eli N. Greenwald

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1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

SAMPLE SUMMARY

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Lab ID	Sample ID	Matrix	Date Collected	Date Received
S031204001	**HD-SS-1-4**	Solid	03/29/2017 16:00	03/30/2017 09:20
S031204002	**HD-SS-5-8**	Solid	03/29/2017 15:45	03/30/2017 09:20

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NARRATIVE

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

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ANALYTICAL RESULTS

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Solid results are reported on a wet weight basis.

Lab ID **S031204001** Date Collected 3/29/2017 16:00 Matrix Solid
Sample ID **HD-SS-1-4** Date Received 3/30/2017 09:20 Results are expressed as wet weight values

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Methyl Mercury Analysis	**Prep Method:**		EPA 1630		**Prep by:**		JS			
	Analytical Method:		EPA 1630					**Analyzed by:**	JS	
Methyl Mercury (as Hg)	0.13	ug/kg	0.10	0.05	1	04/12/17 00:00	MPR 15060	04/13/17 00:00	MHG 5573	

Lab ID **S031204002** Date Collected 3/29/2017 15:45 Matrix Solid
Sample ID **HD-SS-5-8** Date Received 3/30/2017 09:20 Results are expressed as wet weight values

Parameters	Result	Units	R. L.	MDL	DF	Prepared	Batch	Analyzed	Batch	Qual
Methyl Mercury Analysis	**Prep Method:**		EPA 1630		**Prep by:**		JS			
	Analytical Method:		EPA 1630					**Analyzed by:**	JS	
Methyl Mercury (as Hg)	0.11	ug/kg	0.10	0.05	1	04/12/17 00:00	MPR 15060	04/13/17 00:00	MHG 5573	

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NELAP ACCREDITED TNI LABORATORY

QUALITY CONTROL DATA

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Analysis Description:	Methyl Mercury Analysis	**QC Batch:**	MPR/15060
Analysis Method:	EPA 1630	**QC Batch Method:**	EPA 1630

METHOD BLANK: 752705

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Methyl Mercury (as Hg)	ND	0.10	0.05	ug/kg	

LABORATORY CONTROL SAMPLE: 752706

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Methyl Mercury (as Hg)	ug/kg	75	75.5	101	45-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 752708 752709

Parameter	Units	S031204001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Methyl Mercury (as Hg)	ug/kg	0.13	1	1.16	1.24	103	111	30-130	6.7	50	

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NELAP ACCREDITED TNI LABORATORY

QUALITY CONTROL DATA QUALIFIERS

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

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ENVIRONMENTAL ANALYSES

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
S031204001	**HD-SS-1-4**	EPA 1630	MPR/15060	EPA 1630	MHG/5573
S031204002	**HD-SS-5-8**	EPA 1630	MPR/15060	EPA 1630	MHG/5573

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SAMPLE CHAIN OF CUSTODY

PAGE 1 OF 1

LAB ORDER #: S0 3/20 4

PROJECT # / PROJECT NAME: HEMPHILL DIVERSION STRUCTURE (4794-01)

P.O. #:

CLIENT: HOLDREGE + KULL

REPORT TO: BRYAN BOTSFORD

ADDRESS: 729 SEARLS AVE CITY: NEVADA CITY STATE: CA ZIP: 95959

BILLING ADDRESS: "

PHONE #: 5304781305 FAX PHONE: 5304781019

SAMPLER (PRINT & SIGN NAME): BRYAN BOTSFORD

ANALYSES REQUESTED: MeHg (1630)

TURN-AROUND TIME: [X] STANDARD [ ] RUSH

DUE DATE: 4/30/17

CALTEST #	DATE SAMPLED	TIME SAMPLED	MATRIX	CONTAINER AMOUNT/TYPE	PRESERVATIVE	SAMPLE IDENTIFICATION SITE	CLIENT LAB #	COMP. or GRAB	MeHg (1630)	REMARKS
	3/29	4:00	SOIL	8OZ (2)	NA	HD-SS-1-4		COMP	X	
	3/29	3:45	SOIL	8oz (2)	NA	HD-SS-5-8		COMP	X	

By submittal of sample(s), client agrees to abide by the Terms and Conditions set forth on the reverse of this document.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	RELINQUISHED BY	DATE/TIME	RECEIVED BY
[signature]	3/29/17 4:15pm	FedEx	FedEx	3/30/17 0920	[signature]

FOR LAB USE ONLY

Samples: WC____ MICRO____ BIO____ AA____ SV____ VOA____ TEMP: 2.0 SEALED: Y ✓ / N____ INTACT: Y ✓ / N____

BD: BIO____ WC____ AA____

CC: AA____ SV____ VOA____

SIL: HP____ PT____ QT____ VOA____

W/HNO_3____ H_2SO_4____ NaOH____

PIL: HNO_3____ H_2SO_4____ NaOH____ HCL____

COMMENTS

MATRIX: AQ = Aqueous Nondrinking Water, Digested Metals; FE = Low R.L.s, Aqueous Nondrinking Water, Digested Metals; DW = Drinking Water; SL = Soil, Sludge, Solid; FP = Free Product

CONTAINER TYPES: AL = Amber Liter; AHL = 500 ml Amber; PT = Pint (Plastic); QT=Quart (Plastic); HG = Half Gallon (Plastic); SJ = Soil Jar; B4 = 4 oz. BACT; BT = Brass Tube; VOA = 40 mL.VOA; OTC = Other Type Container

R____ PR____ M____ F____

REV. 11/03 PINK - CLIENT COPY AS RECEIPT YELLOW - CLIENT COPY TO ACCOMPANY FINAL REPORT WHITE - LABORATORY

APPENDIX B

Laboratory Reports for Particle Size Analysis

Particle Size Distribution

ASTM D422

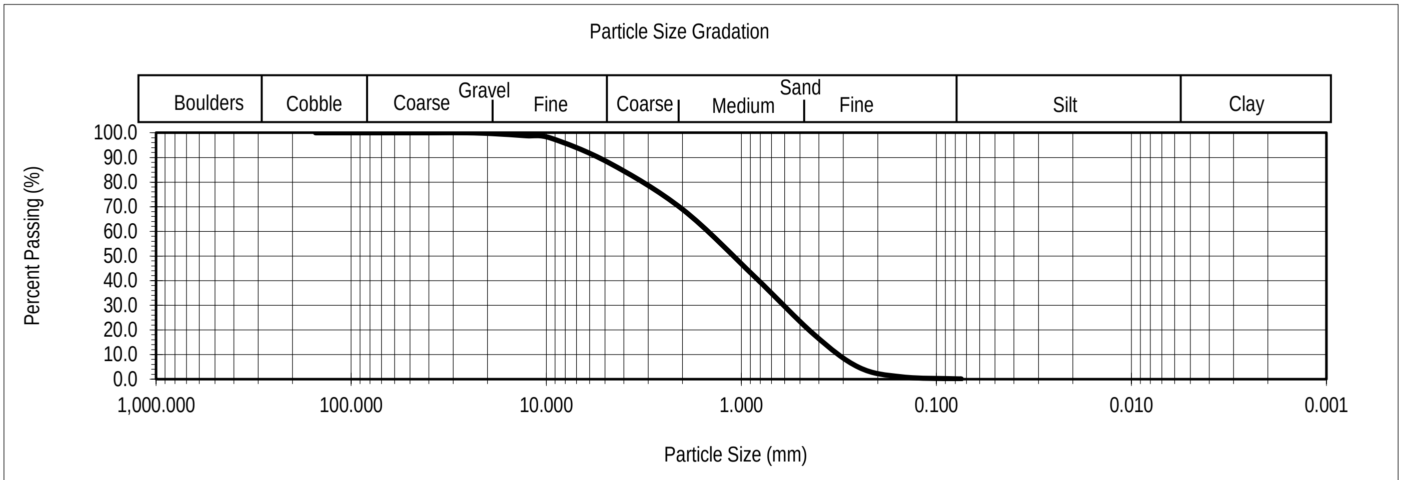
Project No.:	**4794-01**	Project Name: **Hemphill**	Date: **4/7/2017**
Sample No.:	**HD-SS-1**	Boring/Trench: **-** Depth, (ft.): **-**	Tested By: **MLH**
Description:	**Strong Brown (7.5YR 4/6) Poorly Graded Sand**		Checked By: **MLH**
Sample Location:	**0**		Lab. No.: **15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	4,024.3	100.0
3 Inch	3.0000	76.2	0.00	0.0	4,024.3	100.0
2 Inch	2.0000	50.8	0.00	0.0	4,024.3	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	4,024.3	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	4,024.3	100.0
3/4 Inch	0.7500	19.1	12.80	12.8	4,011.5	99.7
1/2 Inch	0.5000	12.7	35.50	48.3	3,976.0	98.8
3/8 Inch	0.3750	9.5	36.00	84.3	3,940.0	97.9
#4	0.1870	4.7500	408.90	493.2	3,531.1	87.7
#10	0.0787	2.0000	757.68	1,250.9	2,773.4	68.9
#20	0.0335	0.8500	1,106.74	2,357.6	1,666.7	41.4
#40	0.0167	0.4250	933.61	3,291.2	733.1	18.2
#60	0.0098	0.2500	538.94	3,830.2	194.1	4.8
#100	0.0059	0.1500	156.38	3,986.5	37.7	0.9
#200	0.0030	0.0750	33.51	4,020.1	4.2	0.1

Hydrometer

Cc = 0.76

Cu = 4.62



HOLDREGE & KULL

(530) 478-1305 - Fax (530) 478-1019 - 792 Searls Ave.- Nevada City, CA 95959 - A California Corporation

Particle Size Distribution

ASTM D422

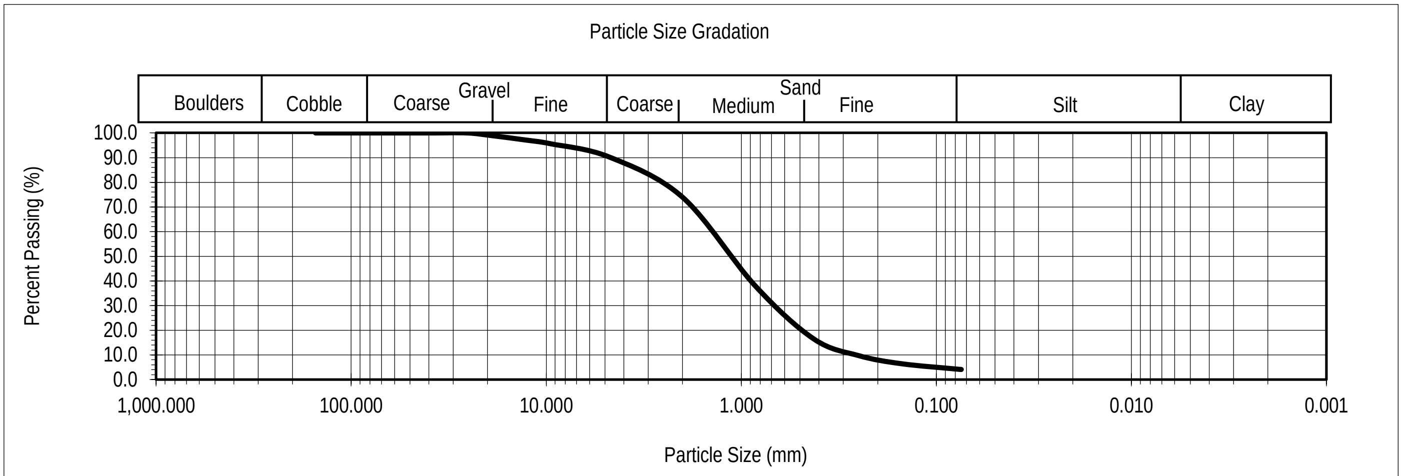
Project No.:	**4794-01**	Project Name: **Hemphill**	Date: **4/7/2017**
Sample No.:	**HD-SS-2**	Boring/Trench: **-** Depth, (ft.): **-**	Tested By: **MLH**
Description:	**Dark Brown (10YR 3/3) Poorly Graded Sand**		Checked By: **MLH**
Sample Location:	**0**		Lab. No.: **15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	6,205.8	100.0
3 Inch	3.0000	76.2	0.00	0.0	6,205.8	100.0
2 Inch	2.0000	50.8	0.00	0.0	6,205.8	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	6,205.8	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	6,205.8	100.0
3/4 Inch	0.7500	19.1	66.80	66.8	6,139.0	98.9
1/2 Inch	0.5000	12.7	112.50	179.3	6,026.5	97.1
3/8 Inch	0.3750	9.5	91.60	270.9	5,934.9	95.6
#4	0.1870	4.7500	335.20	606.1	5,599.7	90.2
#10	0.0787	2.0000	1,012.80	1,618.9	4,586.9	73.9
#20	0.0335	0.8500	2,225.00	3,843.9	2,361.9	38.1
#40	0.0167	0.4250	1,339.86	5,183.8	1,022.0	16.5
#60	0.0098	0.2500	419.47	5,603.2	602.6	9.7
#100	0.0059	0.1500	205.48	5,808.7	397.1	6.4
#200	0.0030	0.0750	142.25	5,951.0	254.8	4.1

Hydrometer

Cc = 1.19

Cu = 5.77



HOLDREGE & KULL

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Particle Size Distribution

ASTM D422

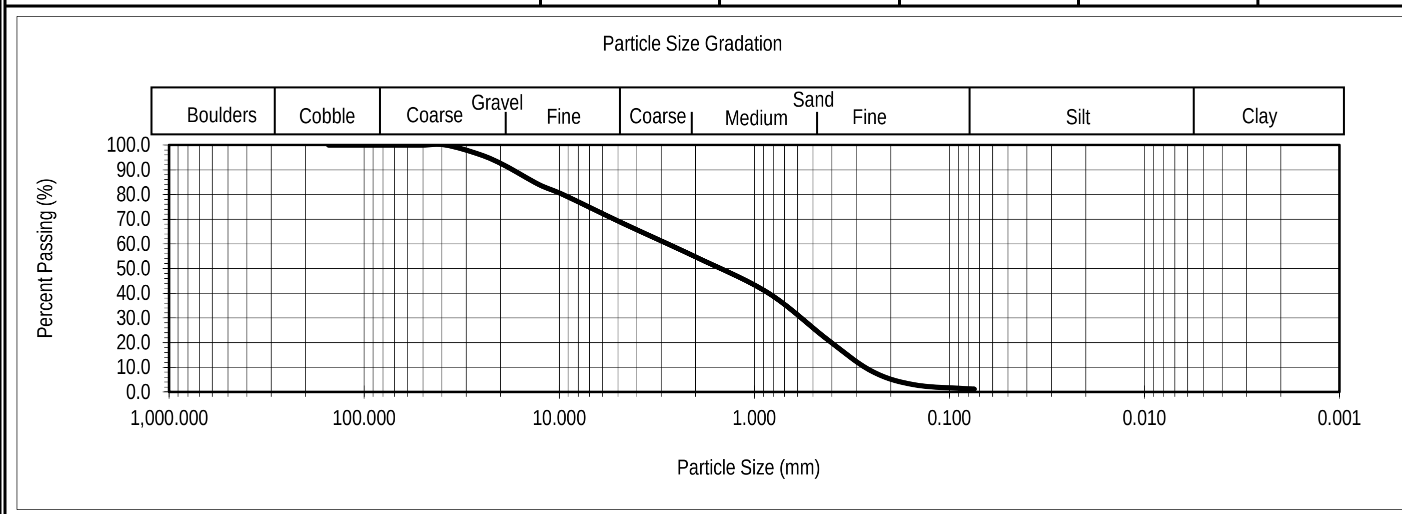
Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-3**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Brown (7.5YR 4/3) Poorly Graded Sand with Gravel**			Checked By:	**MLH**
Sample Location:	**0**			Lab. No.:	**15-17-082**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent Passing
(U.S. Standard)	Inches (in.)	Millimeter (mm)	Retained On Sieve (gm)	Accumulated On Sieve (gm)	Passing Sieve (gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	8,646.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	8,646.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	8,646.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	8,646.1	100.0
1.0 Inch	1.0000	25.4	336.40	336.4	8,309.7	96.1
3/4 Inch	0.7500	19.1	377.20	713.6	7,932.5	91.7
1/2 Inch	0.5000	12.7	670.20	1,383.8	7,262.3	84.0
3/8 Inch	0.3750	9.5	355.80	1,739.6	6,906.5	79.9
#4	0.1870	4.7500	990.90	2,730.5	5,915.6	68.4
#10	0.0787	2.0000	1,185.44	3,915.9	4,730.2	54.7
#20	0.0335	0.8500	1,260.22	5,176.2	3,470.0	40.1
#40	0.0167	0.4250	1,616.59	6,792.8	1,853.4	21.4
#60	0.0098	0.2500	1,125.43	7,918.2	727.9	8.4
#100	0.0059	0.1500	480.08	8,398.3	247.9	2.9
#200	0.0030	0.0750	146.80	8,545.1	101.1	1.2

Cc = 0.47

Cu = 10.58

Hydrometer



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Particle Size Distribution

ASTM D422

Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-6**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Brown (7.5YR 4/4) Poorly Graded Sand with Gravel**			Checked By:	**MLH**
Sample Location:	**0**			Lab. No.:	**15-17-082**

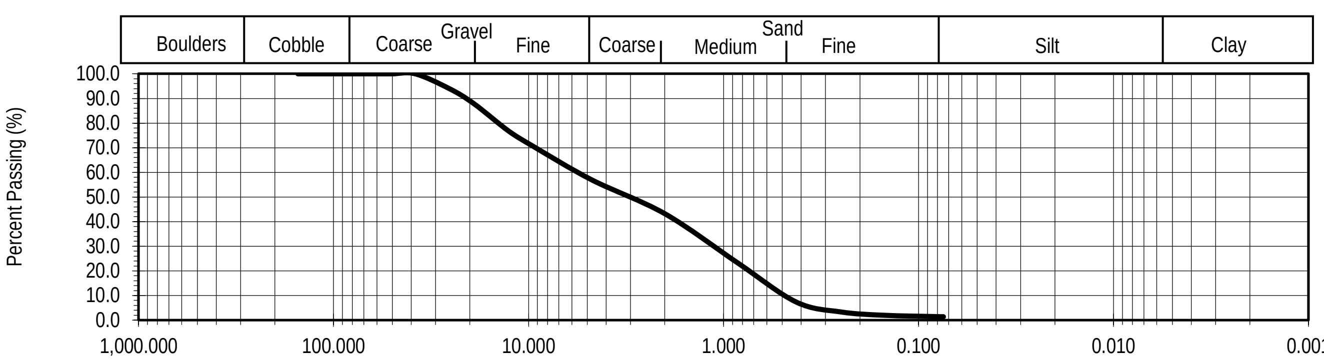
Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	9,035.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	9,035.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	9,035.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	9,035.1	100.0
1.0 Inch	1.0000	25.4	548.30	548.3	8,486.8	93.9
3/4 Inch	0.7500	19.1	548.80	1,097.1	7,938.0	87.9
1/2 Inch	0.5000	12.7	993.40	2,090.5	6,944.6	76.9
3/8 Inch	0.3750	9.5	557.10	2,647.6	6,387.5	70.7
#4	0.1870	4.7500	1,238.80	3,886.4	5,148.7	57.0
#10	0.0787	2.0000	1,245.37	5,131.8	3,903.4	43.2
#20	0.0335	0.8500	1,794.47	6,926.2	2,108.9	23.3
#40	0.0167	0.4250	1,441.59	8,367.8	667.3	7.4
#60	0.0098	0.2500	367.12	8,735.0	300.2	3.3
#100	0.0059	0.1500	121.85	8,856.8	178.3	2.0
#200	0.0030	0.0750	53.80	8,910.6	124.5	1.4

Cc = 0.52

Cu = 11.98

Hydrometer

Particle Size Gradation



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Particle Size Distribution

ASTM D422

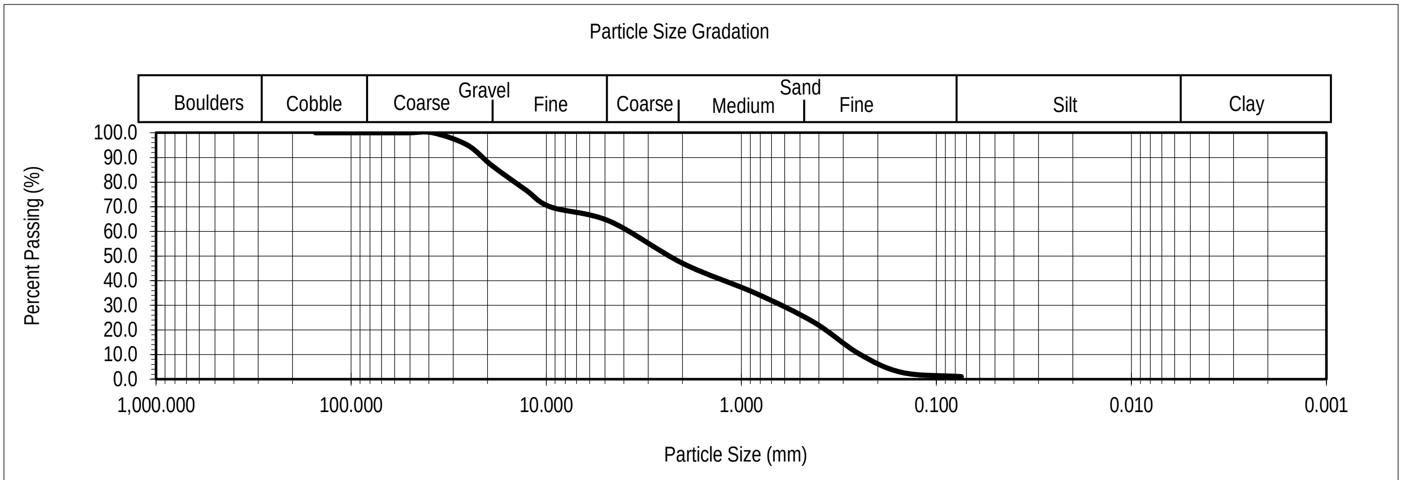
Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-7**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Dark Brown (10YR 3/3) Poorly Graded Sand with Gravel**			Checked By:	**MLH**
Sample Location:	**0**			Lab. No.:	**15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	5,902.5	100.0
3 Inch	3.0000	76.2	0.00	0.0	5,902.5	100.0
2 Inch	2.0000	50.8	0.00	0.0	5,902.5	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	5,902.5	100.0
1.0 Inch	1.0000	25.4	292.60	292.6	5,609.9	95.0
3/4 Inch	0.7500	19.1	487.30	779.9	5,122.6	86.8
1/2 Inch	0.5000	12.7	593.40	1,373.3	4,529.2	76.7
3/8 Inch	0.3750	9.5	400.80	1,774.1	4,128.4	69.9
#4	0.1870	4.7500	341.30	2,115.4	3,787.1	64.2
#10	0.0787	2.0000	1,010.91	3,126.3	2,776.1	47.0
#20	0.0335	0.8500	712.38	3,838.7	2,063.8	35.0
#40	0.0167	0.4250	698.66	4,537.4	1,365.1	23.1
#60	0.0098	0.2500	752.89	5,290.2	612.2	10.4
#100	0.0059	0.1500	451.23	5,741.5	161.0	2.7
#200	0.0030	0.0750	99.10	5,840.6	61.9	1.0

Cc = 0.44

Cu = 15.83

Hydrometer



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APPENDIX 3.3 B

Auburn Ravine-Hemphill Diversion Assessment Sediment Transport Study
(Balance Hydrologics 2021);

Auburn Ravine-Hemphill Diversion Assessment Sediment Transport Study

Prepared for:

Nevada Irrigation District

NID

Prepared by:

Balance Hydrologics

March 2021

March 3, 2021

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APPENDICES

Appendix A Modeling Results

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1 INTRODUCTION

The Hemphill Diversion Dam provides infrastructure for maintaining agricultural irrigation delivery of Nevada Irrigation District (NID) imported water from Auburn Ravine. Auburn Ravine flows into the Eastside Canal, which flows into the Sacramento River just downstream of the confluence with the Feather River. The Sacramento River and its tributaries have been identified by the Central Valley Steelhead Draft Recovery Plan (NMFS, 2014) as a good candidate for habitat restoration. Additionally, Auburn Ravine supports chinook salmon as indicated in recent studies by California Department of Fish and Wildlife, Placer County and NMFS. The current Hemphill Diversion Dam is a fish passage barrier and removing it would add approximately 6 additional miles of headwater habitat for Steelhead and Chinook Salmon.

Nevada Irrigation District (NID) has requested that Balance Hydrologics ('Balance') characterize the nature of channel bed evolution and sediment transport, as associated with different dam removal alternatives. We understand that NID is still in the process of evaluating and selecting a preferred alternative, a process which involves many components including diversion replacement alternatives, fish count surveys, and evaluation and documentation of environmental impacts, as required under CEQA. This report is limited to a sediment transport modeling study, intended to characterize how sediment transport and channel evolution may be affected by three general dam removal alternatives.

The modeled alternatives are not necessarily those that will ultimately be considered through CEQA, but are developed to represent the range of probable sediment transport response associated with different dam removal scenarios:

- Alternative 1: Dam removal and no active sediment management
- Alternative 2: Dam removal and active sediment management
- Alternative 3: Incremental dam removal and no active sediment management

At this time, we understand that the general project alternatives being considered fall into one of these categories with respect to sediment transport and we have limited our analysis to these three alternatives for clarity and simplicity. Each sediment transport alternative can ultimately be compared to the "No Action" scenario which is run as an existing conditions scenario, which was also used to help parameterize the sediment transport model.

For the purposes of this study, “Dam removal” means complete removal of hardened structures within the active channel area, including the bed and bank protection rip rap around the dam.

“Incremental dam removal” refers to removal of the dam incrementally over three different construction seasons. We have not evaluated whether the existing dam construction or materials are suitable for an incremental removal. Due to the nature of the numerical model as outlined below, we have modeled incremental dam removal of the approximately 8-foot-high dam as follows:

- Step 1: Removal of 2 feet of dam
- Step 2: Removal of 5 total feet of dam
- Step 3: Removal of all 8 feet of the dam; this is the same as Alt. 1 and so not modeled separate (see below)

“Active sediment management” refers to excavating and grading the impounded deposits into a designed quasi-stable position to limit the total volume of sediment released to downstream areas. We have modeled one generalized channel configuration for this purpose, but more detailed design work would be required before implementing that alternative, especially in light of the unstable streambanks upstream of the dam. Alternatives 1 and 3 (no active sediment management) involve removing all or part of the dam and letting natural sediment production and transport processes evolve the channel as flow capacity allows.

This study was carried out to evaluate each alternative in terms of the following questions and geomorphological impacts:

1. What flow magnitudes and durations are required for the channel to return to a state of quasi-stable equilibrium after implementing each alternative?

2. What is the potential for erosion and deposition within the model domain?

The general benefits and limitations of each alternative are discussed from a geomorphological perspective, but we have not included potential short- or long-term impacts to fish habitat as a result of the introduction of the impounded sediment downstream.

2 SITE BACKGROUND

2.1 Site Location

The Hemphill Diversion Dam is located on Auburn Ravine approximately 2 miles east of Lincoln, California in Placer County (**Figure 2-1**). The project site is located just north of the Turkey Creek Golf Club and accessed from Virginiatown Road. The contributing watershed is approximately 25.9 square miles with the headwaters originating at elevation 1687 feet[1] and the project site at 207 feet (Stream Stats, 2020). Average watershed elevation is approximately 840 feet (**Figure 2-2**).

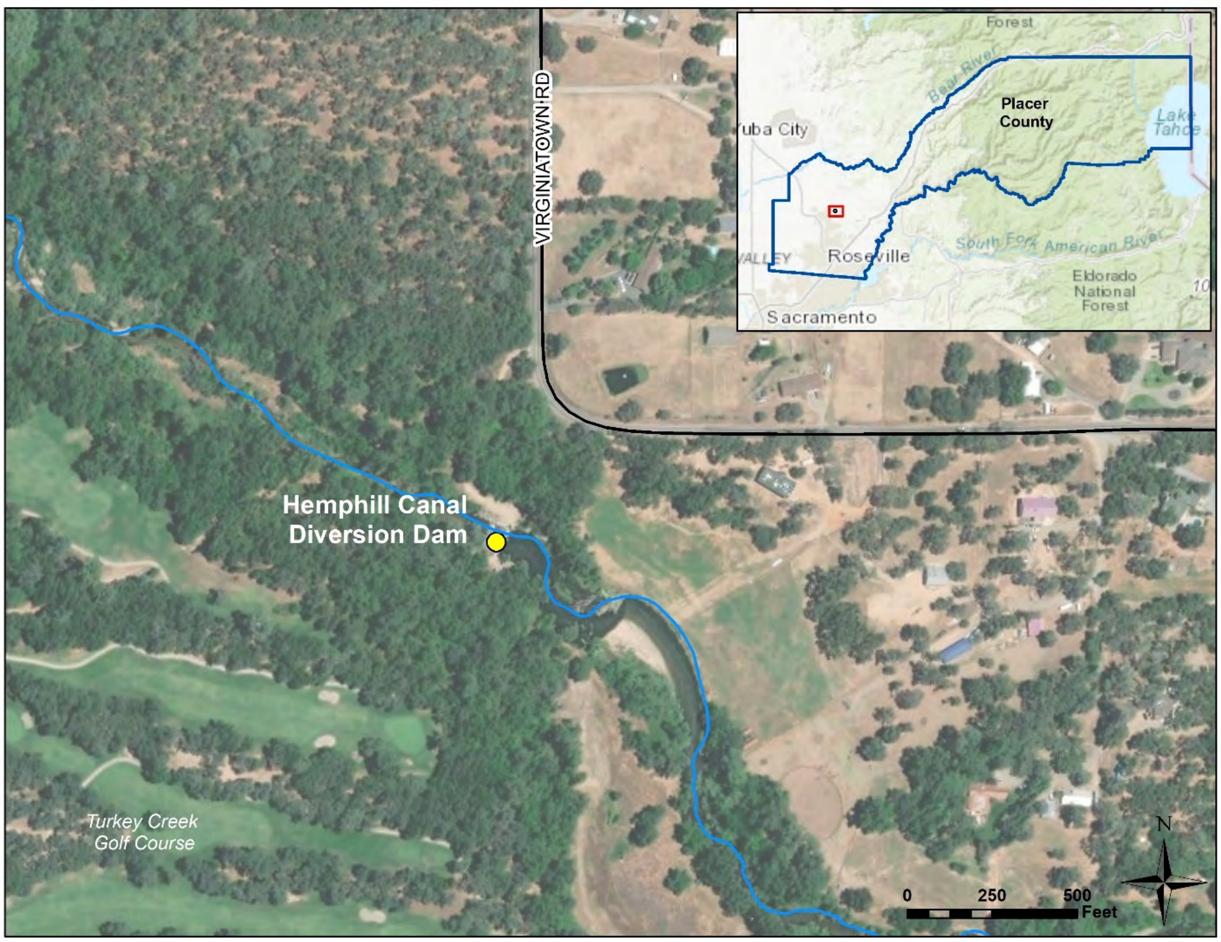


Figure 2-1 Site location overview map.

[1] Unless otherwise specified, all elevations in this report are relative to the NAVD 88 vertical datum.

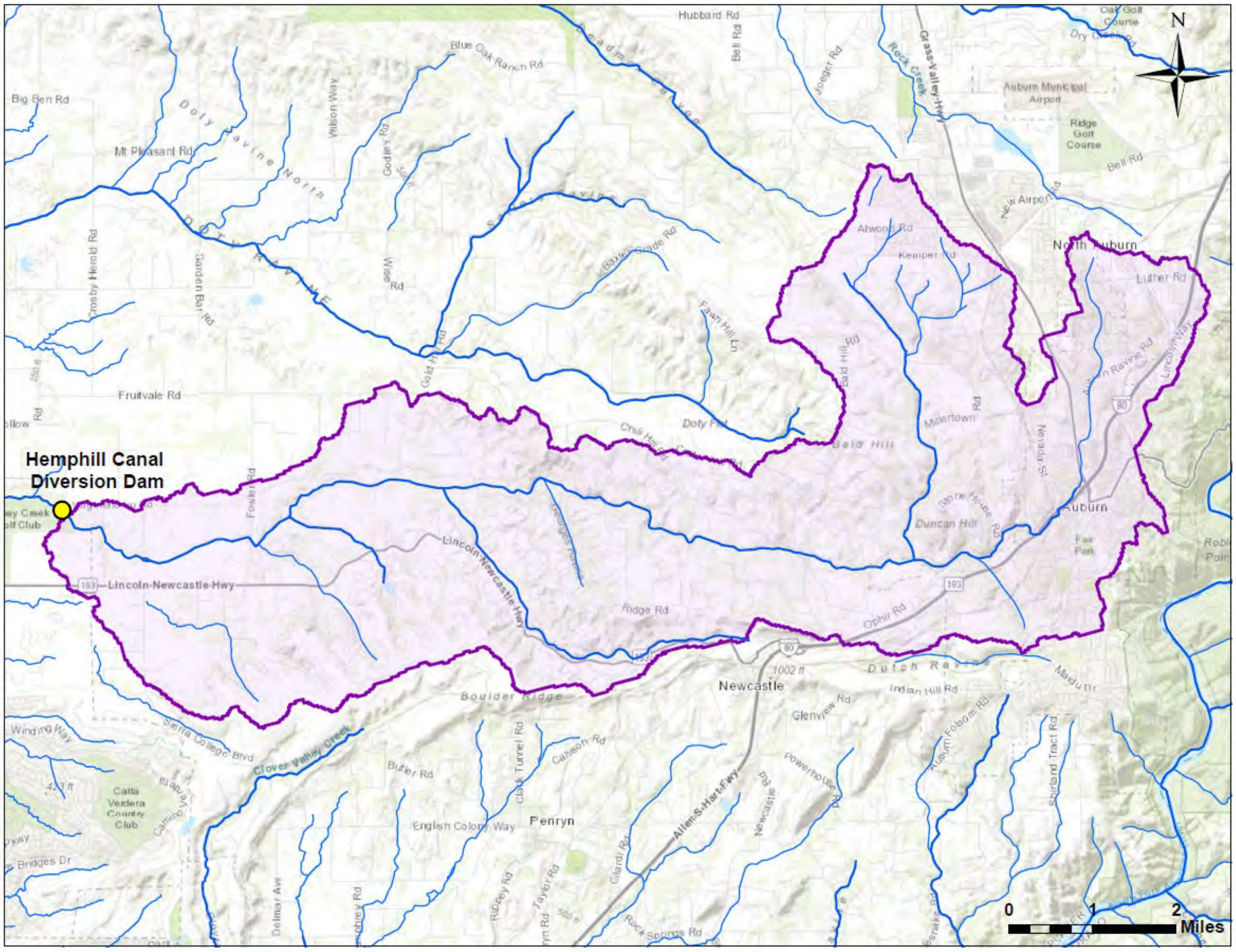


Figure 2-2 Contributing watershed for Auburn Ravine at Hemphill Diversion Dam.

The Hemphill Diversion Dam is approximately 8 feet high and constructed out of concrete. During the diversion season, 3-foot flashboards can be installed to increase ponding depths in the impoundment area and direct flow into the Hemphill Canal. An approximately 5-foot-deep scour pool is present on the downstream side of the dam, which is partially armored with placed boulders. The channel banks immediately adjacent to the dam are hardened with boulder rip rap or concrete.

2.2 Soils

Soils in the Auburn Ravine watershed are primarily comprised of coarse sandy loam, and silt loam, with approximately 18 percent rock outcrop coverage (NRCS, 2020). The NRCS classifies all soils into one of four Hydrologic Soil Groups (HSG) which denote soil permeability and infiltration rate, ranging from Group A soils with high potential infiltration rates to Group D soils with the lowest potential for infiltration. The Hemphill Diversion Dam contributing watershed is dominated by type C soils (45%), followed by type D soils (25%), and type B soils (15%). Approximately 15% of the watershed is mapped as Xerorthents, or cut and fill material which has been displaced primarily as the result of mining activity.

2.3 Geology

The geology in the water is largely comprised of Mesozoic volcanic and metavolcanic rocks (Wagner, et al., 1981). The most notable rock formation is the Penryn Pluton, which outcrops in the vicinity of the project site just east of Lincoln, California to the western edge of Auburn, California, and covers a majority of the watershed. The Penryn Pluton is comprised of medium- to coarse-grained quartz diorite containing plagioclase feldspar, quartz, hornblende, and biotite (Olmsted, 1971). The feldspar and quartz typically weather to a medium to coarse sand, or 'decomposed granite' that is found throughout much of the watershed and along stream channels.

2.4 Geomorphic Observations

After an initial site visit, Balance staff returned to the site to conduct a reconnaissance-level geomorphic assessment of the project area on March 9, 2020. Ground-based topographic survey data was also collected that same week by the NID survey crew. These field-based observations are summarized below and also coupled with a LiDAR-derived topographic dataset collected between August 2018 and March 2019 and published January 7, 2020 to illustrate geomorphic conditions in the model domain area (**Figure 2-3**).

Valley-fill sediment overlies the granitic bedrock at the diversion dam location, and consist of moderately well-graded silt, sand and gravel floodplain and alluvial deposits. Auburn Ravine primarily flows within these deposits, migrating laterally over time. As flow regimes and bed elevation controls have changed, the stream appears to have incised into these deposits, eroding older floodplain deposits and forming an inset floodplain downstream of the diversion dam, as well as bar deposits within the active channel belt. Immediately upstream of the dam, the channel is migrating to the right (looking downstream), and multiple inset floodplains have developed downstream of the dam.

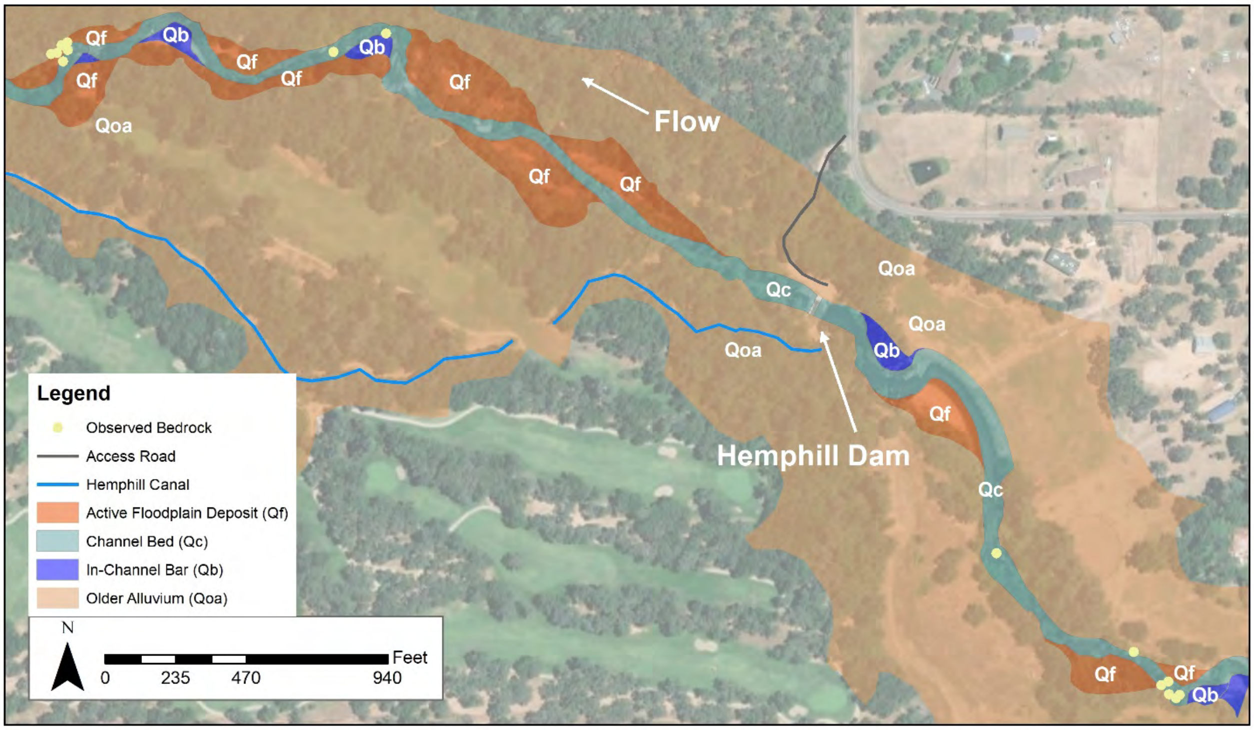


Figure 2-3 **Geomorphic units.** Based on topographic data, field observations, and aerial imagery.

The channel bed is generally composed of sand and gravel, with cobbles present on higher channel bars. Loosely-compacted deposits observed on gravel bars consisted of coarse sand and fine gravels (**Figure 2-4**). The channel thalweg elevation was measured by NID in March 2020 during the ground-based survey. Based on this survey, average channel slope is approximately 0.2 percent upstream of the dam and 0.4 percent downstream of the (**Figure 2-5**). Upstream of the diversion dam, the channel slope is likely directly influenced the dam, which serves to control the bed elevation and gradient. Immediately downstream of the diversion dam, the channel structure is more tightly packed, with a more consistent armor layer of cobbles and boulders and less sand on the bed surface (Holdrege & Kull, 2017).

Figure 2-4 Example of outcropping bedrock and sand and gravel bar, located upstream of Hemphill Dam, looking upstream.

Lidar reflections cannot penetrate water and are therefore typically removed from lidar point clouds in post-processing. However, the digital elevation model (DEM) of lidar point clouds in the wetted channel area can give an approximate water-surface elevation. Assuming that the inferred water-surface elevation is approximately parallel to the bed elevation over several thousand river miles, we estimate the overall channel slope in the areas outside of the direct influence of the dam and the impoundment area to be approximately, 0.4%, the same as the model domain reach downstream of the diversion dam.

Within the report study area, large quartz diorite boulders or bedrock are visible on the bed and in the channel banks (**Figure 2-4**). While it is possible that some of these large boulders have been placed, we interpret the larger occurrences to be bedrock outcrop that likely provides a control on bed elevations, channel stability, and lateral channel migration.

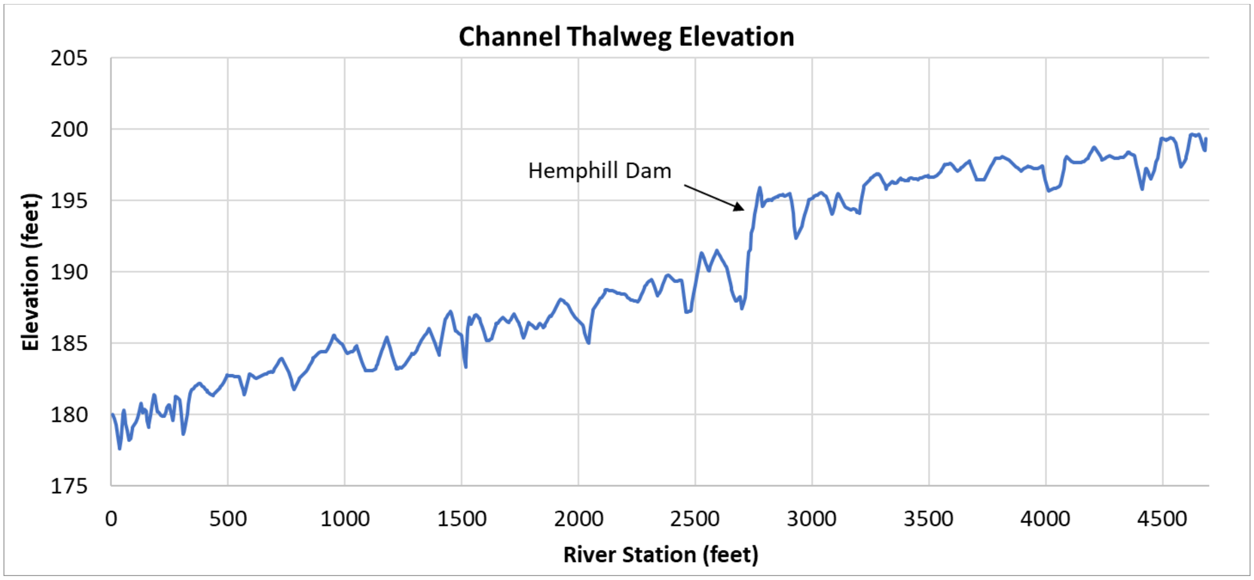


Figure 2-5 Channel thalweg elevation within the model domain.

As such, we have established the sediment transport and channel behavior model domain to include bedrock outcrop at the upstream end, where channel incision and lateral migration is expected to be minimal. For example, at the upstream end of our model domain, a channel bar has formed over the last decade, migrating toward the right bank and depositing sediment on the inside bend. Historical aerial imagery illustrates a laterally dynamic channel with active sediment deposition and transport processes. In contrast, the reach just downstream of this has outcropping bedrock on the right bank and lateral migration has been arrested over the same period (**Figure 2-6**). It is therefore assumed that the exposed bedrock will slow bed incision in this reach.

A 2- to 3-foot high beaver dam was observed approximately 1200 feet downstream of the diversion dam during our March 2020 field reconnaissance, and is also visible in the 2018-2019 LiDAR-based topography, suggesting that it is a relatively stable feature.

Figure 2-6 Aerial images of upstream model boundary comparing May 2002, June 2011, September 2019. White outline of May 2002 active channel on 2011 and 2019 images. Note white bedrock in 2011 image, also observed in the field in March 2020. Reach is approximately 1,300 feet upstream of the dam.

3 MODELING METHODOLOGY

The sediment transport model was completed using SRH2D version 3.2.4 via the Aquaveo SMS software package version 13.0.12. Each alternative was modeled using the 2-, 10-, and 25-year design storm to evaluate a range of responses to different flow rates. The model input data and model parameters are described below in more detail for each of the project alternatives.

3.1 Input Design Storm Hydrographs

Available gaging data in this watershed does not include high flow data, which typically transports the largest proportion of total sediment. Therefore, we constructed a simplified hydrologic model using the U.S Army Corps of Engineers' HEC-HMS platform (version 4.3) to derive representative hydrographs for use in the sediment transport model. We understand that additional flow data sources may be available but were not reviewed for this study.

The modeling approaches and assumptions used in the HEC-HMS modeling are summarized below.

3.1.1 Design Storms and Rainfall

The elevation-duration rainfall depths (inches) were taken from the Placer County Stormwater Management Manual, and linearly interpolated for the mean basin elevation of approximately 800 feet. The precipitation values used for each design storm are summarized in **Table 3-1**.

Table 3-1 Precipitation depths scaled to 800 feet elevation

	Partial-Duration Depth (inches)					
Duration	2- year Frequency	5-year Frequency	10-year Frequency	25-year Frequency	50-year Frequency	100-year Frequency
5 min	0.14	0.20	0.25	0.31	0.36	0.42
15 min	0.25	0.36	0.44	0.55	0.64	0.72
1 hr	0.50	0.70	0.84	1.03	1.16	1.30
2 hr	0.72	0.99	1.17	1.42	1.60	1.79
3 hr	0.87	1.20	1.42	1.70	1.92	2.14
6 hr	1.22	1.65	1.95	2.33	2.63	2.74
12 hr	1.75	2.38	2.82	3.35	3.79	4.17
1 day	2.39	3.22	3.85	4.54	5.09	5.63

3.1.2 Watershed Characteristics

The watershed is approximately 25.9 square miles, with a mean basin elevation of 844 feet (Gotvald, 2012, e.g. StreamStats). The average percentage of impervious area is approximately 7.2 percent according to the 2011 National Land Cover Database. The soils in the watershed are predominantly well drained, coarse sandy to silty loams.

3.1.3 Hydrograph Parameterization and Model Calibration

Hydrologic methodology follows Placer County drainage guidelines for a simplified rainfall-runoff model and uses parameterization techniques from the Sacramento County guidelines when not specified by Placer County.

Total runoff is derived using both an Initial and Constant rate of infiltration. The constant infiltration amount was derived based on HSG type C soils over predominantly woody land cover with fair cover, resulting in an infiltration rate of 0.13 inches per hour. The Initial Loss was estimated to be 0.15 in, which is consistent with Sacramento County initial losses and average water capacity of the soil types in the watershed.

The selected Hydrograph transform was the Snyder Unit Hydrograph, consistent with the Placer County guidance for a lump-parameter model. The Snyder Unit hydrograph is parameterized by a lag time in hours and a peaking coefficient. Peak flows were calibrated to available peak flow estimated values for the project site derived using standard regional regression methodology (Gotvald, 2012). Lag time was calibrated to each peak flow rate (**Table 3-2**). Peaking coefficient was set to a uniform value of 0.5 which is consistent with standard values in other counties, but as the lag time is calibrated to the published peak flow values, the choice is largely immaterial for determining the flow range for each of the design storms.

Calibrated lag times were verified against the lag times calculation following the Sacramento County Drainage Manual (1996), where lag time (T_{lag}, in hours) equals:

$$T_{lag} = Cn \times \left(\frac{L \ \times L_c}{S^{0.5}}\right)^{0.33}$$

where C is a constant of 1560, n is dependent on the basin land use and condition of the main drainage course, L is the length of the main watershed drainage path, in miles, L_c is the length along the main drainage path from the point of interest to the centroid of the watershed in miles, and S is the overall slope of the main watercourse (feet/mile).

Calculated lag times ranged from approximately 4 hours to 6 hours depending on the size of the flow event, and consistent with calibrated lag times in **Table 3-2** above.

The resulting design storm hydrographs for the 2-, 10-, and 25-year design storms are plotted in **Figure 3-1**.

Table 3-2 Peak design flows (Gotvald, 2012) and calibrated lag time values

Design Storm	Peak Flow (cfs)	Lag Time (hr)
2- year	752	6.25
5-year	1690	4.75
10-year	2390	4.25
25-year	3250	4.10
50-year	3960	4.00
100-year	4660	3.75

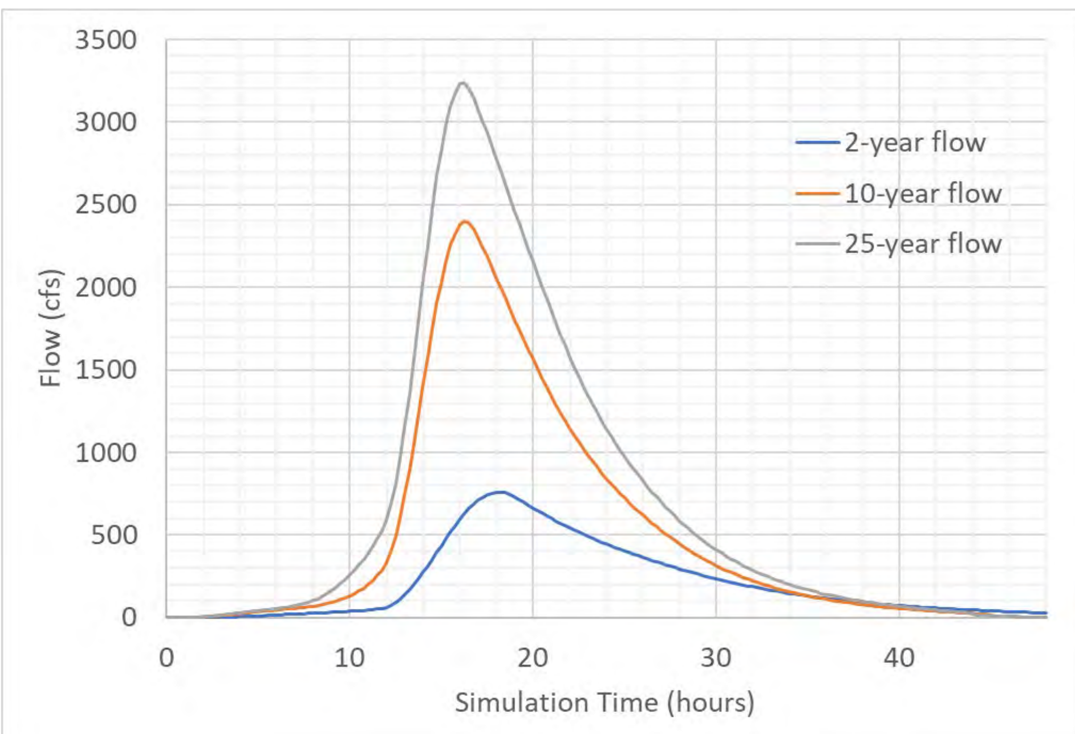


Figure 3-1 Design storms for the 2-, 10-, and 25-year event.

3.2 Model Domain Mesh

The sediment transport model is parameterized with an initial digital elevation model (DEM) derived from a combination of several datasets which represent the existing conditions. The first is a Lidar dataset collected between August 2018 and March 2019 and published January 7, 2020. Recent Lidar datasets provide excellent high-resolution look at elevations over a large area but do not see through standing water. Therefore, the lidar data was supplemented with ground-based surveys in the low-flow channel collected by NID survey staff during the week of March 9, 2020. The survey included elevations of the channel thalweg and two additional channel bottom points. Additional points were collected on floodplain/terrace areas to confirm agreement between the two datasets. A DEM was created using the ground-based survey data in the low-flow channel area to the interpreted water-surface edge. The ground-based DEM and lidar datasets were merged at the water-edge boundaries to create a combined DEM for the entirety of the model domain. The DEM used for all model simulations assumes that the diversion-season flashboards are not used since all models simulate high-flow events which typically occur outside of the diversion season.

For Alternative 2 (Sediment Management), the existing conditions DEM was altered to reflect an excavated channel and bed surface in the impounded sediment beginning downstream of the existing dam structure and ending upstream of the previously impounded sediment. The purpose of a pilot channel would be to remove previously impounded sediment to minimize geomorphic change associated with dam removal, and to reduce potential bank and bed instability as the channel adjusts. As noted above, the channel was developed at a conceptual level and ties together upstream and downstream channel bed elevations. The preliminary pilot channel was designed under the following considerations: a) a uniform channel width of 25 feet, as based on apparently stable channel widths upstream and downstream of the constructed channel, b) pilot channel path which maintains sinuosity and channel slope within the channel meander belt zone, c) re-routing the thalweg away from the actively eroding private property on the right bank upstream of the dam and into a high-flow side channel in the existing bar. The pilot channel bottom outline is depicted in **Figure 3-2**, and would require excavation of approximately 8,000 to 8,500 cubic yards of material. Some of this material could potentially be re-used on site further protect the failing right bank, but some amount of off-haul would still be required. Out of necessity, the pilot channel is steeper than either the upstream or downstream reaches, with a slope of approximately 0.0065 feet per foot. While the pilot channel slope is steeper than the upstream and downstream bed slope, construction of a pilot channel would likely allow for more gradual change to the pre-dam bed conditions compared to no management of the impounded sediment. As noted above, additional channel design work would be required prior to implementing this concept.

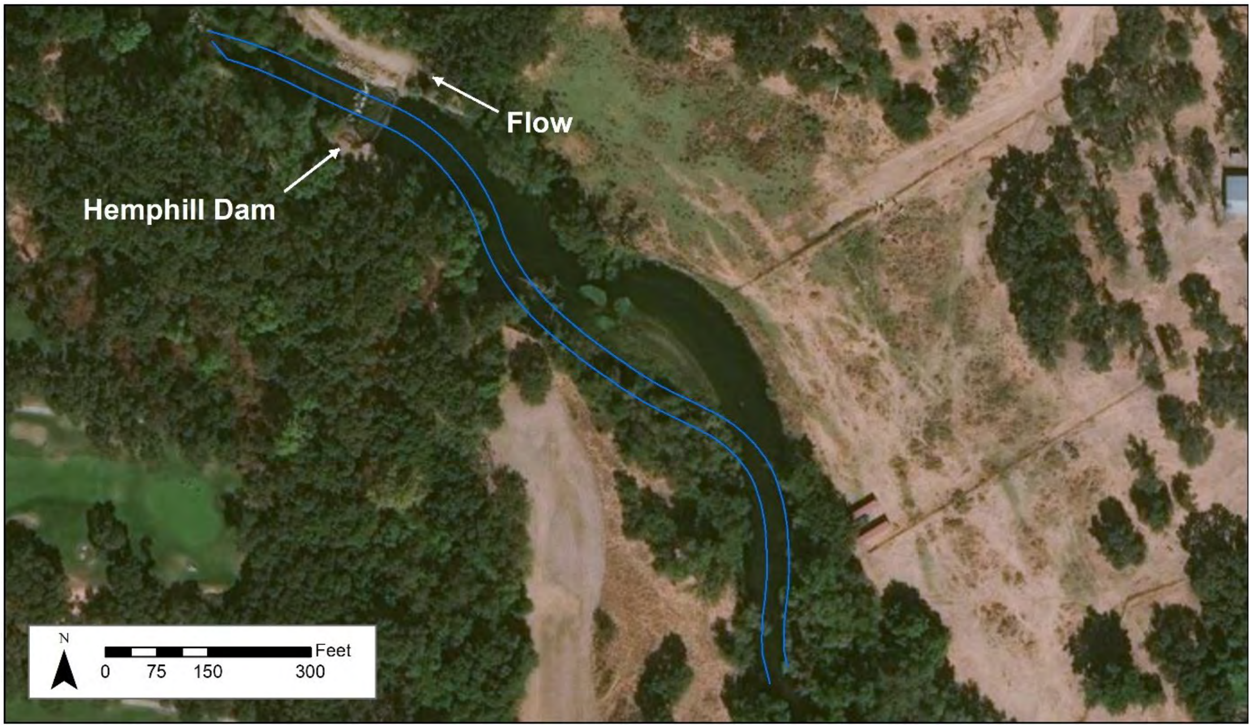


Figure 3-2 Preliminary pilot channel orientation used in the Sediment Management Alternative (Alt. 2).

The downstream model domain boundary was selected at a large arrangement of boulders or exposed bedrock which will likely continue to act as a grade control. The upstream boundary condition was selected to be just upstream of a reach with likely bedrock control (**Figure 2-6**) and with enough of the upstream bed outside of the impoundment backwater area to establish a reach-scale channel slope.

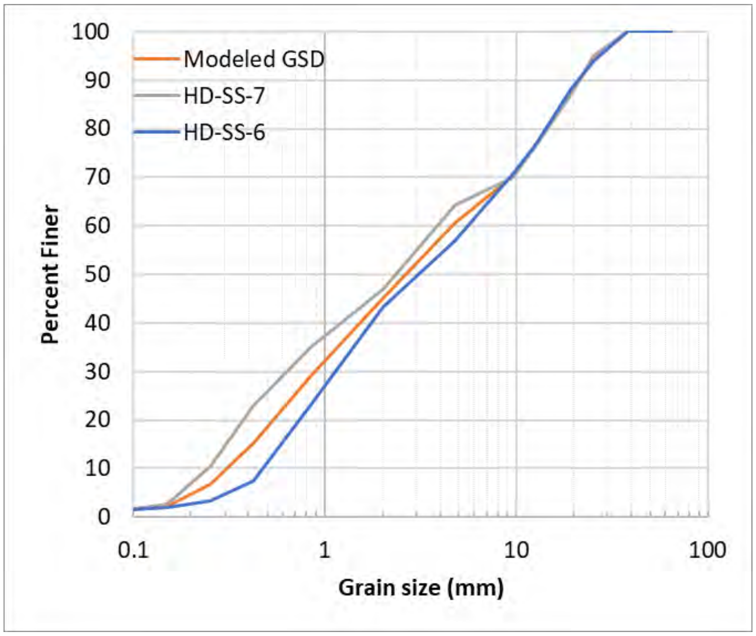
3.3 Bedload Transport Function

SRH2D has several published and widely used sediment transport equations included. Selection of the sediment transport function can significantly affect the results and so it is important to select a function which can appropriately represent the conditions at the project site. Auburn Ravine at Hemphill Dam is a sand-dominated system with approximately 45 percent of grains finer than 2 mm (Holdrege & Kull). We therefore evaluated three potential sediment transport functions: Meyer-Peter Müller (1948), Engelund-Hansen (1972), and Yang (1979) for sand with Yang (1984) for gravel. We found that Engelund-Hansen (1972) produced the most stable and reliable model results for the No Action model runs and have used it for this analysis.

The model is simulated on a timestep that produces a stable model result, typically 0.5 to 2 seconds and simulated for 48-hour duration so that the recession of each design storm is included.

3.4 Channel Grain Size Distributions

Available bed grain size distribution (GSD) data was measured by NV5 in March 2017 and reported in the Geotechnical Engineering and Hydraulic Report (NV5 2020). Five total bulk samples were collected in the impoundment backwater area and three Wolman pebble count transects were conducted just downstream of the dam in the scoured area. Two of the bulk GSD samples were collected at the upstream end of the impounded deposit area, HD-SS-6 and HD-SS-7 which are likely the best representation of the general sediment supply in the model reach. The entire bed was therefore parameterized using the average GSD of the two samples. **Figure 3-3** shows the model GSD compared to the bulk samples. For more details on sample collection, see NV5 (2020). Bedload transport is modeled in nine grain size bins ranging from 0.0025 mm to 32 mm in size, with the large end of the range the largest grain found in the bulk samples.



grain size bins (mm)	
min size	max size
0.0025	0.0625
0.0625	0.125
0.125	0.25
0.25	0.5
0.5	2
2	4
4	8
8	16
16	32

Figure 3-3 Modeled surface and subsurface grain size distributions (GSD) (left), and modeled grain size bins (right).

3.5 Channel Bed Erodibility

As is the case with most sediment transport models, SRH2D does not explicitly model the additional bank strength or cohesion of typical riparian vegetation (e.g. willows, blackberry, etc.). To appropriately model the lateral extent of erosion in the presence of bank vegetation we have designated many floodplain terraces as “non-erodible” (**Figure 3-4**).

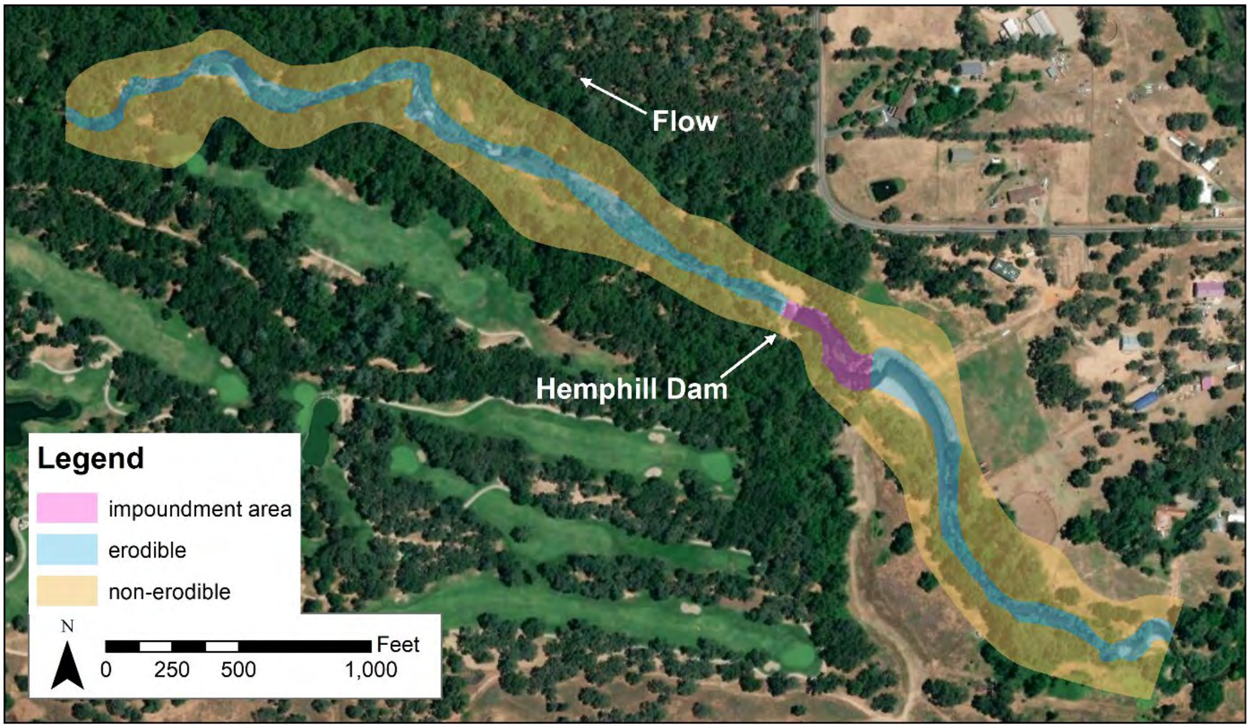


Figure 3-4 Erodible and non-erodible areas in the No Sediment Management alternative (Alternative 1). See above text for description of how erodibility in the impoundment area is handled for each modeled alternative.

3.6 Channel Roughness

Manning's N, or channel roughness coefficient, is parameterized for the model domain. Although Manning's typically varies with bed GSD, vegetation type, and even flow depth, it is sufficient to parameterize the model domain in terms of averaged roughness given the spatial scale and level of detail in the model. Due to the numerical dependency of bed shear stress on water depth and therefore Manning's n value, spatially variable Manning's n values which account for vegetation can counterintuitively accelerate erosion in overbank areas compared to the low-flow channel. Thus, Manning's N is set separately for erodible and non-erodible areas of the channel, 0.035 and 0.06, respectively.

3.7 Active Layer Depth

Sediment transport models parameterize the channel in layers, with the top-most layer as the "active layer" which stores numerical information about surface GSD and the depth of that surface layer. Bed erosion occurs when hydraulic forcing exceeds the threshold of motion for the grains at the surface. When erosion occurs, the thickness of the active layer is removed from the modeled node. As a result, the magnitude of the cumulative bed scour is highly sensitive to the choice of active layer depth. A sensitivity analysis of the 2-year No Action model run was completed to choose an appropriate active layer depth for this system, selecting a depth which produced final scour depth in a similar range as the surveyed channel thalweg. We selected an active layer depth of 5 millimeters, and which is finer than approximately 61 percent of the bed surface GSD (**Figure 3-3**).

3.8 Upstream Boundary Conditions

At the upstream boundary of the model domain, flow is input as an Input Flow Hydrograph for the 2-, 10-, or 25-year flow event. Flow is distributed across the model mesh using the cross-sectional area of the inlet cross-section. In order for the entire model domain to experience a similar flow rate as the design storm propagates through the reach, we have seeded each model run with a flow-only hydraulics model run using a constant inflow of 10 cfs (i.e. “Wet Start”).

Sediment input can either be modeled to be equal to the hydraulic capacity of the channel, or explicitly input as a sediment-discharge rating curve. Most rivers do not transport sediment rates equal to the hydraulic capacity at higher flows as a result of bedrock controls, watershed urbanization, channel incisions, invasive vegetation colonization, bank stabilization efforts, reservoirs or other sediment sinks, or flood peak regulation. We therefore used the 2-, 10- and 25-year No Action model runs to select a sediment capacity ratio and found that upstream sediment loading of 50 percent of the total capacity was appropriate for maintaining channel characteristics in the No Action 2-year model run used for model calibration. **Figure 3-5** shows the modeled input sediment transport rating curve for each grain size bin.

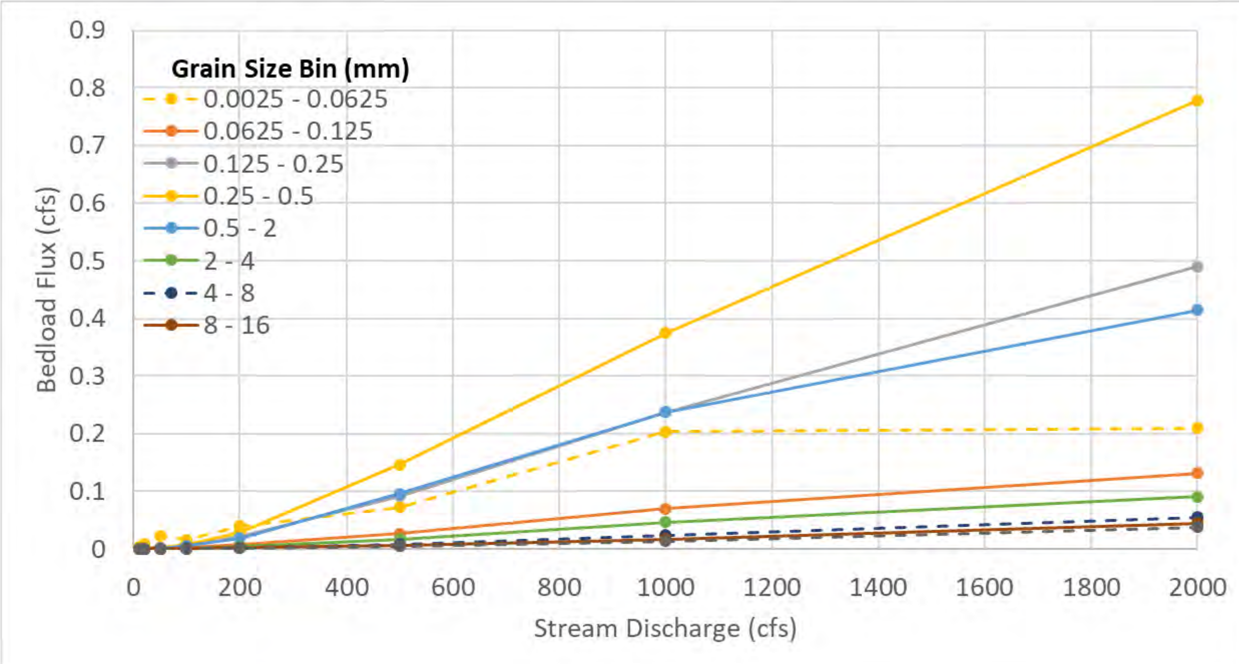


Figure 3-5 Input sediment rating curves for each grain size bin. Represents approximately 50 percent of the available sediment transport capacity.

3.9 Downstream Boundary Conditions

The downstream hydraulic boundary conditions were derived using the Hydraulic Design Function within HEC-RAS version 5.0.7 (**Figure 3-6**). The water-surface elevation (WSE) was calculated in a representative cross-section using Manning's Equation for a range of flows, using a local slope of 0.0033 feet per feet and a composite Manning's N value of 0.06 to account for the presence of large boulders and other channel roughness elements near the downstream model boundary conditions.

3.10 Model Representation of Alternatives

Appropriate representation of the processes that would occur under the range of dam alternatives is often constrained by numerical or even software limitations. Here we outline the approaches we used to best approximate the most representative conditions under the range of dam removal alternatives. The alternative-specific model parameters discussed below are in addition to the general parameterization outlined above.

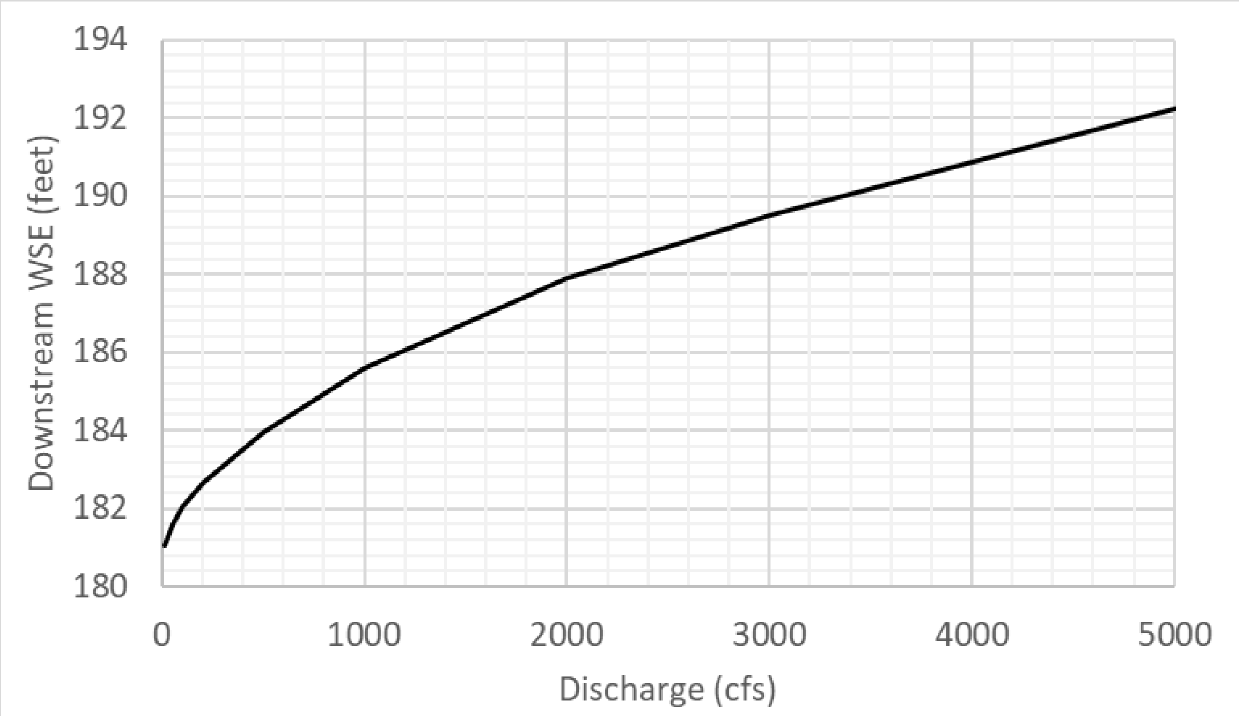


Figure 3-6 Downstream hydraulic rating curve.

3.10.1 No Action

The No Action scenario was initialized with the existing conditions DEM. To prevent appreciable scour in the backwater area immediately upstream of the dam, the bed was set to non-erodible in this area; sediment was allowed to accumulate freely. This choice was made to prevent sediment being transported over the dam unrealistically. It is possible that further model refinement could result in a different result.

3.10.2 Alternative 1: Dam Removal and No Sediment Management

In the case of dam removal with no sediment management, the bed surface is allowed to erode or accumulate freely throughout the model domain.

3.10.3 Alternative 2: Dam Removal and Sediment Management

The dam removal with sediment management alternative was initialized with a bed surface DEM which included a pilot channel design concept as described above. The bed could freely erode or deposit throughout the model domain.

3.10.4 Alternative 3: Incremental Dam Removal and No Sediment Management

Given the choice of using design storms to parameterize bed channel response to dam alternatives, an incremental removal or “notching” of the dam under sequential design storms was not realistic, given the low recurrence probabilities of the design storms. For example, it is unlikely that notching the dam by 2 feet in Step 1 and total 5 feet in Step 2 would each be followed by a large enough event to achieve channel equilibrium after a single event. Further, because sediment transport models are deterministic, the bed adjustment in response to sequential design storms of the same size (i.e. two 10-year storms in a row) produces minimal bed change outside of the immediate dam area as the bed adjusted to the deterministic quasi steady-state condition after the first storm.

After multiple iterations and given the limitation of a numerical modeling method, we ultimately chose to represent the incremental dam removal alternative by modeling separately a 2-foot dam removal and separately a 5-foot dam removal, representative of Year 1 and Year 2 of the incremental dam removal alternative. Because this is a deterministic model, Year 3 of this alternative is the same as Alternative 1, (removal of the entire 8-foot-high dam with no sediment management). If the incremental removal is pre-scheduled (rather than according to monitoring flow rates and channel response), it is possible that a year with low peak flows could result in minimal reworking of the impounded sediment after partial removal and so it is helpful to characterize the 5-foot scenario as a worst-case scenario in an incremental dam removal alternative. Incremental dam removal to specific depths are parameterized so that the bed is set to be non-erodible more than 2 or 5 feet in depth in the impoundment backwater area.

A realistic approach to understanding incremental dam removal could include analysis of annual hydrographs, perhaps including a range of hydrologic responses over the course of a year or multiple years (e.g. dry, average, wet periods). As previously discussed, the design storm approach was selected for this stage in the project development. This is discussed more in Section 5.

4 MODELING RESULTS

Modeling results for the No Action scenario and the three dam alternatives are presented in Appendix A as a series of channel maps and profiles showing areas of bed erosion and deposition. In this case the plot is of *erosion*—positive numbers and cool colors indicate net bed erosion, and negative numbers and warm colors indicate deposition or channel aggradation. Included in each figure is a profile plot through a representative thalweg. The orange profile is the initial condition bed elevation profile (either existing conditions or existing conditions with a pilot channel). The blue lines represent the bed elevation throughout the 48-hour model simulation, progressing from light blue to dark blue. The dark blue profile shows the final simulated channel elevation. It is important to note the representative thalweg location was chosen as the best approximation of a channel bottom which can migrate laterally throughout a simulation and therefore may or may not represent the lowest bed elevation during each timestep. These plots are, however, useful for evaluating the overall channel slope, and general trends in deposition and erosion.

It is also important to note that many of the simulation results show considerable (2+ feet) of deposition at the upstream-most portion of the model domain. This is likely in response to the wide cross-sectional area which includes a large gravel bar and does not include the effect of possibly higher velocities entering the cross-section from the narrower upstream reach. This section of the model domain is more dependent on the model boundary conditions than realistic in-channel conditions, and should therefore not be considered to be indicative of probable geomorphic change.

4.1 No Action

The No Action scenario was evaluated both as a model calibration tool, and to understand the potential range of response to the existing dam structure under a range of design storms. Figures A1 – A3 illustrate an increasing depth of sediment deposited upstream of the Hemphill Dam which is expected as a result of the backwater and grade control effects created by the dam structure. Peak flows close to the 2-year flow event are often estimated to transport the majority of total sediment load over time because flows are large enough to transport a range of grain sizes and occur frequently. Thus, channel form is often largely influenced by flows in the 2-year event range. As expected, simulated channel response to the 2-year flow event (Figure A1) produces a similar bed structure (i.e. pool depths and riffle heights) as compared to the existing channel profile. In contrast, the larger events, 10- and 25-year events, both fill some existing pools and form new, or even deeper pools. This is consistent with the literature on bed response during larger flow events.

4.2 Alternative 1: Dam Removal and No Sediment Management

The first Alternative (Alt. 1) evaluated is the case in which the dam is removed, but no previously-impounded sediment is removed from the channel (Figures A4 – A6). In this case, flows are allowed to freely transport and re-work the stored sediment, transporting it downstream. Simulations indicate that after a 2-year flow event (Figure A4), a new channel thalweg would be carved through the impounded sediment and transported downstream, but channel slope adjustment would not propagate upstream without additional or larger-magnitude flow events. Up to approximately 2 feet of sediment is predicted to be deposited downstream under this simulation.

After a 10-year event, model results indicate that overall channel adjustment would propagate farther upstream (to approximately station 4000) and an average of 3 to 4 feet of sediment would be deposited in the existing downstream scour pool. In this scenario the overall channel slope is predicted to become mostly adjusted to the slope of the reach downstream of the dam, but additional flow events would likely result in further channel change upstream of the impoundment, as allowed by bedrock control.

After a 25-year event, model results indicate that channel adjustment would propagate farther upstream throughout the model domain. Additionally, a local slope break, or "bump" in the sediment accumulation downstream of the former dam (approximately station ~2500) indicates that the receding limb of a 25-year event may be sufficient to propagate some of the deposited sediment downstream.

It is not unexpected that sediment is predicted to accumulate downstream of the dam under this alternative, and this may be a desirable condition. After construction of the dam, the coarse sediment supply was likely interrupted and therefore depleted. Bed scour and an armored, coarse, and tightly-interlocked bed downstream of the dam corroborates this, and could be returned to a more natural channel condition with restored longitudinal slope and sediment transport continuity.

4.3 Alternative 2: Dam Removal and Sediment Management

Alternative 2 simulates channel response to proactive sediment management in the form of a graded pilot channel through the previously impounded sediment. In comparison to the other simulations, Alt. 2 produces the least geomorphic change, with minimal deposition just downstream of the former dam where sediment supply is likely severely depleted (Figures A7 – A9). Despite selecting the pilot channel location in a topographic low on the left side of the existing meander belt, the larger 10- and 25-year flow events indicate that the thalweg would tend to migrate from the original pilot channel location toward the outer right bank where recent and active bank retreat is observed. This is unsurprising as the channel hydraulics are the main driver of the lateral migration and channel incision. If further bank erosion and lateral migration is undesirable upstream of the dam, these model results suggest the need for active management of bank stability in the case of any of the outlined dam removal alternatives.

Although not an unexpected result, these model results suggest that active management of the impounded sediment via excavation and construction of a pilot channel would cause the least amount of deposition, erosion or net sediment transport downstream of the dam. These results also provide an initial assessment of choices in designing the pilot channel slope in connection the upstream and downstream reaches.

4.4 Alternative 3: Incremental Dam Removal

After a 2-foot reduction in the dam height, impounded sediment is predicted to become mobilized in each design storm (Figures A10 – A12). The 2-year flow event would carve a new channel thalweg, but as suggested by a steep slope just upstream of the dam, this flow does not have enough hydraulic power to propagate upstream and adjust the thalweg slope to the upstream reach. Downstream, the geomorphic change is muted as compared to a complete dam removal (Alt. 1), with only 1 to 2 feet of sediment aggradation. In the 10- and 25-year flow events, the channel elevation is predicted to become less steep compared to the 2-year event, the steepened channel would still not propagate upstream throughout the model domain; a slope break still exists between the newly carved thalweg and the upstream reach. Sediment accumulated downstream is considerably less than the full dam removal scenario (Alt. 1).

After a 5-foot reduction in the dam height, we see an exaggerated geomorphic response in all design storms, compared to the 2-foot reduction in dam height (Figures A13 – A15). Interestingly, the 2-year event is sufficient to reconnect the channel elevation at the dam location by filling in the downstream scour pool and eroding the upstream impounded deposits, perhaps suggesting that lowering the dam by 5 feet could be sufficient for re-establishing longitudinal slope, sediment transport continuity, and possibly passage by salmonids. Similar to the 2-foot lowering, a 5-foot lowering produces a fairly steep channel slope in the impoundment area and maintains a slope break, with approximately 2 feet of sediment deposition in the reach immediately downstream of the dam. A 10-year event propagates the slope break observed in the 2-year model results farther upstream, but also accumulates approximately 3 to 4 feet of sediment downstream of the former dam. Model results suggest that portions of the upstream channel are relatively unimpacted by the change in dam elevation, even at 5 feet.

Modeling results of the incremental dam removal alternatives suggest that incremental lowering of the dam to an ultimate elevation that is 5 feet lower than the existing crest may limit the spatial scale of the geomorphic change, particularly regarding slope adjustment upstream of the dam. This may be a desirable alternative if geomorphic change needs to be actively managed. Conversely, there are typically extra costs and impacts associated with repeated mobilization and channel disturbance which should be weighed against other dam alternatives.

5 NEXT STEPS

5.1 Model Refinement

As the dam removal alternatives are refined, this analysis should be revised and updated. Now that the sediment transport model framework has been established, additional alternatives can be evaluated with relative efficiency. If dam removal with sediment management (Alt. 2) is selected and a "pilot channel" is constructed we recommend additional model runs to refine the placement, width, and slope of the channel.

5.2 Use of Design Storms for Understanding Geomorphic Response Times

To balance the need to explore geomorphic responses to a number of dam removal alternatives, and absent consistent high-flow gaging data, we have chosen to use design storms as input hydrology for this analysis. In reality, geomorphic response is directly dependent on the frequency and magnitude of storm events over longer periods of time than modeled, though these are difficult to predict accurately. The most accurate quantification of geomorphic timescale response would involve obtaining accurate streamflow hydrographs through streamflow gaging at this location over multiple years and modeling sediment transport dynamics over the annual hydrographs during years with low, moderate, and sustained high flow conditions. and in differing sequences. This is both resource intensive, both in terms of labor and computation resources. At this stage in the project, the design storms adequately frame the type of response that is to be expected under different alternatives and during different high flow events, both of which were selected for simplicity and clarity of results comparison. Future analysis of annual hydrographs could be completed with either modeled or measured flow data and is recommended after further alternative refinement.

5.3 Upstream Bank Stability Assessment

Alternative refinement should include additional considerations of the eroding right bank upstream of the dam. If a dam removal alternative is selected without actively reconfiguring the channel, it is likely that the adjustment of the bed (likely incision) would further destabilize the already migrating and failing bank. If that is an undesired outcome, the results of this analysis suggest that use of a pilot channel may be able to redirect flows away from the bank in the short-term channel adjustment period, but we recommend that additional design elements be included with the pilot channel configuration to reduce the risk of channel migration toward this bank. Such elements could consist of bio-engineered bank stabilization techniques.

5.4 Fish Habitat Impacts

This sediment transport modeling exercise does not include an assessment of fish passage potential or the short- or long-term impacts to fish habitat upstream and downstream of the project site. Upon further refinement, a similar analysis could be employed to evaluate the impact of bedload transport on habitat. If analysis of short-term turbidity is necessary, we would recommend further model calibration supplemented with collection of field data.

6 LIMITATIONS

This sediment transport modeling was prepared in general accordance with the accepted standard of practice existing in Northern California for projects of similar scale at the time the investigations were performed. No other warranties, expressed or implied, are made. We note that modeling is a difficult and inexact art, and a variety of physical factors can affect the results from what has been presented herein; in particular, geomorphic change, redevelopment, and bed grain size distribution. Judgments leading to conclusions and recommendations are generally made with an incomplete knowledge of the conditions present and based on data provided by others. More extensive or extended studies, including additional hydrologic or geomorphic baseline monitoring, can reduce the inherent uncertainties associated with such studies. If the client wishes to further reduce the uncertainty beyond the level associated with this study, Balance should be notified for additional consultation.

Concepts and findings contained in this report are intended for characterizing potential range of geomorphic response to dam removal alternatives in Auburn Ravine only, and should not be used for other purposes without great care, updating, review of analytical methods used, and consultation with the authors.

We have used standard environmental information such as precipitation, topographic mapping, and soil mapping, in our analyses and approaches without verification or modification, in conformance with local custom. New information or changes in regulatory guidance could influence the plans or recommendations, perhaps fundamentally. As updated information becomes available, the interpretations and recommendations contained in this report may warrant change. To aid in revisions, we ask that readers or reviewers advise us of new plans, conditions, or data of which they are aware.

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APPENDIX A

Modeling Results

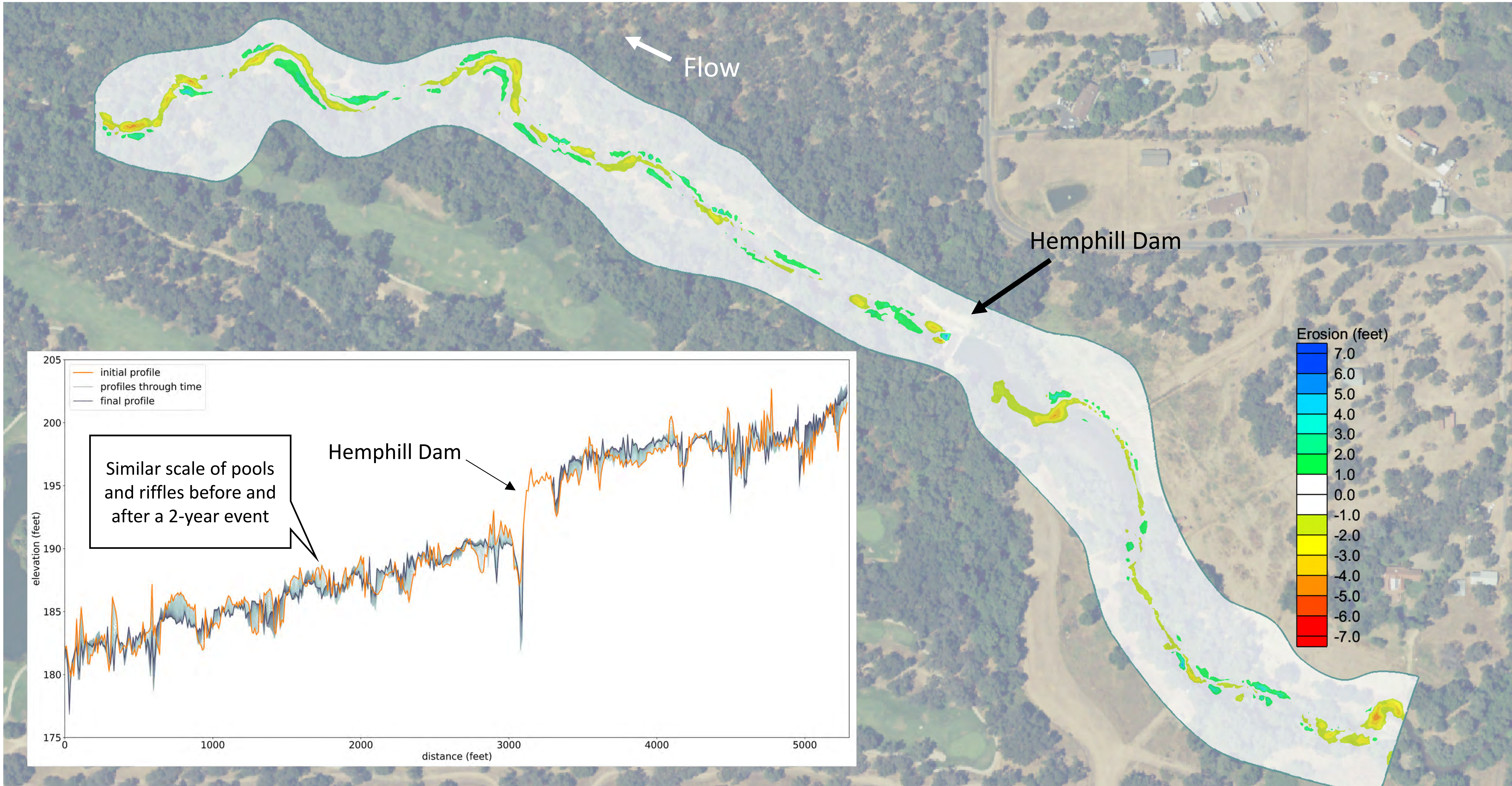

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Figure A1. No Action Scenario, 2-year event erosion and deposition map with profile plot.

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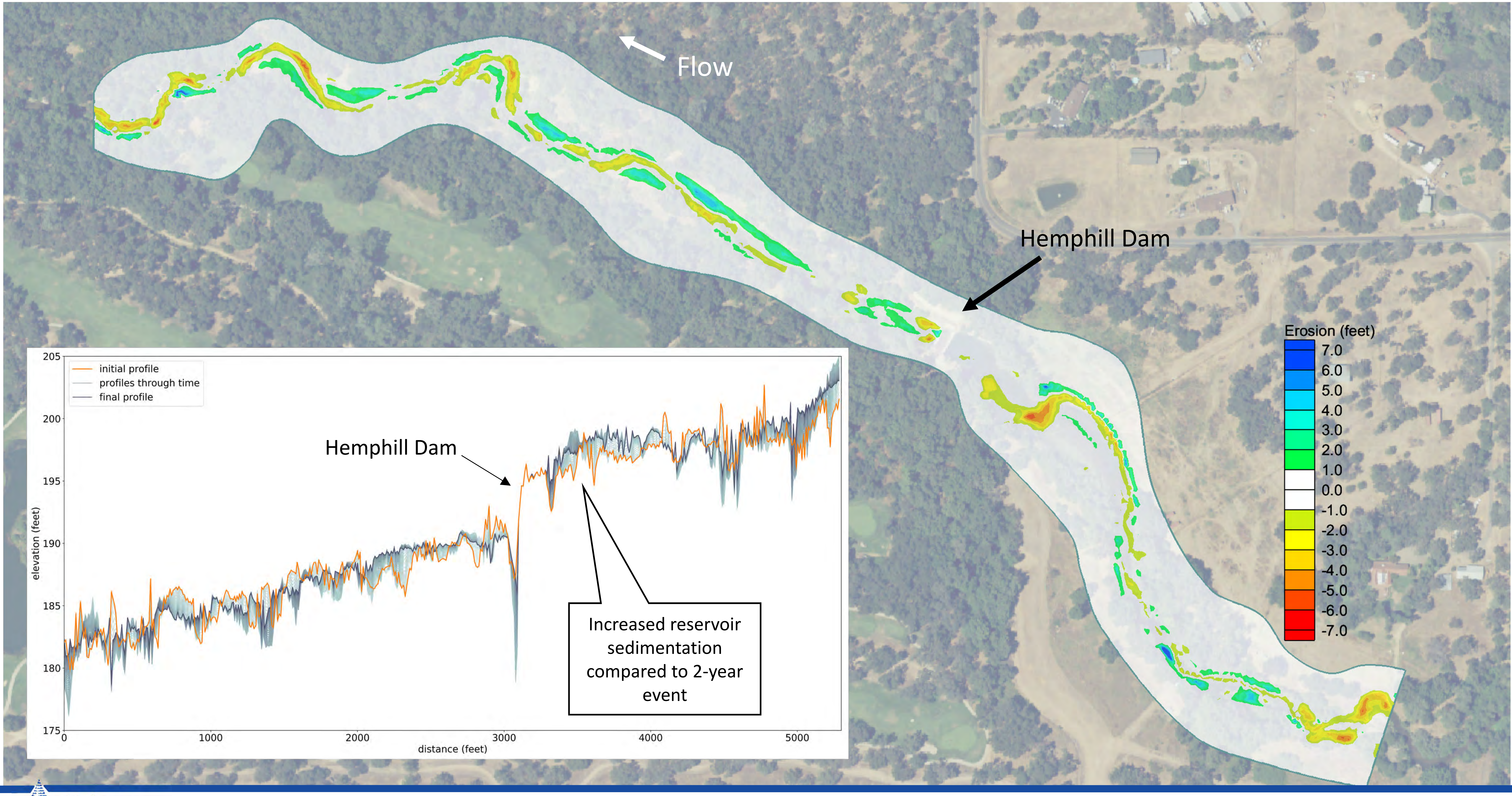

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Figure A2. No Action Scenario, 10-year event erosion and deposition map with profile plot.

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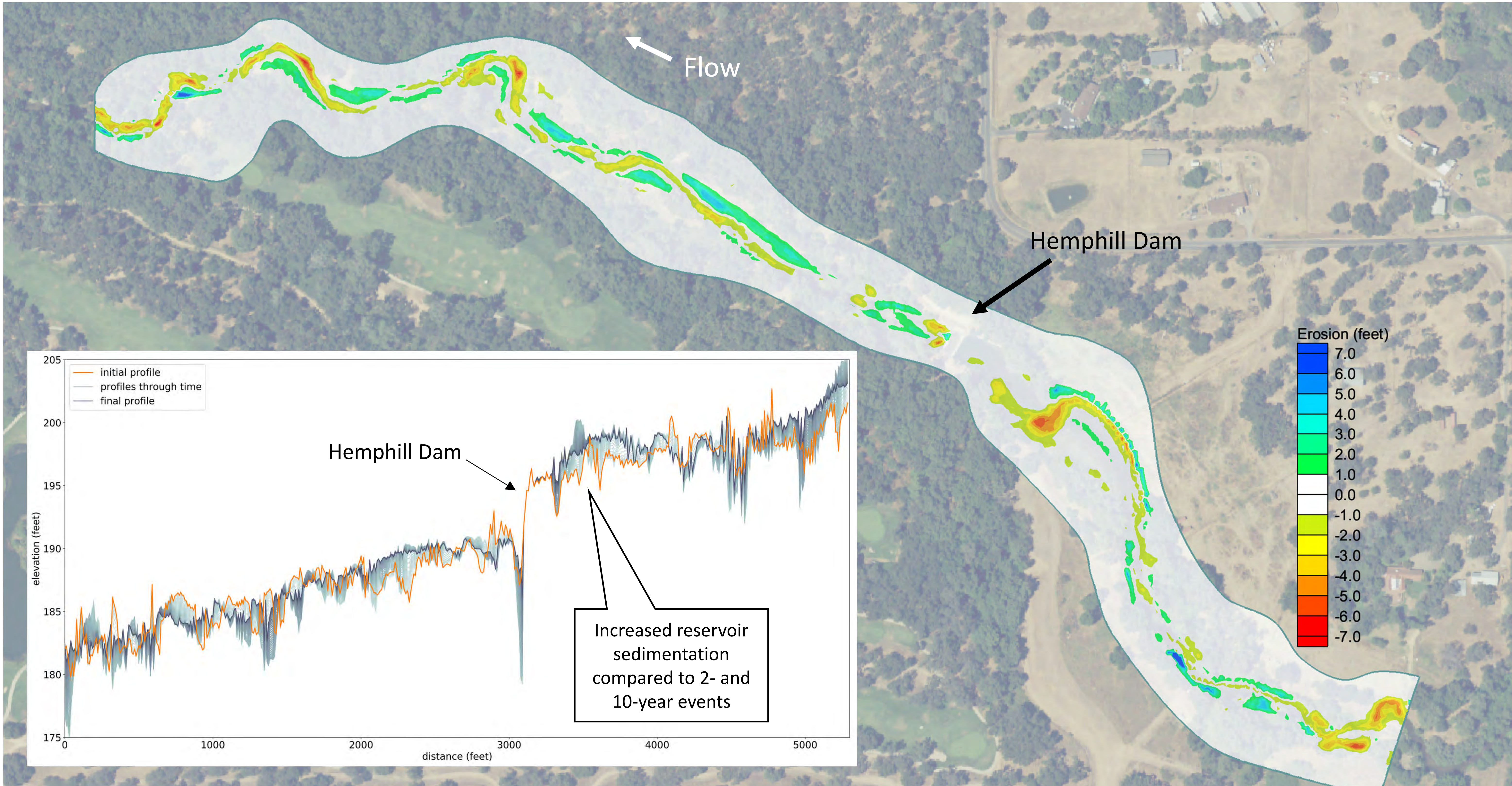

Figure A3. No Action Scenario, 25-year event erosion and deposition map with profile plot.

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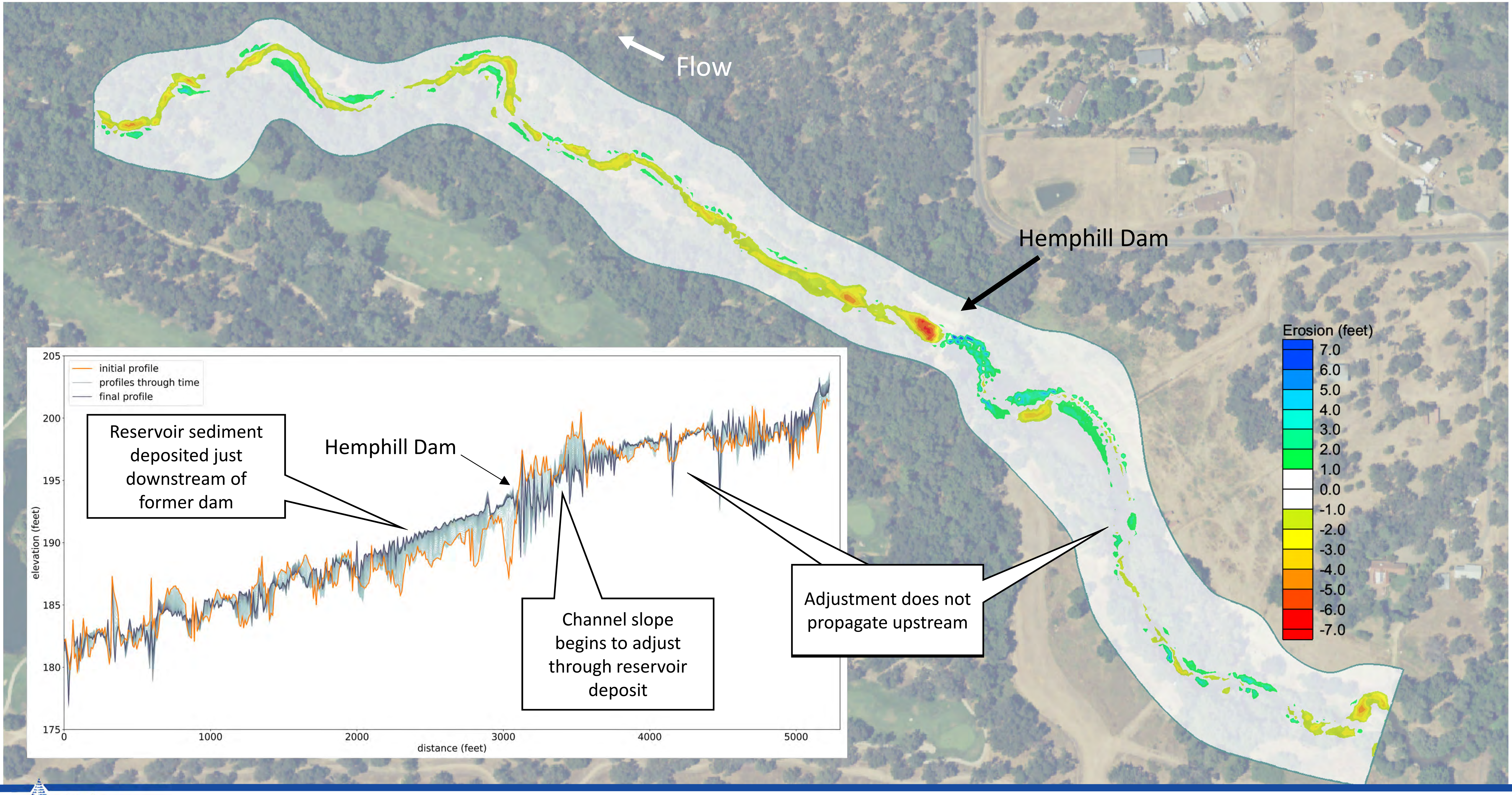

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Figure A4. Dam Alternative 1: Dam Removal and No Sediment Management, 2-year event erosion and deposition map with profile plot.

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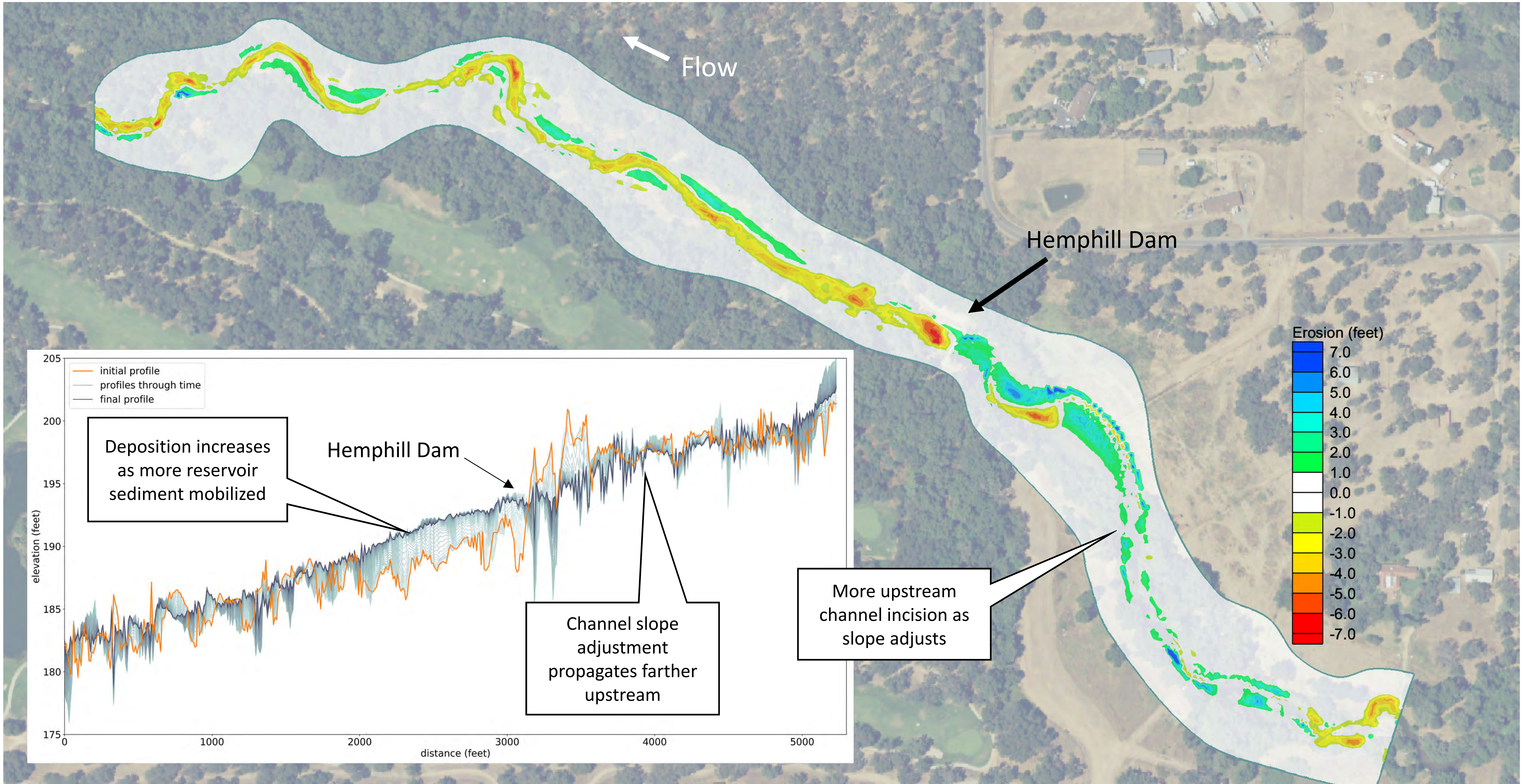

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Figure A5. Dam Alternative 1: Dam Removal and No Sediment Management, 10-year event erosion and deposition map with profile plot.

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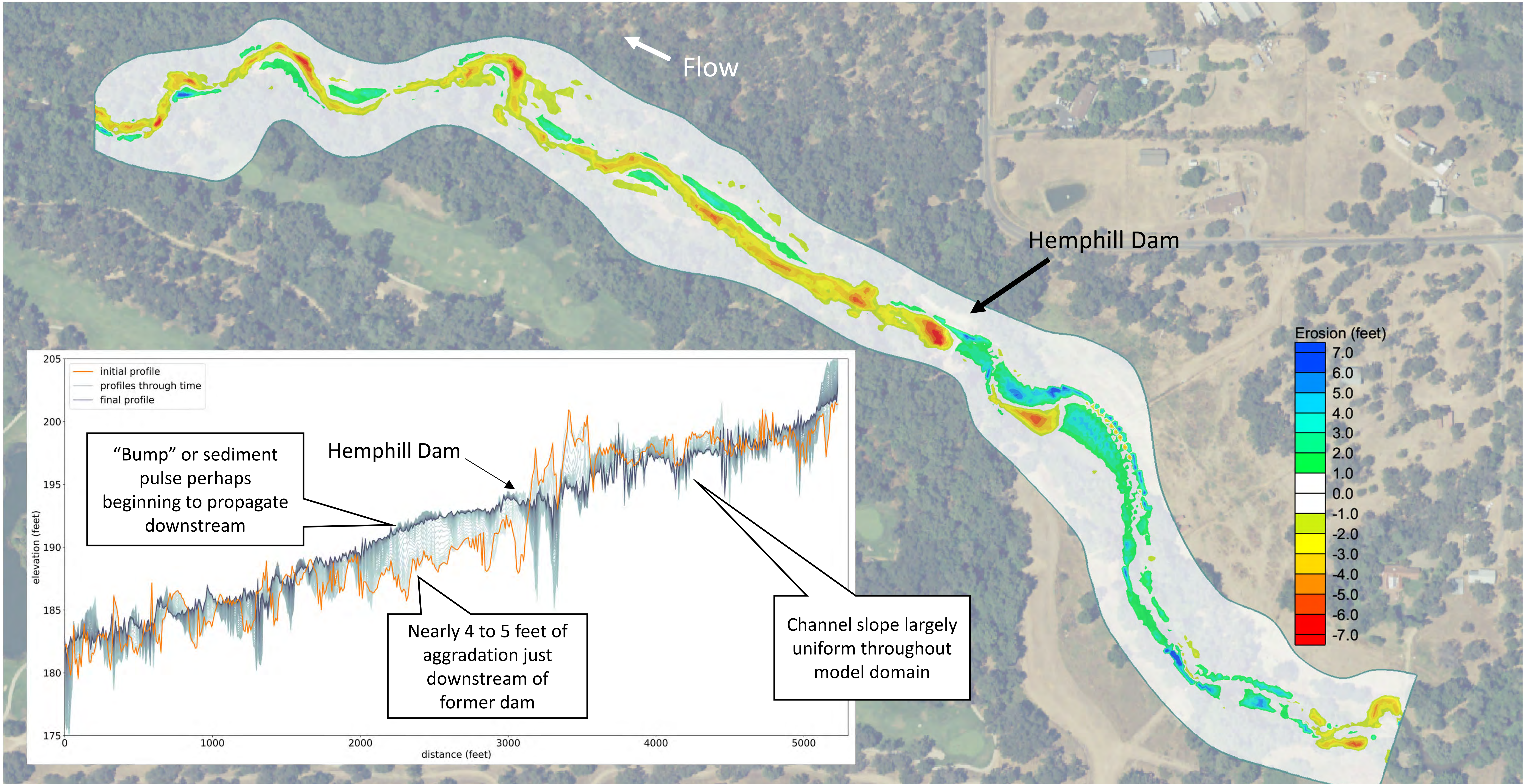

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Figure A6. Dam Alternative 1: Dam Removal and No Sediment Management, 25-year event erosion and deposition map with profile plot.

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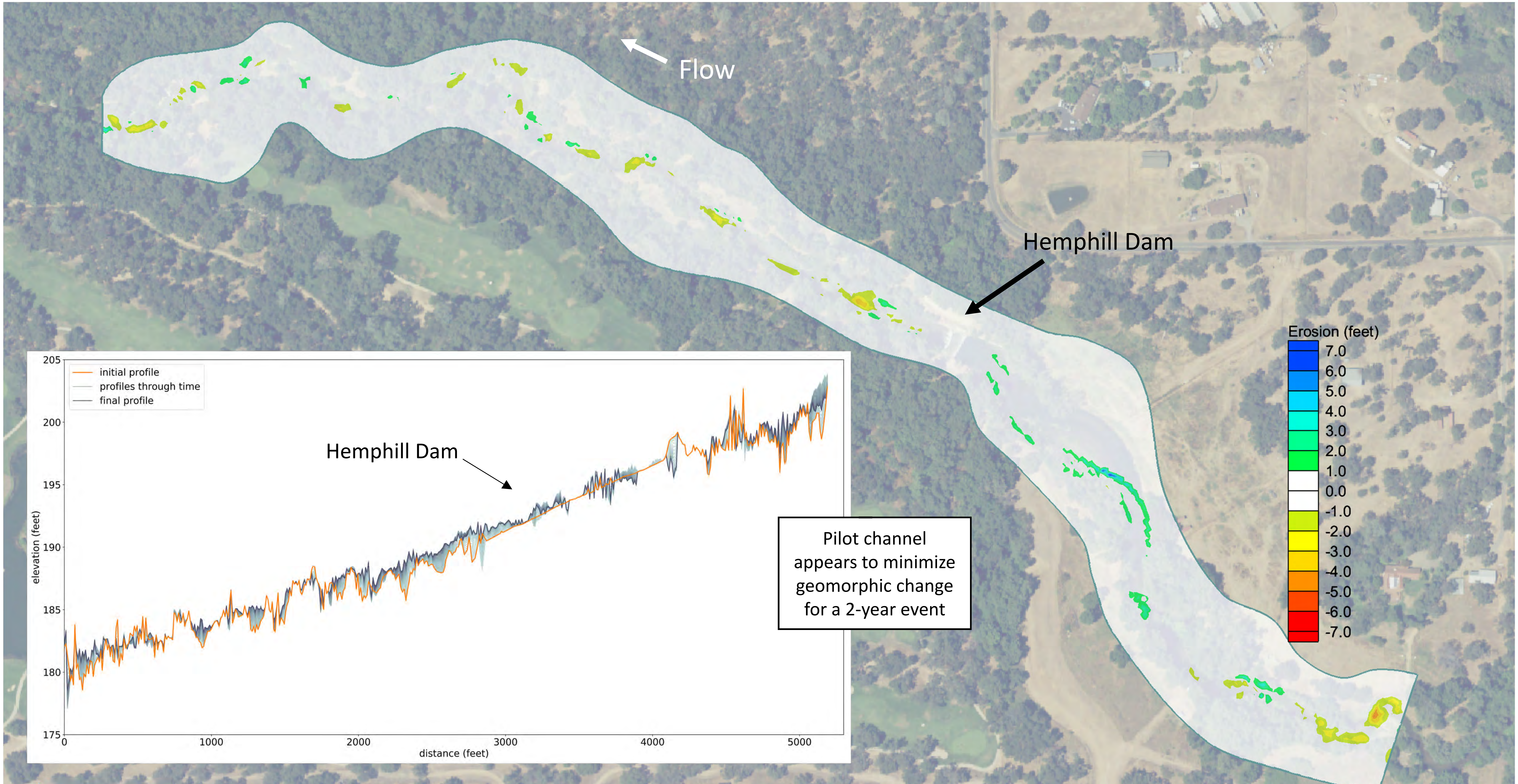

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Figure A7. Dam Alternative 2: Dam Removal and Active Sediment Management, 2-year event erosion and deposition map with profile plot.

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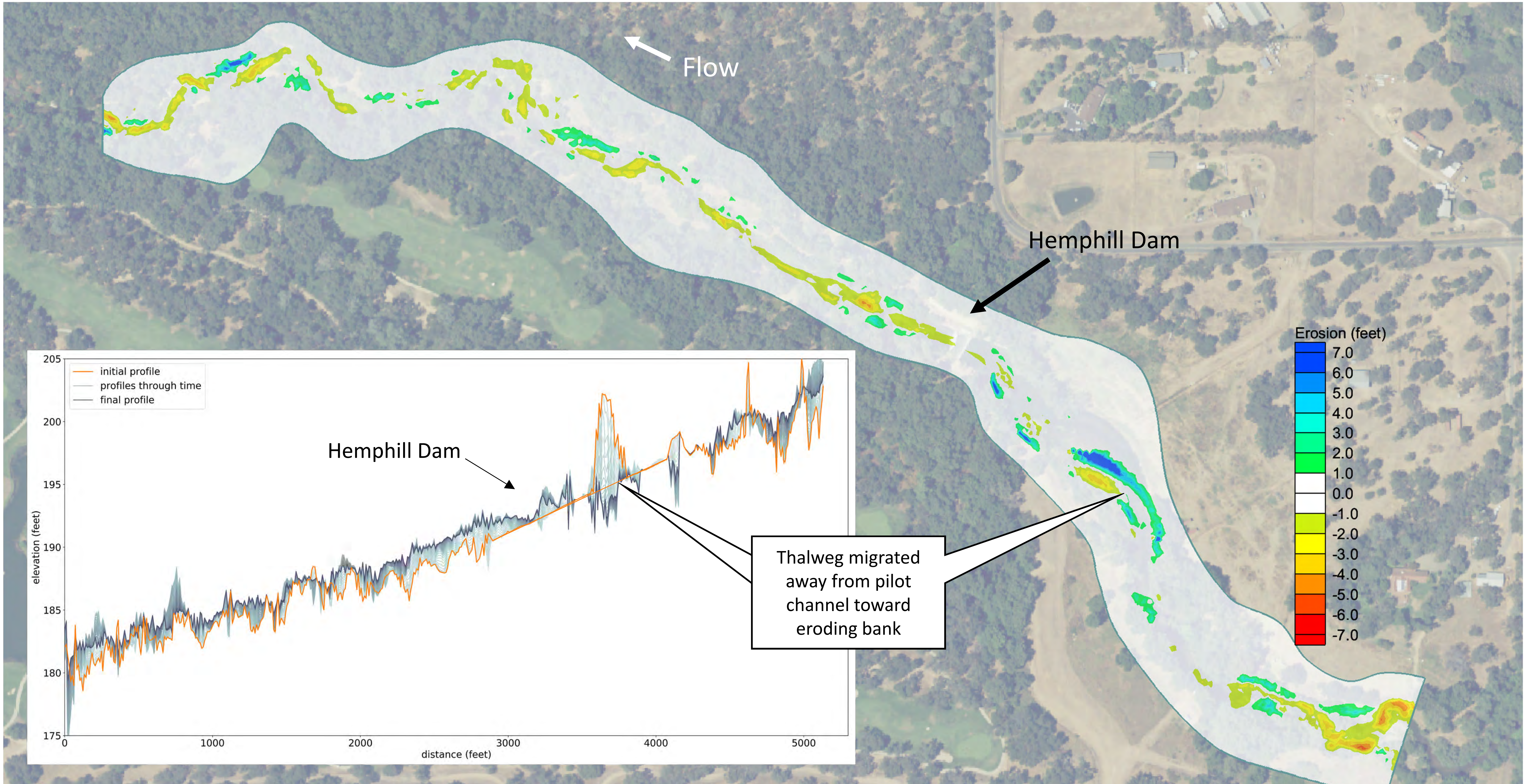

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Figure A8. Dam Alternative 2: Dam Removal and Active Sediment Management, 10-year event erosion and deposition map with profile plot.

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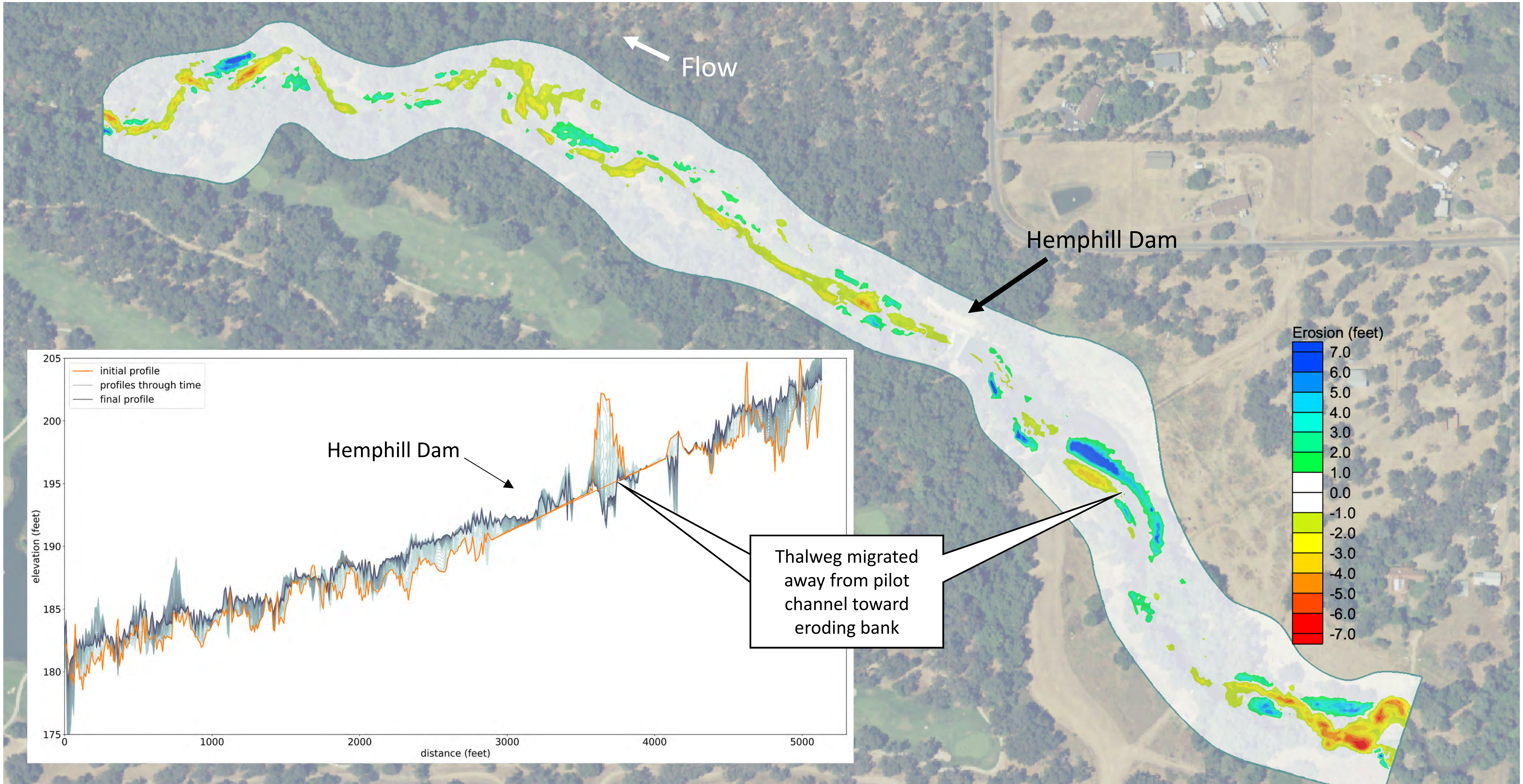

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Figure A9. Dam Alternative 2: Dam Removal and Active Sediment Management, 25-year event erosion and deposition map with profile plot.

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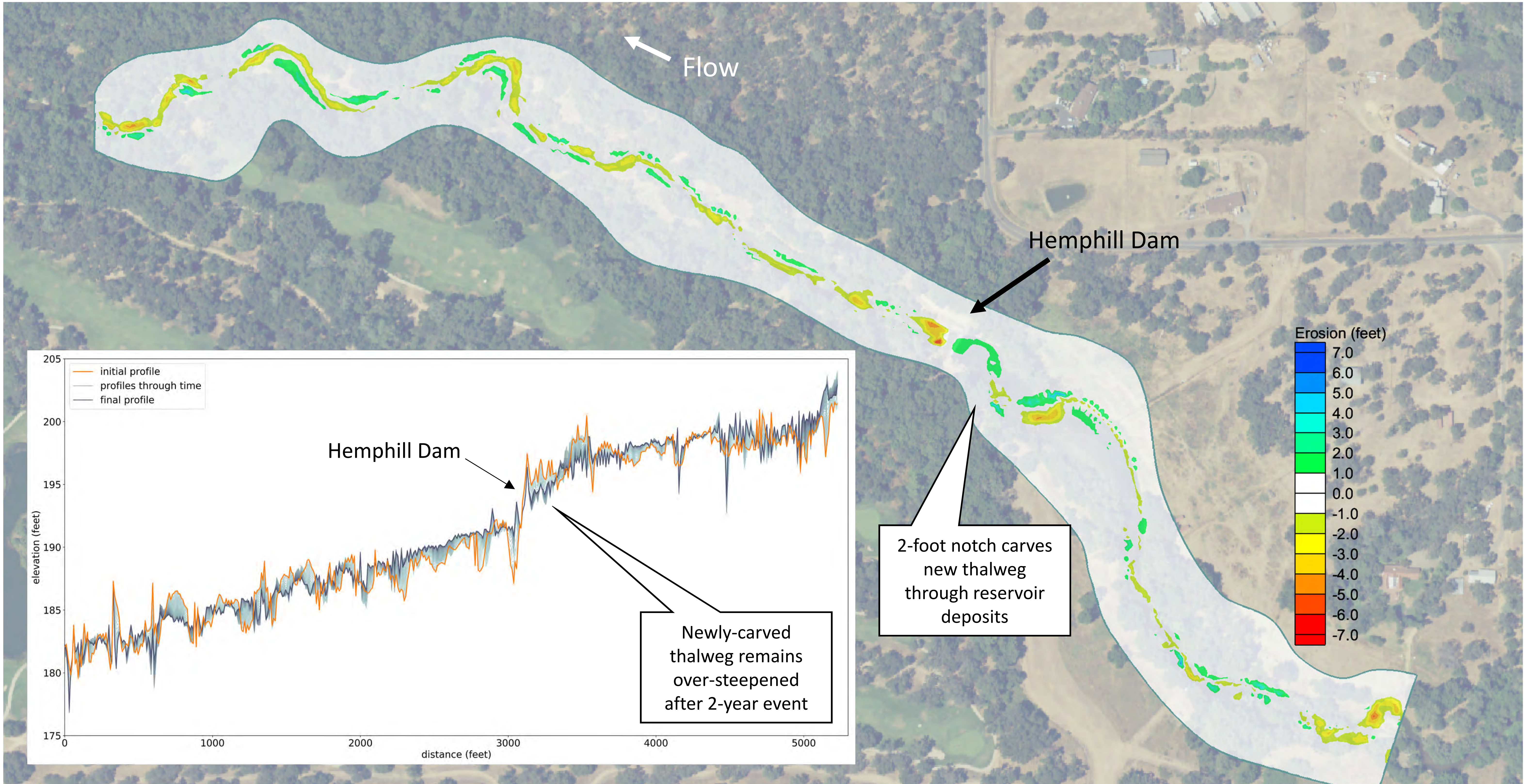

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Figure A10.Dam Alternative 3: Incremental Dam Removal (2 feet) and No Sediment Management, 2-year event erosion and deposition map with profile plot.

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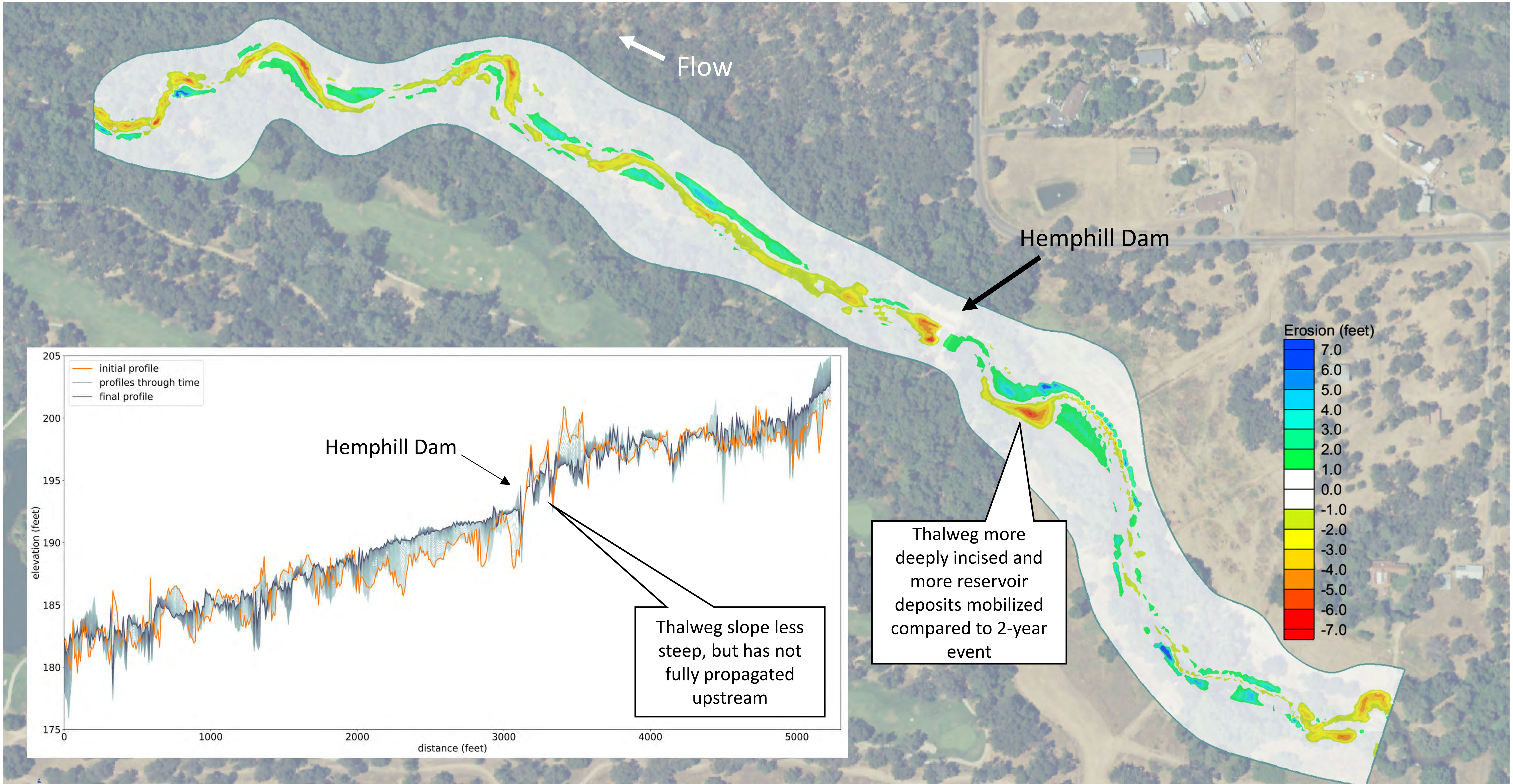

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Figure A11.Dam Alternative 3: Incremental Dam Removal (2 feet) and No Sediment Management, 10-year event erosion and deposition map with profile plot.

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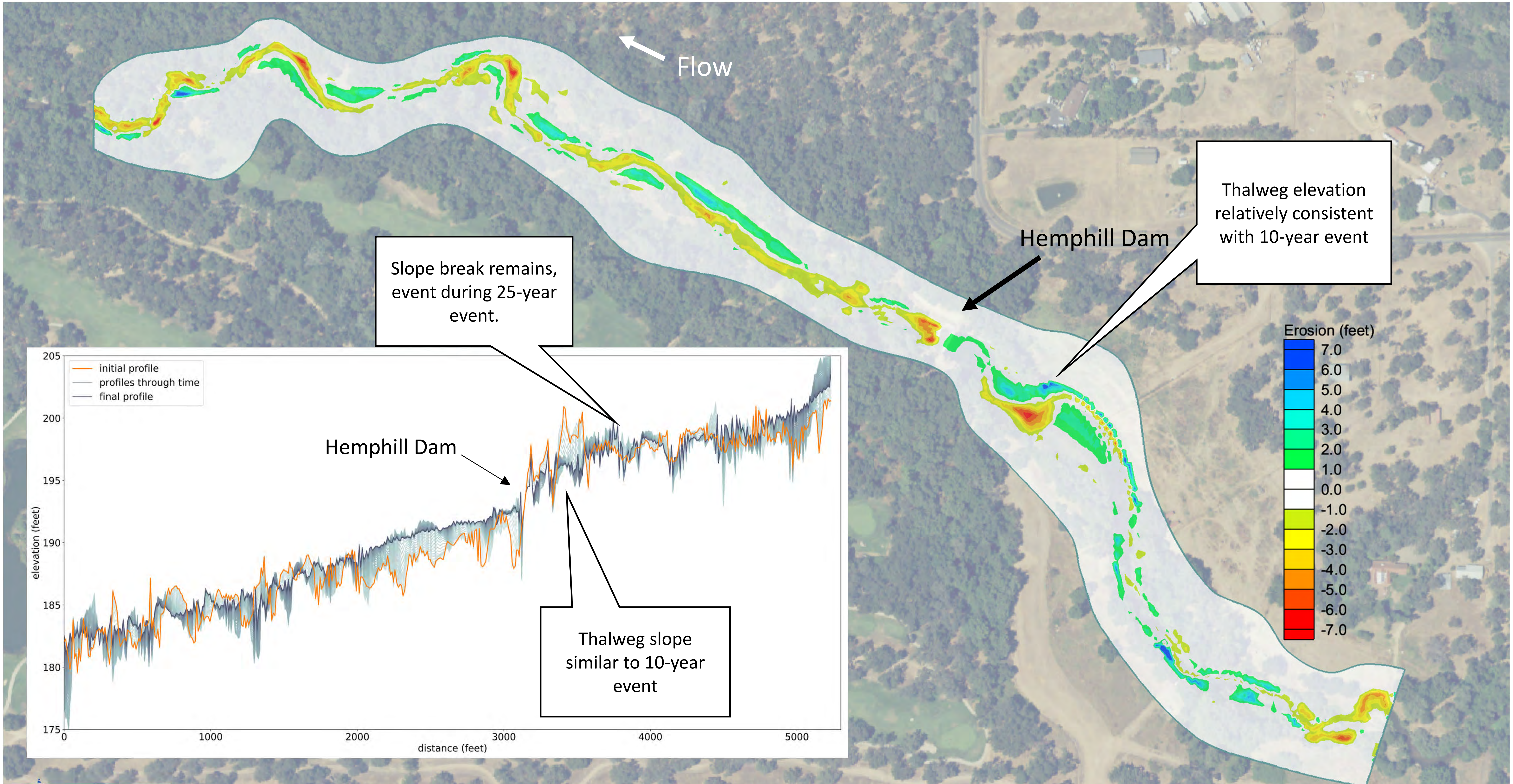

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Figure A12.Dam Alternative 3: Incremental Dam Removal (2 feet) and No Sediment Management, 25-year event erosion and deposition map with profile plot.

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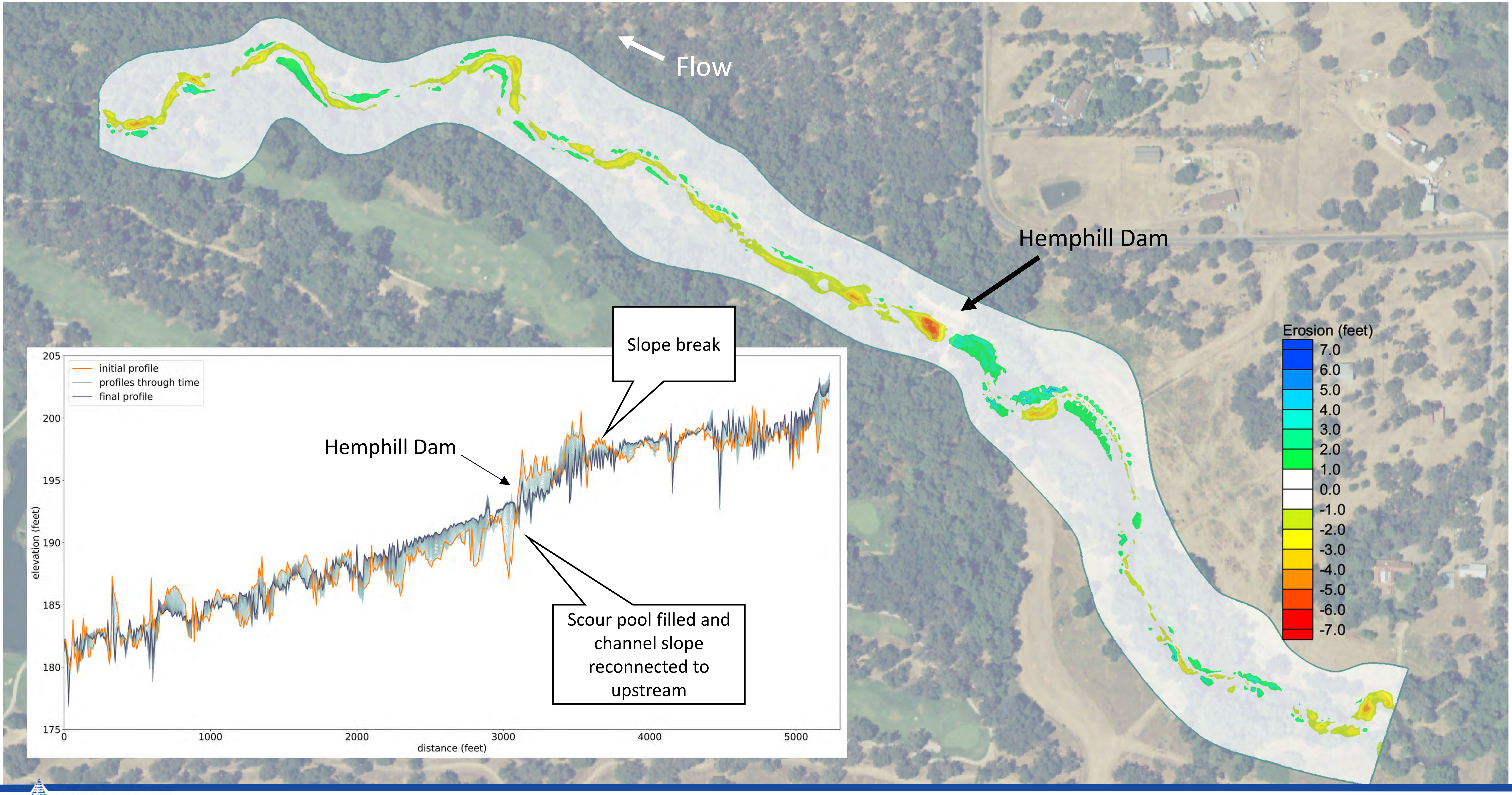

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Figure A13.Dam Alternative 3: Incremental Dam Removal (5 feet) and No Sediment Management, 2-year event erosion and deposition map with profile plot.

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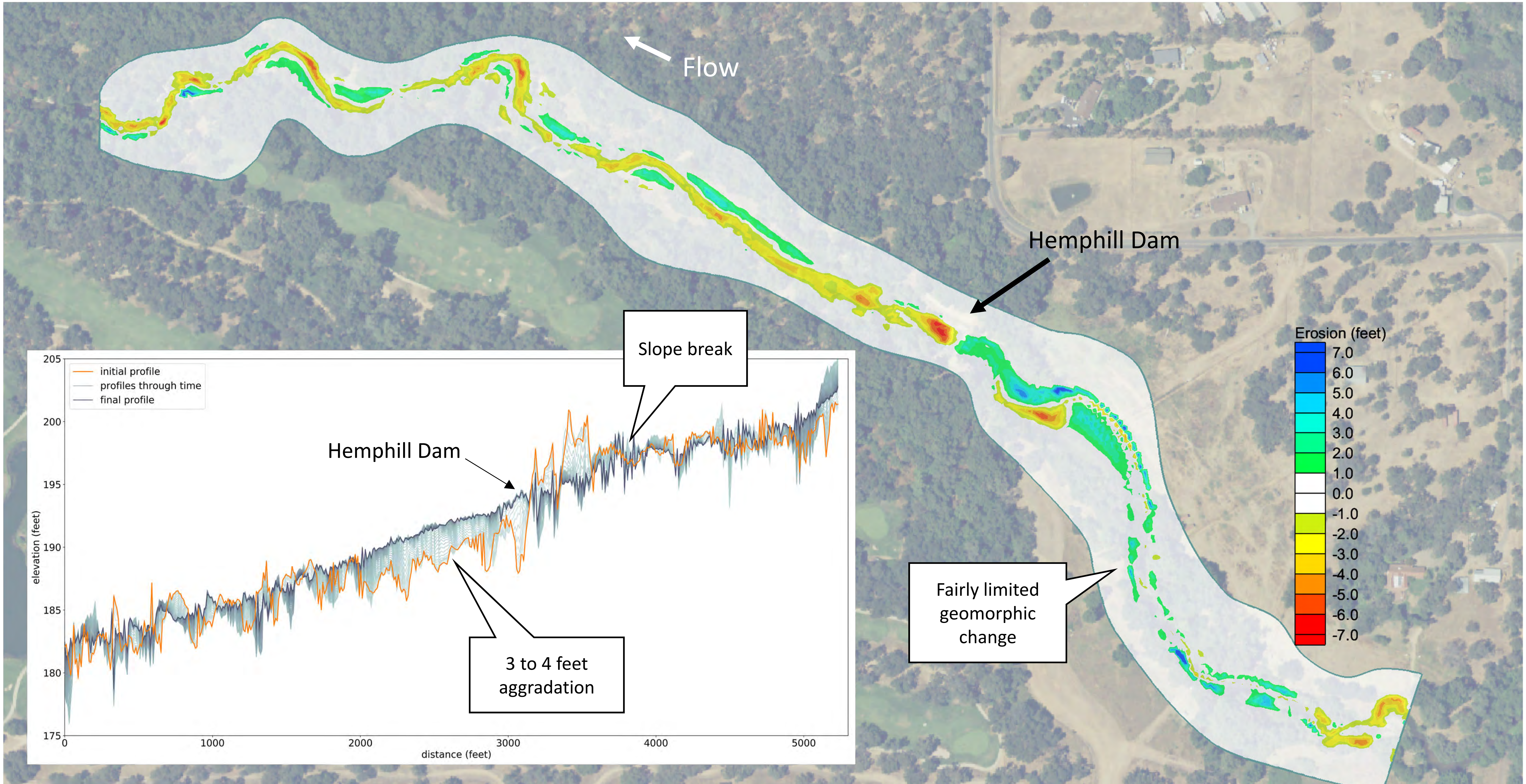

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Figure A14.Dam Alternative 3: Incremental Dam Removal (5 feet) and No Sediment Management, 10-year event erosion and deposition map with profile plot.

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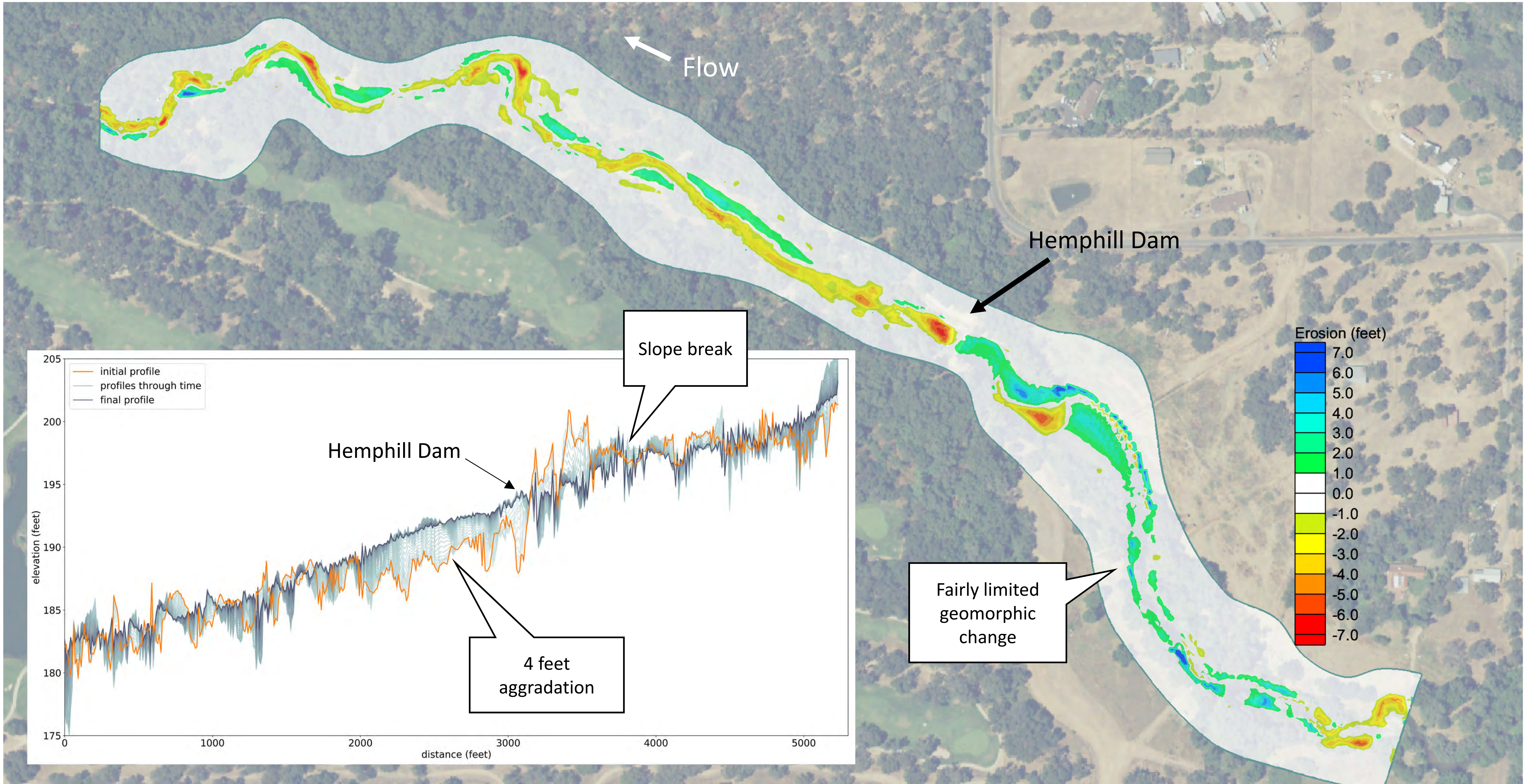

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Figure A15.Dam Alternative 3: Incremental Dam Removal (5 feet) and No Sediment Management, 25-year event erosion and deposition map with profile plot.

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APPENDIX 3.3 C

Fish Passage Alternatives Developed for
Auburn Ravine's NID Gaging Site and Hemphill Dam Site
(Michael Love & Associates 2009);

10965-07-002.11003

FISH PASSAGE ALTERNATIVES DEVELOPED FOR AUBURN RAVINE'S NID GAGING SITE & HEMPHILL DAM SITE

March 2009

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Purpose

The purpose of this Technical Memorandum is to describe the result from our alternatives development and feasibility level analysis for improving fish passage at two sites on Auburn Ravine operated by the Nevada Irrigation District (NID): (1) the gaging station near State Route 65 and (2) the Hemphill Diversion Dam. The information provided is intended to assist the advisory group in selecting a preferred alternative for each site. Once selected, engineering designs will be completed and a basis of design report will be prepared.

Background

Auburn Ravine is a tributary to the Sacramento River. The watershed drains the lower foothills of the Sierra and its headwaters are located near the City of Auburn at an elevation of approximately 1,600 feet. Auburn Ravine emerges from the Sierra foothills as it flows through the Town of Lincoln. Downstream of Lincoln the channel becomes highly altered as it flows through channelized section within agricultural lands dominated by rice fields.

Auburn Ravine supports runs of Chinook salmon and steelhead trout. However, two migration barriers on Auburn Ravine have been identified as limiting the population:

1. A drop at the outlet of a concrete Parshall flume at the NID Gaging Station, located 1,250 feet downstream of State Route 65 in the City of Lincoln, and

2. The Hemphill Diversion Dam, located at the northwest corner of the Turkey Creek Golf Club, approximately 1.5 miles upstream of State Route 193.

Both facilities are operated by the Nevada Irrigation District (NID).

The County of Placer has employed the services of Winzler & Kelly (project engineers), Michael Love & Associates (fish passage engineers) and McBain & Trush (riparian vegetation and fisheries consultants) to design fish passage improvements for salmonids at the NID Gaging Station and Hemphill Dam sites.

A project advisory group was composed of numerous stakeholders, which included staff from the County of Placer, the City of Lincoln, NID, and the California Department of Fish and Game (CDFG). Members of the design team met with the advisory group for a design review meeting on November 20, 2008 to review and provide comment on the conceptual alternatives. Comments and suggestions received were then incorporated into the final alternatives presented in this Technical Memorandum.

Project activities included conducting a phone interview with the operations manager for the NID facilities to clarify current operational procedures and indentify potential project constraints. A topographic survey of both sites was conducted in 2008. Existing vegetation at both sites was mapped in 2007 and fish habitat was mapped in 2008. Findings from the vegetation and fish habitat mapping will be provided in a separate report and will be used for evaluating potential project impacts.

Hydrology

The Auburn Ravine watershed has a Mediterranean climate with low-elevation rain dominated hydrology. Over 85% of precipitation occurs between November and April. Based on observations and historic streamflow records from other similar streams within the region, flows in Auburn Ravine respond rapidly to rainfall events, with the hydrograph both rising and falling abruptly. Historically, flows within Auburn Ravine would have been extremely low to nonexistent during the dry season (May through October).

Flow augmentation has dramatically changed the flow characteristics of Auburn Ravine during the dry season. Auburn Ravine currently serves as a conveyance channel for irrigation water obtained from an inter-basin transfer. The augmented flow is delivered to Auburn Ravine at the Wise Power House, operated by Pacific Gas and Electric and located approximately one mile west of Auburn. Referred to as the "irrigation season", flow augmentation generally begins between April 15th and May 1st, and ends by October 15th. NID measures flow during the irrigation season at the NID Gaging Station near State Route 65. They provided the design team with daily flow records for the irrigation season for 1974 to 2007. Mean monthly flows range from 37 cfs in September to 116 cfs in July (Table 1). To our knowledge, there has been no year-round gaging of streamflows in Auburn Ravine.

Table 1. Mean flow in Auburn Ravine at the NID Gaging Station during periods of flow augmentation.

Month	Mean Flow
May	89 cfs
June	80 cfs
July	116 cfs
August	93 cfs
September	37 cfs

Fisheries Overview

Auburn Ravine has significant anadromous fish resources, which include fall-run and late fall-run Chinook salmon and steelhead trout. Gravel bedded stream reaches suitable for spawning for salmonids exists upstream from City of Lincoln. Surveys of potential salmonid spawning habitat within streams in Western Placer County found that Auburn Ravine contains more potential spawning habitat than all other surveyed stream reaches combined (Jones & Stokes, 2004).

The historic low summer flows would have dramatically limited the amount of habitat available for summer rearing of steelhead/rainbow trout. The increased flow and cool water temperatures associated with flow augmentation has dramatically increased the quantity and quality of summer rearing and foraging habitat for salmonids. Fish sampling by CDFG in 2004 and 2005 found various size classes of steelhead/rainbow trout at all sites sampled between State Route 65 in Lincoln and the Wise Power House. Population densities of various size classes of steelhead/rainbow trout were reported to be relatively high within sampled reaches upstream of State Route 65, with relative steelhead/rainbow trout abundance ranging from 337 to 7,985 individuals per river mile. Other native fish species sampled upstream of State Route 65 included Sacramento pikeminnow, Sacramento sucker, lamprey, and speckled dace.

NID Gaging Station

Located directly downstream of State Route 65 in the City of Lincoln, the NID Gaging Station is a Parshall flume type structure owned and maintained by NID to monitor flow in Auburn Ravine during the irrigation season. The structure consists of a flat channel-spanning concrete section that forms a broad flume with vertical sides. A level ogee shaped curb, approximately 0.8 feet tall, spans the outlet of the fume. This curb provides adequate depth for fish to swim across the concrete section at all flows. The flume and curb section is 25 ft wide, with flaring sidewalls and apron at the inlet and outlet. The entire length of the flume, measured from the ends of the aprons, is 28.5 feet.

Figure 1. A riprap ramp leading up to the NID flow gaging station, which consists of a 25-foot wide concrete Parshall flume. At low flows (a) water depths are too shallow for fish passage. At higher flows (b) water velocities and turbulence can become excessive for passage of adult and juvenile salmonids.

We understand the NID Gauging Station was built in 1981. Since then, the channel bed downstream of the flume has incised approximately 6 feet. To protect the structure from erosion and undermining, large rock has been placed immediately downstream of the flume. This forms an over-steepened riprap ramp that produces shallow depths during lower flows and turbulent conditions with high velocities at higher flows (Figure 1). As a result, upstream passage is partially blocked for adult anadromous salmonids, and may be completely blocked for juvenile salmonids and adult resident trout.

Hemphill Diversion Dam

The Nevada Irrigation District operates a water diversion facility that includes the Hemphill Dam. We understand the Hemphill Canal was built by NID in 1935 and a wooden diversion structure was constructed in Auburn Ravine to divert flows into the canal. In 1969, the existing concrete head works of the Hemphill Canal were built and the existing concrete diversion dam was built in 1981. The typical maximum diversion rate is approximately 20 cfs.

The current concrete diversion dam is located within a low gradient pool-riffle reach of Auburn Ravine. The dam crest is 64 feet wide and 11 feet long, with 6 feet tall concrete abutments. The concrete dam crest is approximately 8 feet above the downstream channel. The face of the dam and channel banks extending 30 feet downstream of the crest have been armored with a mixture of rock and concrete slurry to control scour (Figure 2). Large rock has been placed along the toe of the slurry mixture. On the banks downstream of the concrete slurry, there is rock slope protection (RSP). During the irrigation season, flashboards are added to the top of the dam. The total height of the flashboards is 3.0 feet. The resulting headwater elevation provides sufficient depth at the headgate to obtain the desired diversion rate. The flashboards are generally in-place between April 15 and October 15.

Figure 2. Hemphill Dam at beginning of irrigation season, with 3-foot tall flashboards installed.

During the high winter flows, the flashboards are not in-place and it may be possible for a few adult steelhead to migrate over the dam. Once the flashboards are in-place, the dam is a total barrier adult steelhead. In addition, adult resident trout and juvenile salmonids are blocked at all flows.

Upstream of the dam is a broad active floodplain along the north side of the channel and a smaller floodplain along the south bank. The channel becomes more incised downstream of the dam and it is uncertain if high flows can access the flood plain. Overbank flows upstream of the dam in 2005/2006 return to the channel along the right (north) bank, causing extensive bank erosion. As a result, NID armored approximately 50 feet of the right bank downstream of the dam with 1- to 2-ton riprap.

Previous Fish Passage Study

A conceptual fish passage design report was developed for the NID Gaging Station and the Hemphill Dam (The Mines Group, 2005). The report provided two alternative approaches in addressing fish passage at the NID Gaging Station site. The first approach involved the removal of the structure and the second involved rock-filled gabions to construct a pool and weir fish ladder. Removal of the structure is not recommended because of the headcutting and severe upstream channel incision that would likely result. For the Hemphill Dam the report recommends rock-filled gabions pool and weir fish ladder along the face of the dam apron.

Comments made by CDFG indicated that other alternatives, such as a channel-spanning re-grade using boulder weirs, or similar rock type structures, be explored for the NID Gaging Station and Hemphill Dam sites before an alternative is selected for design.

Project Goals and Objectives

This project is part of a larger effort aimed at enhancing both anadromous and resident salmonid populations within Auburn Ravine. Specific project objectives are:

- Provide upstream passage at the NID Gaging Station and Hemphill Dam for adult anadromous Chinook salmon and steelhead trout during the migration period (October 15 – April 15).

- Provide adult resident and juvenile salmonids upstream passage at the NID gaging station and Hemphill Dam during the non-irrigation season (October 15 – April 15).

- Maintain the ability of the NID gaging station to accurately measure discharge within the flow range occurring during the irrigation season.

- Maintain NID's ability to divert water into the Hemphill Canal at current rates.

- Evaluate fish passage alternatives at the NID gaging station and Hemphill Dam that use rock and other natural materials to control channel grade ("nature-like fishways"), rather than focusing solely on traditional types of fishways.

Several other potential objectives, that have not been agreed upon nor required, may include:

- Providing upstream passage for adult resident trout during the irrigation season (April 15 – October 15).

- Providing upstream passage for juvenile salmonids during the irrigation season (April 15 – October 15).

- Providing safe downstream passage for kelts at the Hemphill Dam during irrigation season (April 15 – October 15).

FEMA Peak Flow Hydrology and Hydraulic Models

According to the 1998 FEMA FIRM, the NID Gaging Station is located in a reach of channel designated as a Floodway in Zone AE (Base Flood Elevation of 147 feet) and the Hemphill Dam is located in a reach of channel designated as Zone A (Base Flood Elevation not established). The FEMA Flood Insurance Study (FIS) is currently being revised and base flood elevations are expected to be established at the Hemphill Dam site. Additionally, the base flood elevation will likely change at the NID Gaging Station based on changes in watershed hydrology and recent grading of the floodplain within the project reach. According to Placer County Flood Control and Water Conservation District, the drainage area for the NID Gaging Station and the Hemphill Dam reaches are 32.20 square miles and 31.63 square miles, respectively. The FIS recommended revised 100-year peak flow rate for full buildout conditions is 12,109 cfs at the NID Gaging Station and 12,151 cfs at the Hemphill Dam. We did not receive an explanation to why the upper site has a higher predicted peak flow.

We requested a copy of the current FEMA FIS and associated hydraulic model from both the City of Lincoln and the County of Placer, but neither had the files available. Additionally, we were informed that the new hydraulic model as part of the FIS revision cannot be made available for this project until it is completed and accepted by FEMA which may not occur until after this project is designed.

Fish Passage Criteria

Fish passage alternatives developed for the two sites on Auburn Ravine are limited to use of the "hydraulic design approach." Under the hydraulic design approach, a fish passage facility is designed to provide passage for specific age/size classes of a fish species at all flows from the low to high fish passage design flow. Passage is provided by producing hydraulic conditions within the swimming and leaping capabilities of the target fish.

Target Species and Lifestages

For the NID Gaging Station and Hemphill Dam, the target species for upstream passage are Chinook salmon and rainbow/steelhead trout. Because juvenile Chinook salmon begin migrating downstream towards the ocean shortly after emerging from the gravels, only the adult lifestage of Chinook salmon requires upstream passage. For rainbow trout, upstream passage should be provided for juveniles and adults, including both the adult resident (rainbow trout) and adult anadromous (steelhead) life histories of the species. To assist in establishing design criteria and evaluating fish passage conditions, four "design fish" were selected:

- **Yearling Trout (*0+Year Trout*)**
  - Approximate Size Range: 60 to 100 mm (2.3 to 3.9 inches)

- **Trout Age 1 Size Class (*1+Year Trout*)**
  - Approximate Size Range: 150 to 240 mm (5.9 to 9.4 inches)

- **Trout Age 2 Size Class (*2+Year Trout*)**
  - Approximate Size Range: 250 to 310 mm (9.8 to 12 inches)

- **Adult Anadromous Steelhead Trout and Chinook Salmon**

Hydraulic Criteria

California Department of Fish and Game (CDFG, 2003) and National Marine Fisheries Service (NMFS, 2002) provide guidance in selecting water velocity, water depth, pool depth, and hydraulic drop design criteria for juvenile salmonids (*0+Year Trout*), adult resident trout (*2+Year Trout*), and adult anadromous salmonids (*Salmon and Steelhead*) (Table 2). For *1+Year Trout*, criteria were selected based on values in published literature combined with professional judgment. Turbulence within a pool can also create a barrier to fish passage, and is evaluated for pool and weir style fishways using the Energy Dissipation Factor (EDF).

Table 2. Fish passage criteria applied to both project sites.

Fish Passage Criteria	Salmonid Lifestage			
	0+Year Trout	**1+Year Trout**	**2+Year Trout**	**Adult Anadromous**
Max. Water Surface Drop[a]	0.5 ft	0.5 ft	0.66 ft	1.0 ft
Min. Water Depth[a]	0.5 ft	0.5 ft	0.66 ft	1.0 ft
Max. Water Velocity for distances less than 60 ft[a]	1 ft/s	3 ft/s[b]	4 ft/s	6 ft/s
Max. EDF for Pools (turbulence)[c]	Not Available	Not Available	3 ft-lb/s/ft^3	4 ft-lb/s/ft^3
Min. Depth in Pools[c]	2.0 ft			
Min. Attraction Flow (%Total Flow in Fishway)	Not Available	Not Available	10%	10%

[a] Based on CDFG (2003) and NOAA (2002) design guidelines, except where noted.
[b] Based on swimming abilities for 6 inch rainbow trout (Tsukamoto, 1975)
[c] Based on Bell (1991)

Fish passage facilities that do not span the entire channel and/or convey the entire streamflow must be designed so fish can find the fishway entrance with little difficulty or delay. This requires establishing good fish attraction, which includes placing the entrance near the barrier and creating hydraulic conditions that attract the fish to the entrance. Hydraulic features that improve attraction include creating a flow jet at the entrance that penetrates the tailwater pool and conveying at least 10% of the total streamflow through the fishway entrance.

Fish Passage Design Flows

Fish passage facilities designed using the hydraulic design approach require a low and high passage design flow for each target fish. This defines the range of flows that suitable fish passage conditions should be provided, including water depths, velocities and drop heights. CDFG (2003) and NMFS (2002) provide guidance in selecting fish passage design flows for projects involving road-stream crossings that can be applied to other projects using the hydraulic design approach. Design flows are defined based on exceedance probabilities obtained from an annual flow duration curve (FDC) constructed using daily average flows (Table **3**). For the low passage design flow, an alternative minimum flow is provided. The guidelines do not include design flow recommendations for *1+year trout*.

Table 3. Fish passage design flows, as prescribed by CDFG (2003) and NMFS (2002).

Salmonid Life Stage	**Fish Passage Design Flow**	
	Low	**High**
Adult Anadromous	50% Annual Exceedance Flow or 3 cfs (lesser of the two)	1% Annual Exceedance Flow
Adult Resident Trout (*2+ year trout*)	10% Annual Exceedance Flow or 2 cfs (lesser of the two)	5% Annual Exceedance Flow
Juvenile Salmonids (*1+ year trout*)	5% Annual Exceedance Flow or 1 cfs (lesser of the two)	10% Annual Exceedance Flow

Defining fish passage design flows for Auburn Ravine is made more complex due to the flow augmentation. Because flows are gaged only during the irrigation season, a synthetic FDC was constructed for Auburn Ravine to predict exceedance flows for the non-irrigation season (October 15 – April 15), which is when adult anadromous salmonids and resident trout typically migrate to spawn. Three streams with suitable streamflow records and similar watershed characteristics as Auburn Ravine were used for development of the FDC:

- Cosgrove Creek near Valley Springs, CA
  (USGS Station No. 11309000, Drainage Area = 20.6 mi^2, Operated 1929-1962)

- Murray Creek near San Andreas, CA
  (USGS Station No. 11308500, Drainage Area = 23.6 mi^2, Operated 1950-1959)

- Calaveritas Creek near San Andreas, CA
  (USGS Station No. 11306500, Drainage Area = 53.3 mi^2, Operated 1950-1966)

Other streams closer in proximity were evaluated but considered ill-suited due to the extent of urbanization within the watershed and the degree of upstream impoundments and diversions.

The synthetic FCD was constructed by developing FDC's for each gaged stream using only flows during the defined migration season of October 15 to April 15. Exceedance flows from each gaging station were then scaled to the drainage area of Auburn Ravine and averaged. A flow duration curve was also constructed for the irrigation season (April 15 to October 15) using the 31 years of daily record flows from the NID gaging station. Finally, an annual FDC was constructed by combining the two (Figure 3).

The combined FDC was used to determine fish passage design flows for the NID Gaging Station (Table 4). Velocities in the Parshall flume exceed the 1 ft/s velocity criteria for *0+ Trout* at slightly more than 25 cfs. One of the project objectives is to preserve the ability to use the flume for measuring flows. Decreasing velocities in the flume would compromise its measurement accuracy. Therefore, the high passage design flow for the *0+ Trout* was set at 25 cfs. This is equivalent to the 20% exceedance flow for the period October 15 – April 15, and would be equal to the 10% annual exceedance flow if Auburn Ravine flows were not augmented during the irrigation season.

For Hemphill Dam, not all developed alternatives assume passage is required when the flashboards are installed. Therefore, two sets of fish passage design flows were developed for Hemphill Dam: (1) with the flashboards removed (Table 5) and (2) with flashboards installed (Table 6).

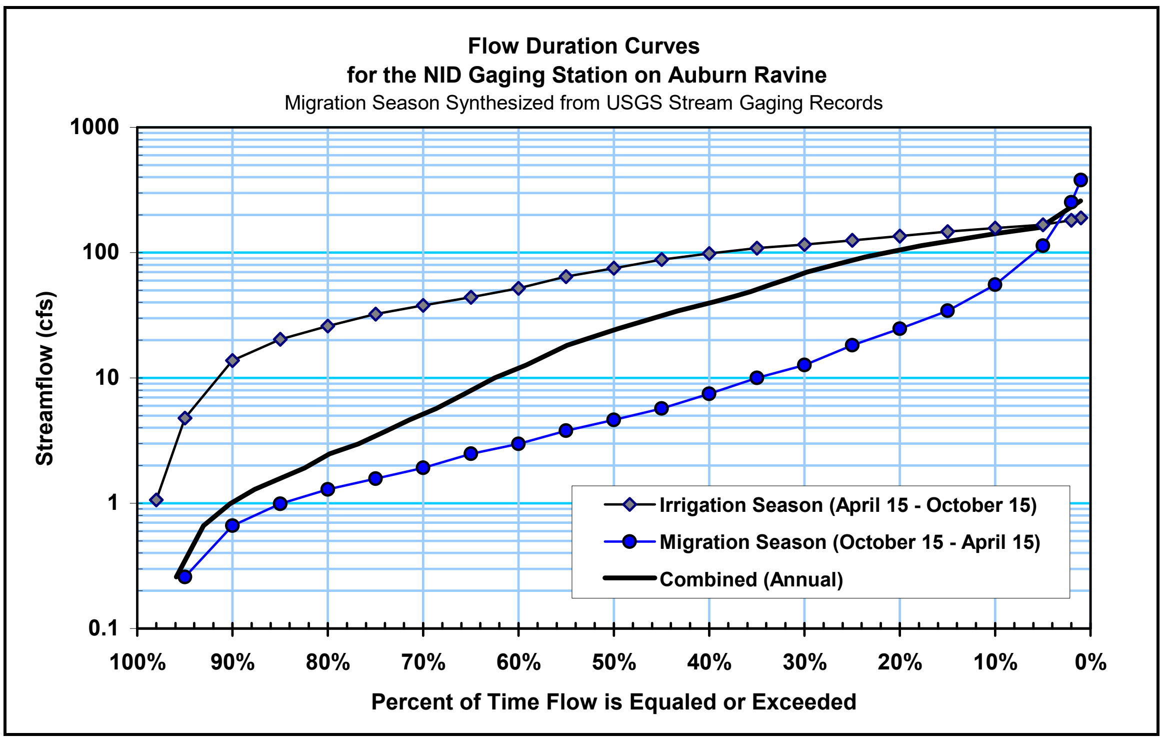


Figure 3. NID Gaging Station Flow duration curves for the irrigation season, adult anadromous salmonid migration season, and the entire year.

Table 4. Proposed fish passage design flows for NID Gaging Station.

Salmonid Life Stage	Fish Passage Design Flow		Description of High Passage Design Flow
	Low[1]	High	
Adult Anadromous	3 cfs	259 cfs	1% Annual Exceedance Flow

2+ Year Trout	2 cfs	159 cfs	5% Annual Exceedance Flow
1+ Year Trout	2 cfs	143 cfs	10% Annual Exceedance Flow
0+ Year Trout	1 cfs	25 cfs[2]	20% Exceedance Flow Oct 15– Apr. 15

[1] The CDFG and NMFS alternative minimum flows.
[2] High fish passage design flow limited by velocities in Parshall flume.

Table 5. Proposed fish passage design flows for the Hemphill Dam during periods when no flashboards are installed.

Salmonid Life Stage	Fish Passage Design Flow		Description of High Passage Design Flow
	Low[1]	High	
Adult Anadromous	3 cfs	254 cfs	1% Annual Exceedance Flow
2+ Year Trout	2 cfs	156 cfs	5% Annual Exceedance Flow
1+ Year Trout	2 cfs	140 cfs	10% Annual Exceedance Flow
0+ Year Trout	2 cfs	24 cfs	20% Exceedance Flow Oct 15– Apr. 15

[1] The CDFG and NMFS alternative minimum flows.

Table 6. Proposed fish passage design flows for the Hemphill Dam during periods when flashboards are installed (if passage is required).

Salmonid Life Stage	Fish Passage Design Flow		Description of High Passage Design Flow
	Low[1]	High	
Adult Anadromous	3 cfs	156 cfs	10% Exceedance Flow from Apr. 15 to Oct. 15
2+ Year Trout	2 cfs	156 cfs	10% Exceedance Flow from Apr. 15 to Oct. 15
1+ Year Trout	2 cfs	140 cfs	20% Exceedance Flow from Apr. 15 to Oct. 1
0+ Year Trout	1 cfs	24 cfs	80% Exceedance Flow from Apr. 15 to Oct. 1

[1] The CDFG and NMFS alternative minimum flows.

Developed Alternatives for the NID Gaging Station

Several design approaches were considered for addressing fish passage at the NID Gaging Station. Based on comments provided by CDFG in regards to the previous fish passage conceptual design report (The Mines Group, 2005), developed alternatives for the NID Gaging Station focused on use of a channel-spanning roughened channel or boulder weirs to regrade the downstream channel. A primary design constraint was to maintain NID's ability to use the flume for gaging streamflows. This requires providing adequate fish passage into the existing flume without backwatering the flume.

NID provided their current stage-discharge rating table for the flume. Based on this, existing hydraulic conditions within the flume are suitable for fish passage, especially adults, over a wide range of flows (Table 7). This is largely due to the presence of the 0.8 feet high ogee shaped curb spanning the outlet of the flume. Depth in the flume may be between 0.8 feet and 1.0 feet at flows less than 7.2 cfs, which is slightly less than the minimum depth required (1 foot) for adult anadromous salmon and steelhead.

Table 7. Existing water depth and velocities within the Parshall flume at the NID Gaging Station

Discharge (cfs)	Depth in Flume (ft)	Velocity in Flume (ft/s)	Note
0	0.8	0	Depth at No Flow Due to Curb Height
7.2	1.0	0.3	Minimum Depth Criteria for Adult Anadromous Salmon and Steelhead
31	1.3	1.0	Maximum Velocity Criteria for *0+ Trout*
168	2.2	3.0	Maximum Velocity Criteria for *1+ Trout*
276	2.8	4.0	Maximum Velocity Criteria for *2+ Trout*
593	3.9	6.0	Maximum Velocity Criteria for Adult Anadromous Salmon and Steelhead

Two potentially feasible alternatives were developed and evaluated. Both consist of a roughened channel constructed of rock chutes and armored pools. The primary difference between them is the overall slope of the roughened channel and the downstream ending location.

Alternative 1 – Steeper Roughened Channel with Chutes & Pools

Alternative 1 consists of a roughened channel with rock chutes and pools. The conceptual designs are illustrated in Figure 4 through Figure 7. The overall slope and length of the roughened channel is 4% for 180 feet. Chutes have a slope of 8% and the drop across the chute range between 1 and 2 feet. The drop across the pools is zero feet. The chutes and pools are designed to mimic the morphology of steep natural channels. The bed and banks are constructed from a matrix of large rock mixed with smaller material to control porosity. The larger material is sized to remain stable up the 100-year flood.

The existing curb on the outlet of flume will be notched. The crest of the chute downstream of the flume will be positioned approximately 0.7 feet lower than the crest of the existing curb to minimize or avoid backwater influence on the flume. This chute will have a horizontal crest to minimize increases in water depth with increasing flows. A pool will be placed between the flume and chute to dissipate energy and provide resting habitat for fish before they swim through the flume. The stage-discharge rating curve for the flume will likely need to be updated following construction.

Channel-spanning sheetpile or cast in place concrete weirs are recommended in four locations for this alternative. One sheetpile would be located at the crest of the upstream-most chute and would be placed at grade with a concrete cap to provide a stable and consistent cross section below the flume. The tops of the remaining three sheetpiles are placed below the roughened channel bed (not visible). These provide increased stability for the roughened channel bed and banks and function as cut-off walls to minimize subsurface flow during low-flows. The geotechnical investigation, to occur during the next phase of the project, will assist in determining the suitability of the soils for use of sheetpile.

The existing banks are unstable and will be laid back to allow for replanting above the banklines of the roughened channel. The entrance (downstream end) of the roughened channel is placed upstream of a currently unstable section of channel, which includes active bank failures and channel widening in response to channel incision. During final design, tying into and stabilizing the existing banks at the downstream transition will need to ne addressed.

Preliminary analysis indicates this alternative satisfies fish passage criteria for all life stages at the indicated design flows.

Alternative 2 – Steeper Roughened Channel with Chutes & Pools

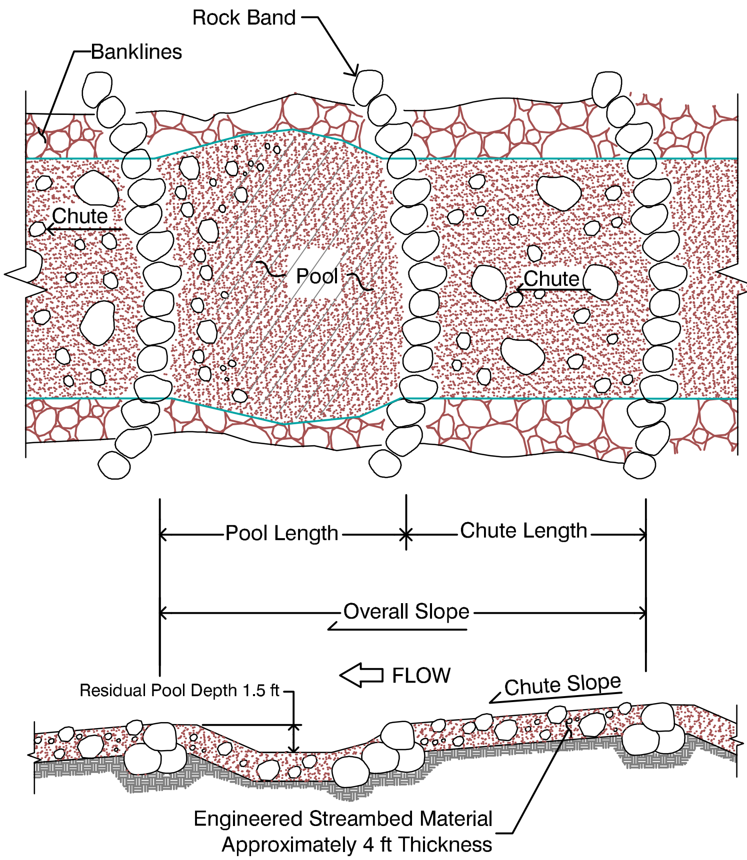
Alternative 2 is a roughened channel with chutes and pools, with design and stabilization measures similar to Alternative 1. The conceptual designs are illustrated in Figure 4 and Figure 8. For this alternative, the overall slope is reduced to 3%, causing it to extend 230 feet downstream of the flume. The alternative extends farther downstream than Alternative 1, locating the downstream end in an unstable reach with widening and unstable banks. Chutes slope at 6% and drops across the chutes are between 1 and 2 feet. The existing curb will be notched. To minimize or avoid backwatering the flume, the upstream-most chute will have a horizontal crest positioned approximately 0.7 feet lower than the crest of the existing curb in the flume.

Due to the lower overall channel slope, sheetpile may not be required for maintaining stability of the material in the chutes. However, this may provide less ability to control low-flow permeability.

Preliminary analysis indicates this alternative satisfies fish passage criteria for all life stages at the indicated design flows.

Outstanding Issue for NID Gaging Station Site

The final feasibility determination will rely on determining the discharge in the channel during the 100-year flow. This will determine if the stable rock size is reasonable at the 100-year flow is feasible. Determination of the amount of flow in the channel versus flow conveyed across the floodplain will require obtaining the most current HEC-RAS hydraulic model of the project reach. There is considerable uncertainty in the amount of flow conveyed in the channel immediately downstream of the NID Gaging Station due to the size and elevation of the upstream floodplain, and the presence of a constructed overbank flood channel south of the main channel. Based on the calculated capacity of the Parshall flume, upstream flow begins to go out of bank at approximately 1,000 cfs.



CHUTE-POOL ROUGHENED CHANNEL PLAN AND PROFILE
NOT TO SCALE

Alternative 1: Chute-Pool Sequence
Overall Slope 4%, Chute Slope 8%

Drop Across Chute	1 ft	2 ft
Chute Length	12.5 ft	25 ft
Pool Length	12.5 ft	25 ft

Alternative 2: Chute-Pool Sequence
Overall Slope 3%, Chute Slope 6%

Drop Across Chute	1 ft	2 ft
Chute Length	16.5 ft	33 ft
Pool Length	16.5 ft	33 ft

FIGURE 4 - NID GAGE SITE ALTERNATIVES 1 & 2
CHUTE - POOL CHANNEL DETAIL

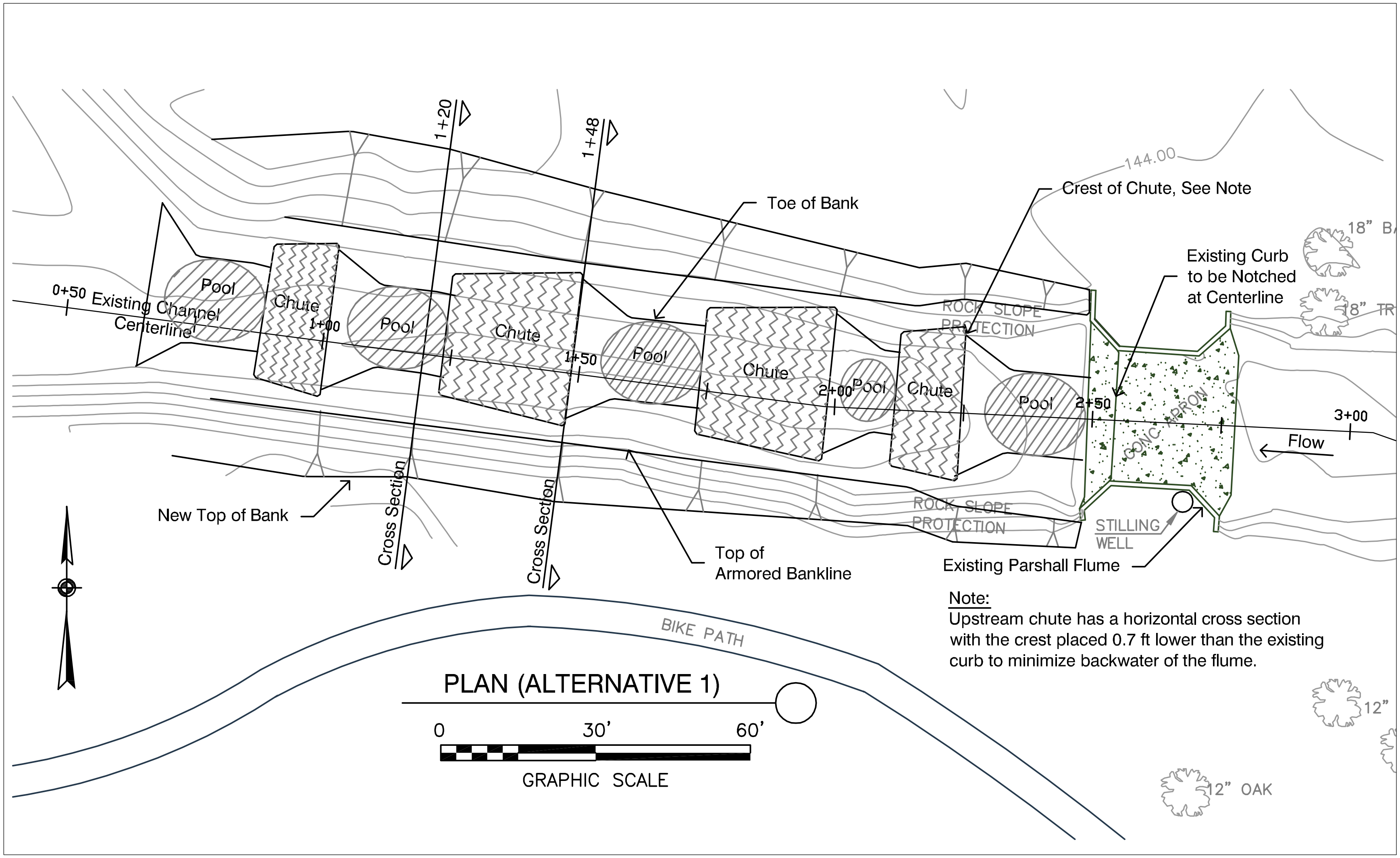


FIGURE 5 - NID GAGE SITE ALTERNATIVE 1
4% CHUTE - POOL CHANNEL, PLAN VIEW

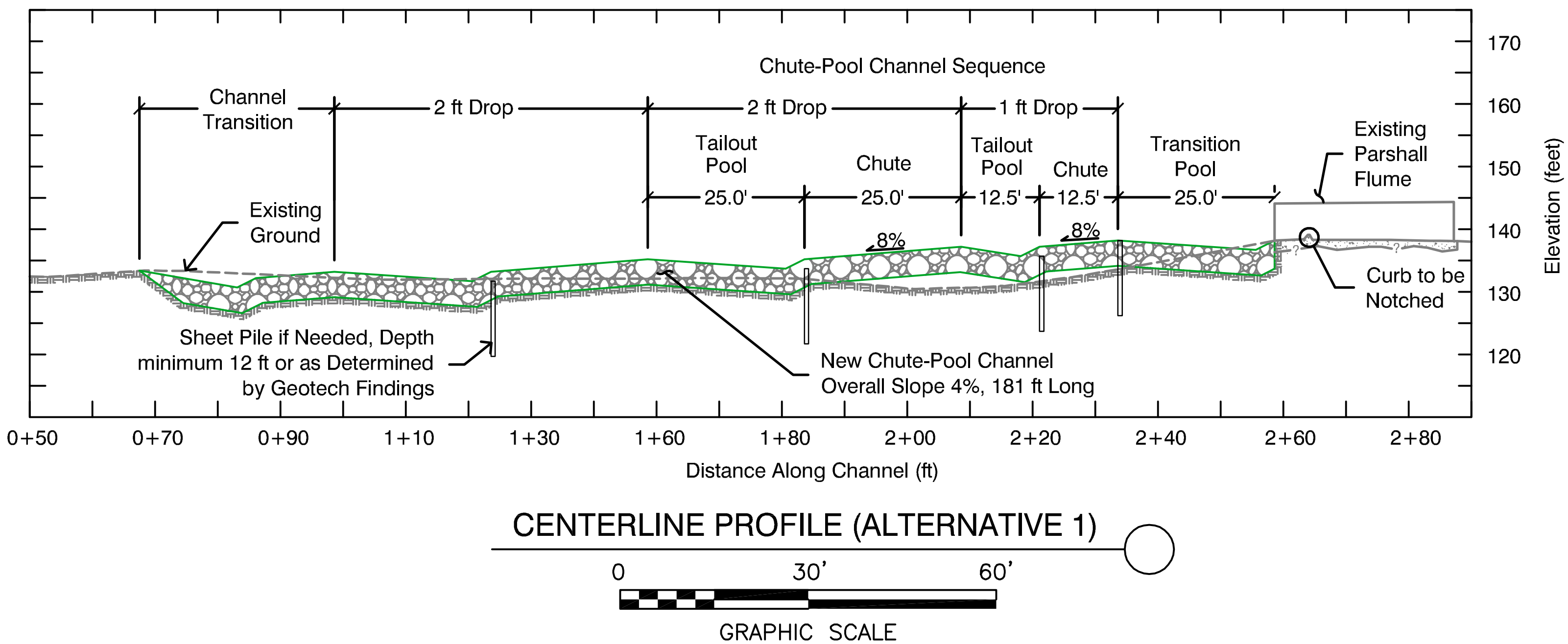
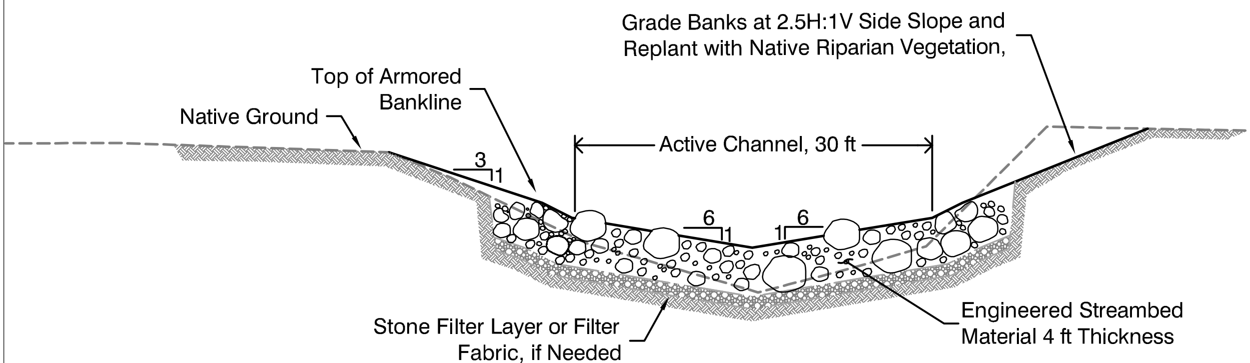
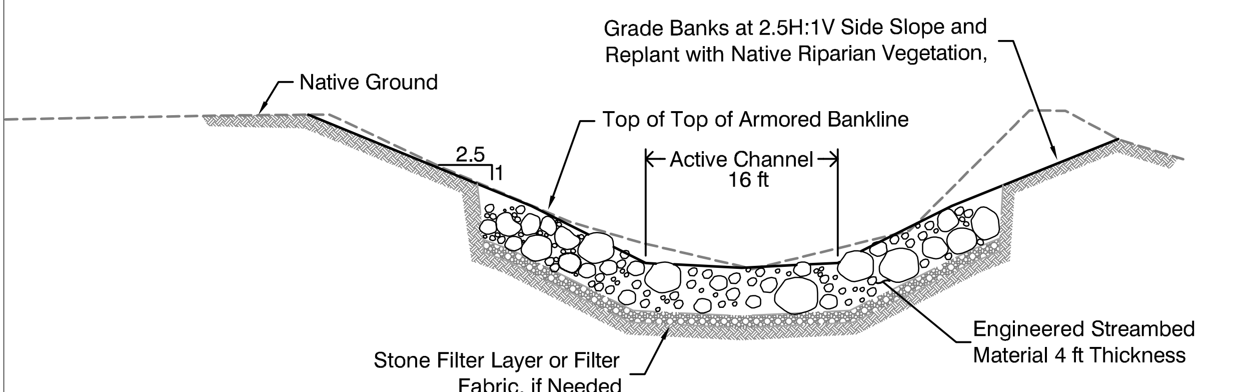


FIGURE 6 - NID GAGE SITE ALTERNATIVE 1
4% CHUTE - POOL CHANNEL, PROFILE VIEW



CHUTE CROSS SECTION
STA 1+48 (ALTERNATIVE 1)
NOT TO SCALE



POOL CROSS SECTION
STA 1+20 (ALTERNATIVE 1)
NOT TO SCALE

FIGURE 7 - NID GAGE SITE ALTERNATIVE 1
4% CHUTE - POOL CHANNEL CROSS SECTIONS

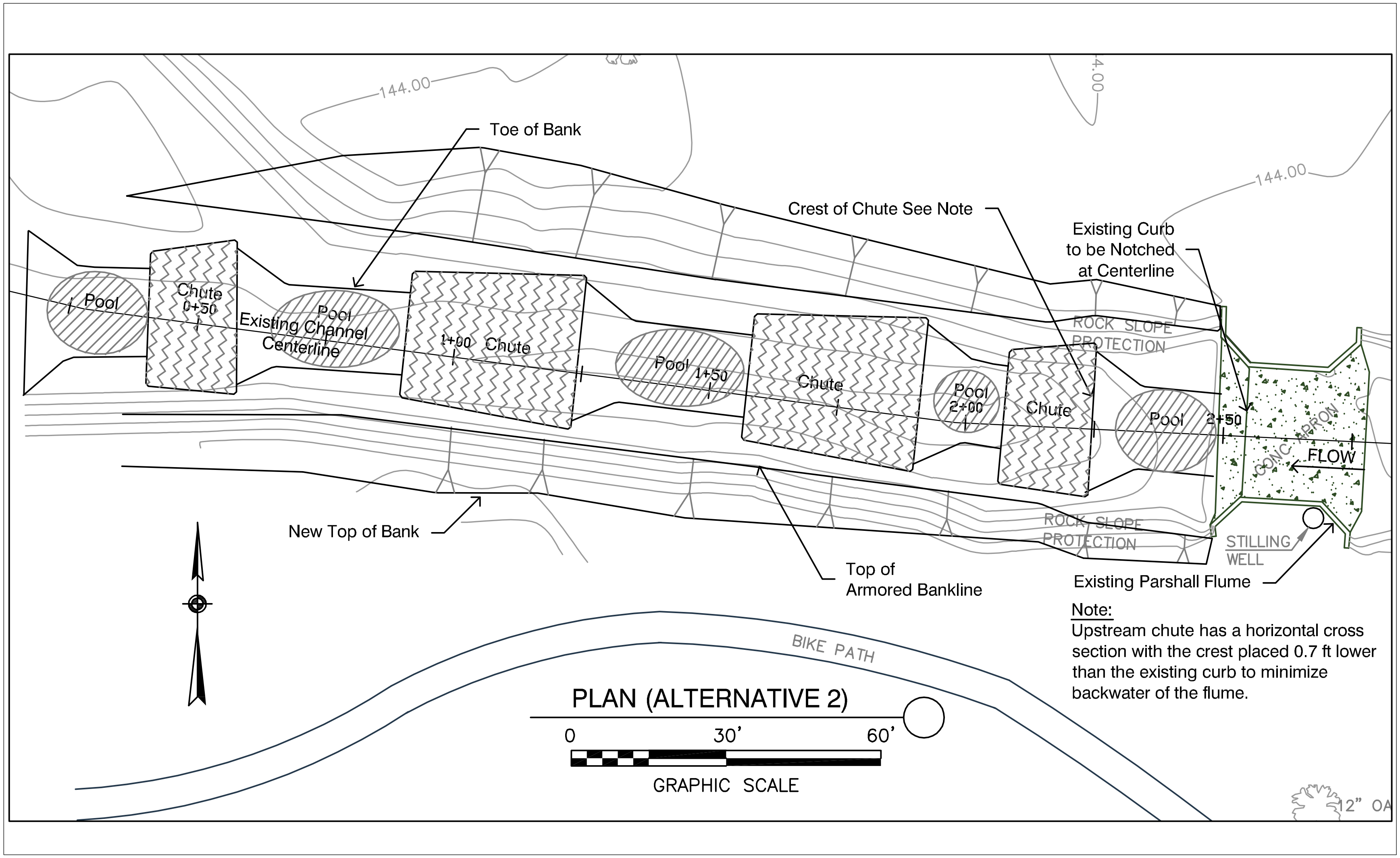


FIGURE 8 - NID GAGE SITE ALTERNATIVE 2
3% CHUTE - POOL CHANNEL, PLAN VIEW

Developed Alternatives for the Hemphill Dam

Several design approaches were considered for addressing fish passage at the Hemphill Diversion Dam. All alternatives preserve the ability of NID to install flashboards during the irrigation season. Alternatives are divided into two scenarios: (1) passage provided only during the non-irrigation season when flashboards are removed and (2) year-round passage provided using two fishway exits. The two exits accommodate the range of water surface elevations associated with and without flashboards in-place.

Based on comments provided by CDFG in regards to the previous fish passage conceptual design report (The Mines Group, 2005), one "nature-like" fishway alternative was developed for each of the two scenarios. However, use of a channel spanning roughened channel or boulder weirs was considered infeasible given the width of the dam crest (64 feet) and downstream channel bed (55 feet to 75 feet) combined with the height of the dam (8 feet, plus 3 feet tall flashboards during irrigation season). Channel spanning approaches at this site require importing an extremely large volume of rock material, and addressing challenging and potentially high-risk geotechnical issues concerning stability, permeability. Additionally, channel-spanning approaches fail to accommodate passage over the dam when the flashboards are installed. For these reasons, developed alternatives focused on partial-spanning and bypass channel approaches instead of channel spanning approaches.

Alternative 1 – Two-Stage Bypass Channel for Year-Round Passage

A nature-like bypass channel constructed along the north or south bank may be configured with two fishway exits to provide year-round fish passage with and without dam flashboards (Figure 9). This developed alternative places the bypass channel along the north bank to minimize loss of mature riparian trees and avoid having to relocate the diversion headworks. However, the same approach could be applied to the south bank. The south side may be preferable because it is less susceptible to bank erosion and deposition, and is all or nearly all, on NID's property.

The fish entrance to the bypass channel is located at the base of the dam. The channel is positioned to create a jet that would penetrate the existing scour pool to improve fish attraction. Immediately upstream of the entrance, the bypass channel crosses under the existing parking area through a 10-foot wide by 80-foot long culvert. The culvert serves a secondary function, limiting the amount of flow conveyed in the channel during overbank flooding by creating a backwater that extends to the exit of the bypass channel. Upstream of the culvert, the two-stage bypass channel uses a chute-and-pool roughened channel design to maintain an overall 3% grade. The chutes and pools are built with a matrix of large rock mixed with smaller material, which is sized to remain stable up the 100-year flood.

The Lower Stage of the bypass channel is 300 feet long (190 feet of roughened channel) and leads to a raceway and exit suitable for the headwater associated with winter operations (no flashboards on dam). The raceway has a gate that regulates flow into the fishway during winter operations and provides auxiliary flow to the bypass channel for fish attraction during summer operations (flashboards installed). With a channel width of approximately 15 feet, the first stage channel conveys at least 10% of the total stream flow at the highest fish passage design flow of 254 cfs. The slope of the channel banks is suitable for vegetation. The top width of the excavated channel could be as wide as 60 feet near the dam, decreasing in the upstream direction.

The second, Upper Stage of the bypass channel provides fish passage during summer operations, when the water surface upstream of the dam is 3 to 4 feet higher than during winter operations. From the confluence with the lower bypass channel, the upper bypass channel is 100 feet long, has a channel width of approximately 10 feet and uses chutes and pools to control the 3% channel grade. A flow control gate is located at the fish exit to control the amount of flow in the channel. The gate is closed during winter operations and this section of channel is dry. Auxiliary flow entering from the lower exit gate provides adequate attraction flows at the bypass channel entrance.

This alternative extends onto the neighboring property and impacts a limited area of mature riparian vegetation. The project survey does not extend onto the neighboring properties, so some assumptions were made regarding the elevation of the existing ground. Perusing this alternative will require additional topographic, vegetation, and geomorphic survey and characterization.

Preliminary analysis indicates this alternative satisfies fish passage criteria for all life stages at the indicated design flows.

Alternative 2 – Partial-Width Roughened Channel

Alternative 2 consists of a partial width roughened channel 170 feet in length and approximately 15 feet wide, which cuts through the existing dam abutment along the north bank (Figures 10 and 11). The channel bed consists of chutes and pools constructed at an overall slope of 3.5%. The 6% chutes have 2 feet of drop, with 24-foot long pools below each chute to dissipate energy and provide holding habitat. The chutes and pools are built with a matrix of large rock mixed with smaller material, which is sized to remain stable up the 100-year flood.

The entrance is 60 feet downstream from the end of the dam apron, and the exit is about 60 feet upstream of the dam crest, close to the property line. The walls along the sides of the channel are vertical, or nearly vertical, and constructed of either concrete or sheetpile. Rather than a vertical wall, rock placed at a 45-degree slope could be used in some locations along the north side of the roughened channel. Bed retention sills would span the top and bottom of each chute to provide additional stability and control subsurface flow. To provide flow control (manipulate rate of flow over dam vs. in the roughened channel), a 10-foot long section the dam crest would be lowered and guides installed for stoplogs.

This roughened channel alternative only provides passage when the flashboards on the dam crest are not in place. A gate is located across the roughened channel near the dam crest to shut off flow when flashboards are installed for the irrigation season. A grate could be placed over the top of the roughened channel at the dam crest for ease of operations and maintenance of the existing flashboards.

For this alternative, rock placed in the channel is vulnerable to erosion forces associated with overbank flood flows returning to the channel at this location. This is evidenced by previous bank erosion at this location. The existing conditions hydraulic model (HEC-RAS) is needed to evaluate flood conditions and determine feasibility. If this alternative is selected, moving the structure to the south bank should be considered because of the high erosion potential along the north bank associated with the return of overbank flood flows.

Preliminary analysis indicates this alternative satisfies fish passage criteria for all life stages at the indicated design flows.

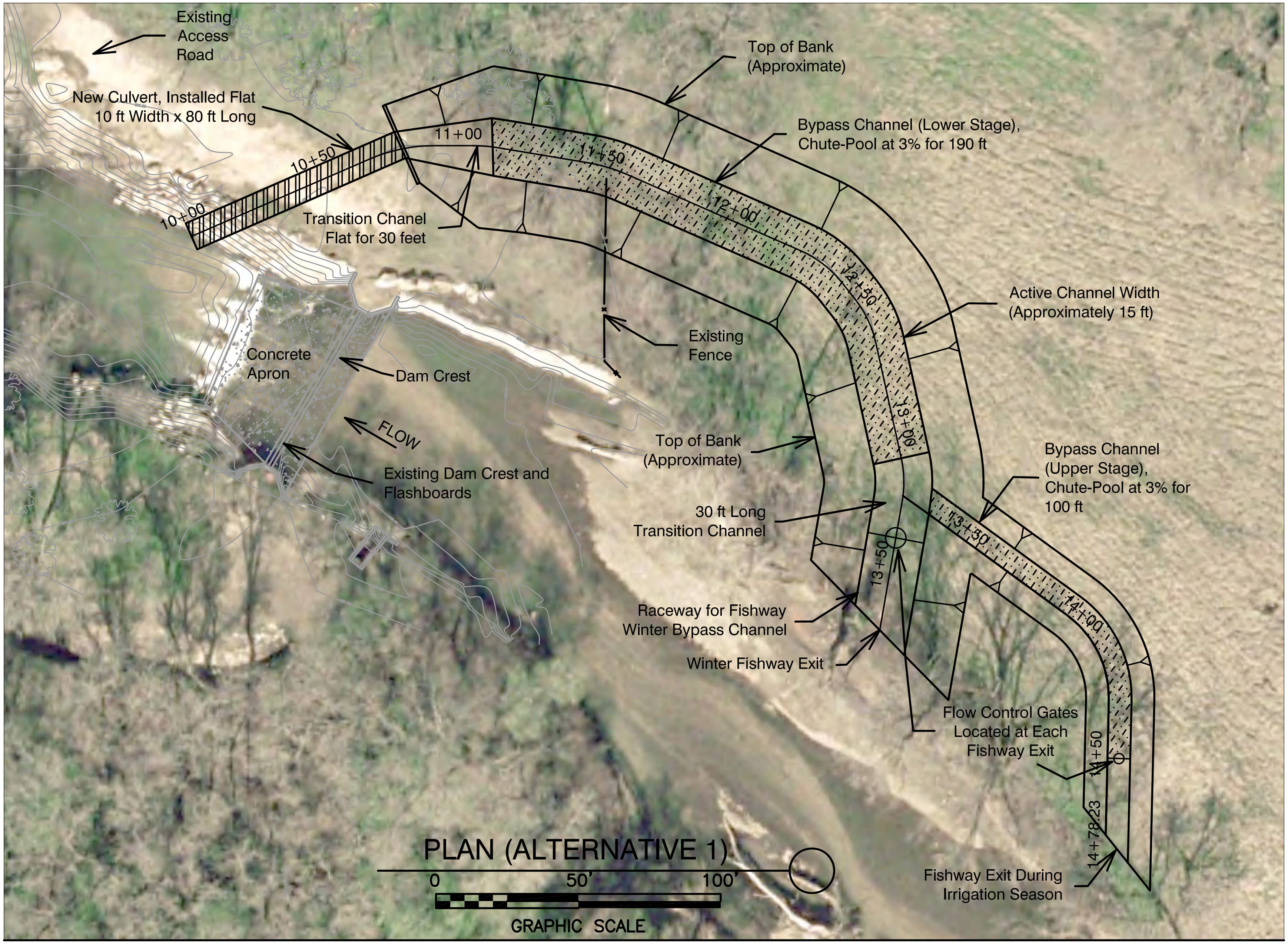


FIGURE 9 - HEMPHILL DAM SITE, ALTERNATIVE 1
TWO-STAGE BY-PASS CHANNEL LAYOUT, PLAN VIEW

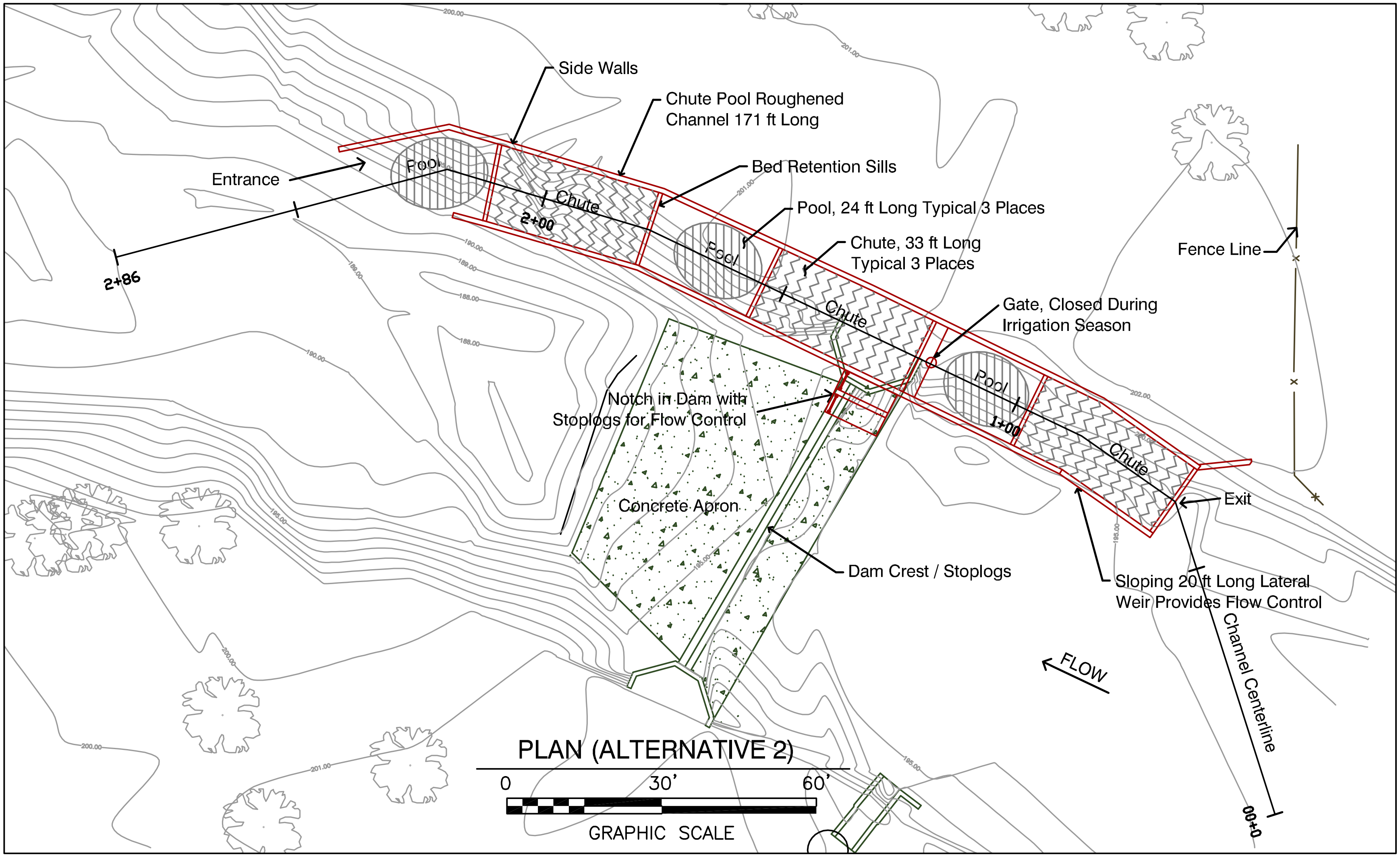


FIGURE 10 - HEMPHILL DAM SITE ALTERNATIVE 2
PARTIAL WIDTH CHUTE-POOL ROUGHENED CHANNEL FISHWAY, PLAN VIEW

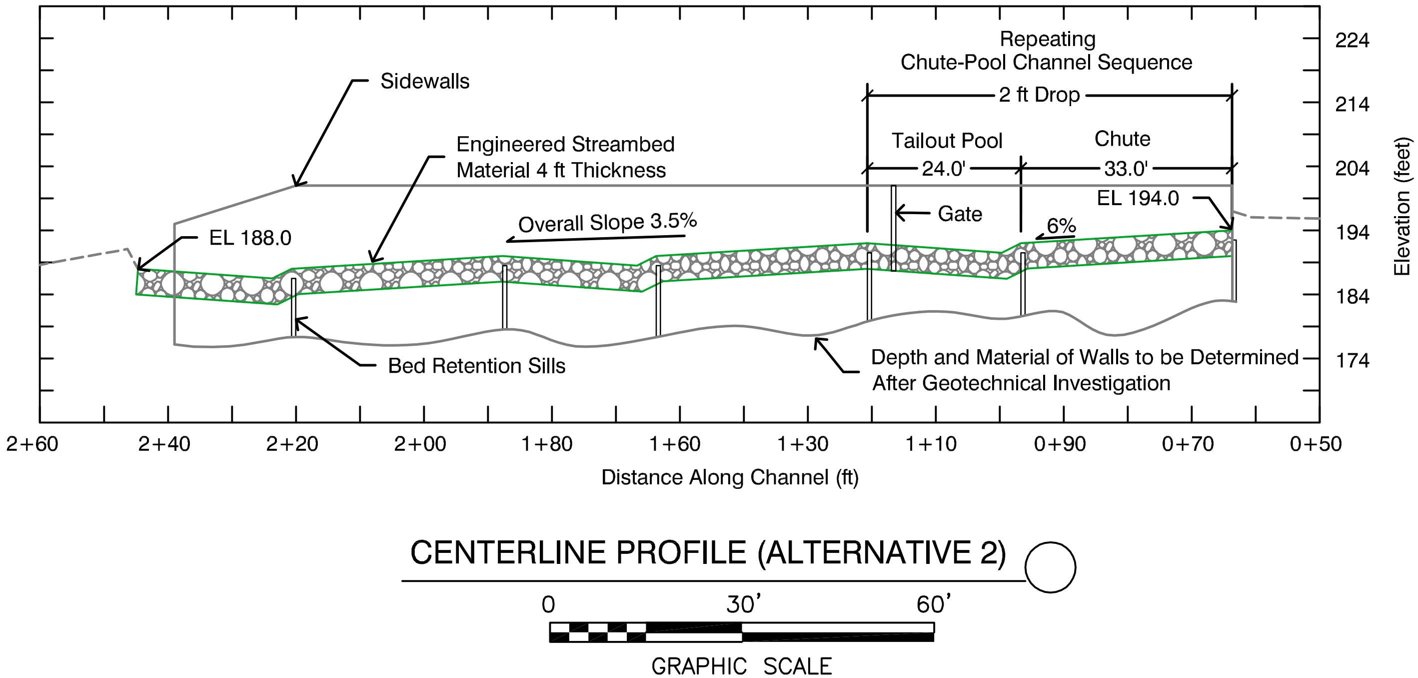


FIGURE 11 - HEMPHILL DAM SITE ALTERNATIVE 2
PARTIAL WIDTH CHUTE-POOL ROUGHENED CHANNEL FISHWAY, PROFILE

Alternative 3 – Single Stage Pool-and-Chute Fish Ladder

A pool-and-chute fish ladder built across the dam apron along the south bank can provide fish passage during winter operations (no flashboards on dam) (Figure 12 and Figure 13). Placement of the ladder along the south bank was selected due to the high erosion potential along the north bank associated with the return of overbank flood flows. The pool-and-chute ladder is 55 feet long and 10 feet wide and has 13 weirs constructed of concrete. Weirs are spaced 4.5 feet apart and the drop over each weir is 6 inches. The entrance weir is 25 feet downstream of the dam apron. Upstream of the exit weir is a removable gate, potentially constructed of removable H-beams and stoplogs. This gate would be installed when the flashboards are installed at the beginning of the irrigation season, shutting off flow to the ladder.

The ladder is designed to satisfy fish passage criteria while conveying 28 cfs within the ladder. To provide flow control, a 10-foot long section the dam crest would be lowered and guides installed for stoplogs. The logs would be set to maintain at least 10% of the total streamflow in the ladder up to the high fish passage design flow. This would allow the fish ladder to operate up to a streamflow of 280 cfs.

Pool-and-chute ladders provide good fish attraction because of the high velocity jet produced down the center of the ladder that fish can sense far from the entrance. Pool-and-chute ladders operate over a wider range of flows than a pool-and-weir ladder and are less susceptible to clogging with debris than a vertical slot fish ladder.

Alternative 4 – Two Stage Fish Ladder for Year-Round Passage

In addition to the pool-and-chute fish ladder developed in Alterative 3, a secondary ladder is included in this alternative (Figure 14 and Figure 15) to provide passage during the irrigation season. The second stage is a pool and weir ladder with a width of 4 feet and overall length of 36 feet. Weirs are formed with stoplogs, and the drop over each weir is limited to 6 inches. The exit weir height may need to be adjusted periodically as flows ramp up and down at the beginning and ending of the irrigation season. By adjusting the stoplogs, the ladder can accommodate a headwater range in the forebay of about 1.5 feet. This ladder can convey up to 5 cfs before becoming excessively turbulent in the pools between the weirs.

A short raceway leads from the exit of the lower ladder to the entrance weir of the upper ladder. A gate, potentially constructed with removable H-beams and stoplogs, is placed across the lower exit during the irrigation season. A gate in the dam abutment can then be opened to supply up to 10 cfs auxiliary water into the lower pool-and-chute ladder to provide sufficient attraction flow during the irrigation season. During winter operations, the auxiliary flow gate will be closed and the lower exit will be opened. The exit of the upper ladder will be closed using stoplogs, and the stoplog weir within the upper ladder will be removed to avoid stranding and sediment accumulation during winter flood flow.

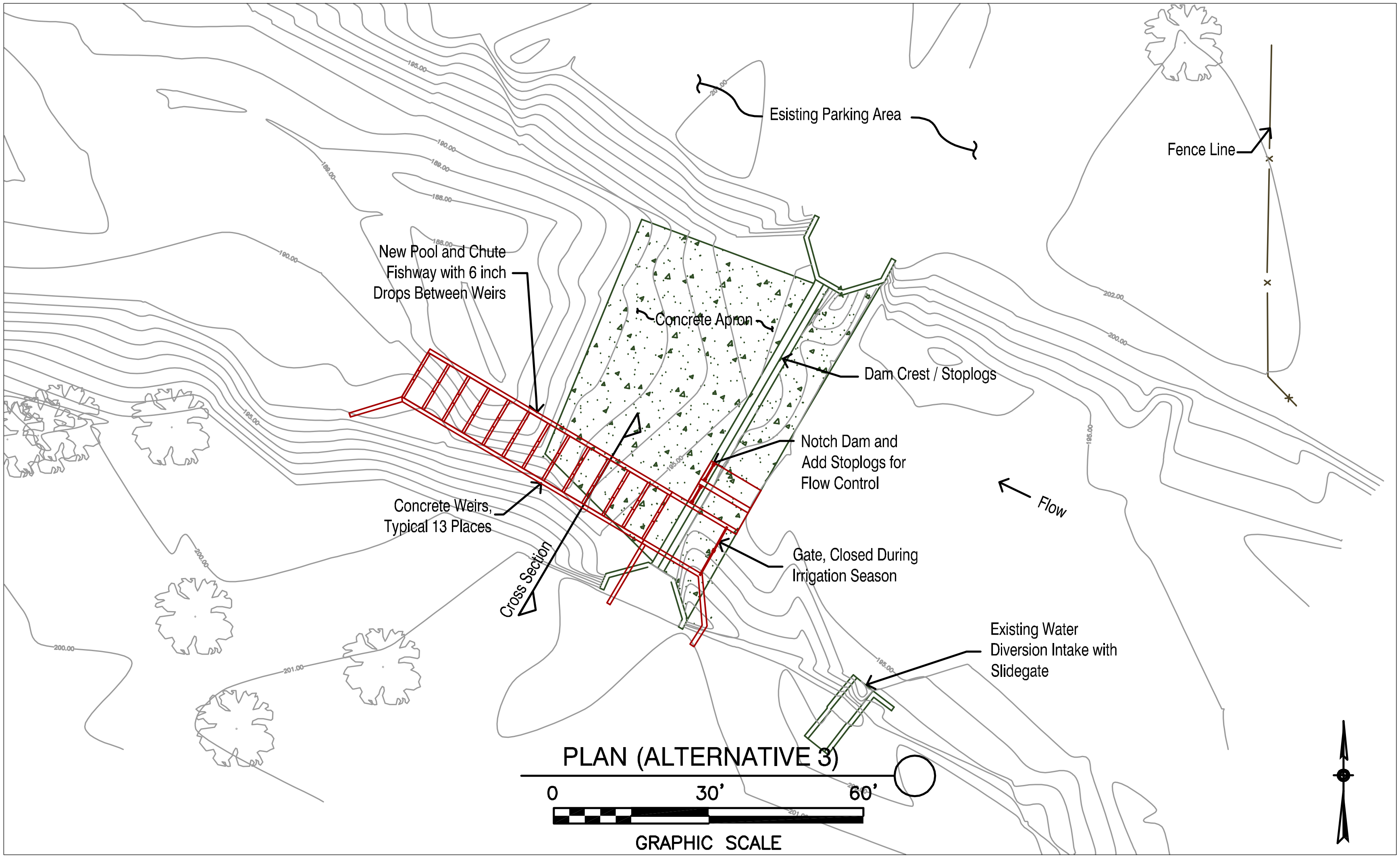


FIGURE 12- HEMPHILL DAM SITE ALTERNATIVE 3
SINGLE STAGE POOL & CHUTE FISH LADDER, PLAN VIEW

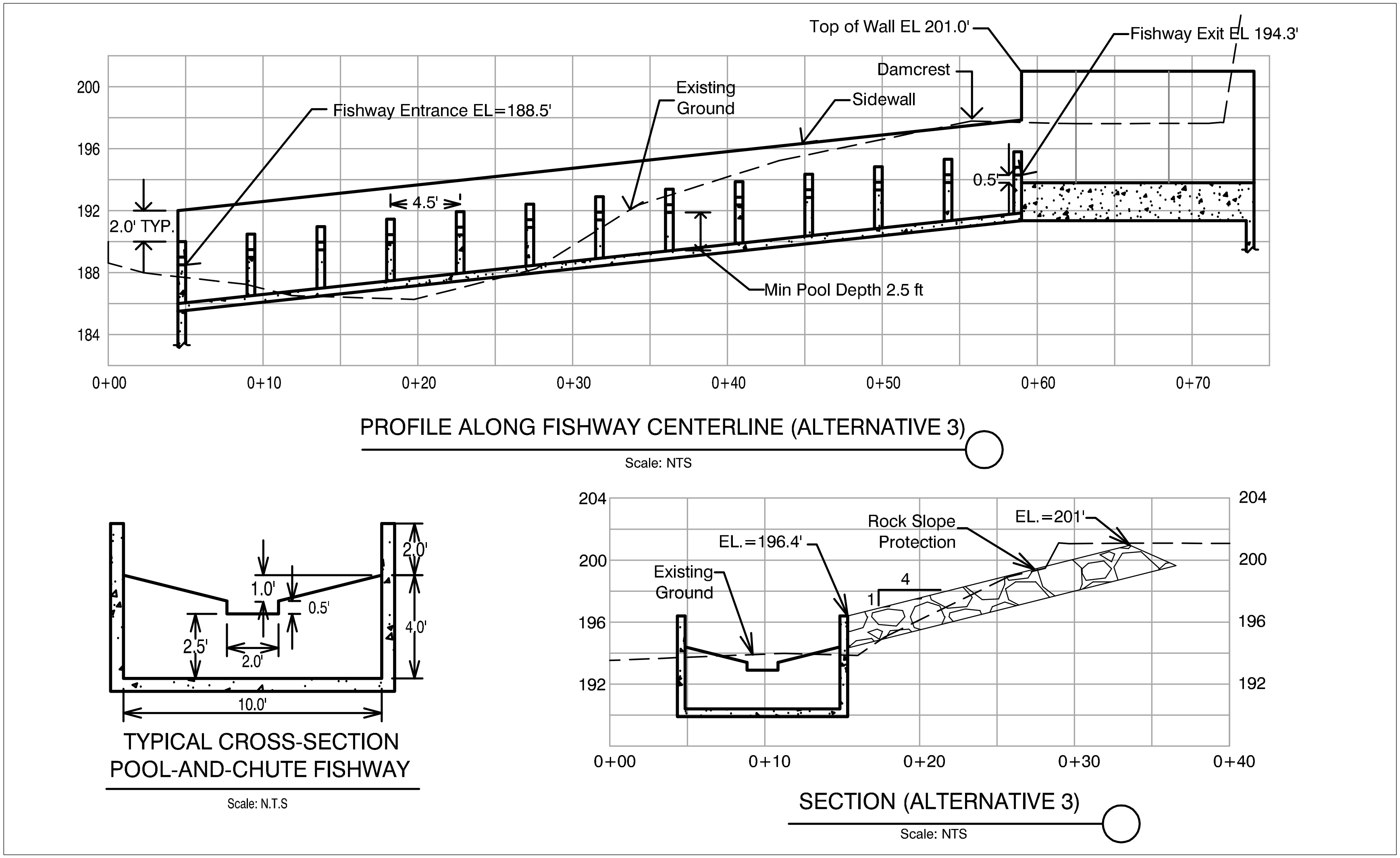


FIGURE 13 - HEMPHILL DAM SITE ALTERNATIVE 3
SINGLE STAGE POOL & CHUTE FISH LADDER, PROFILE & CROSS SECTIONS

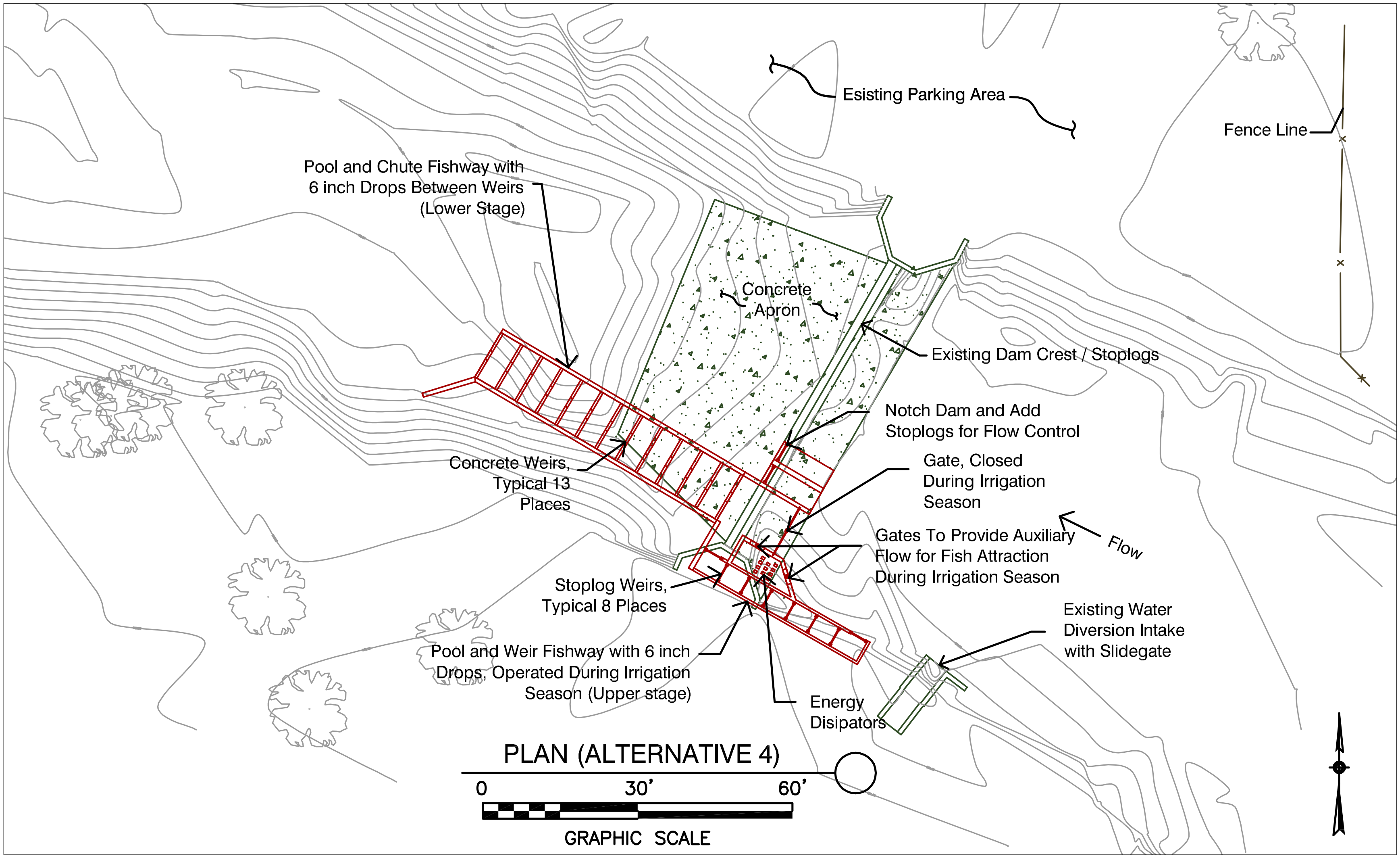
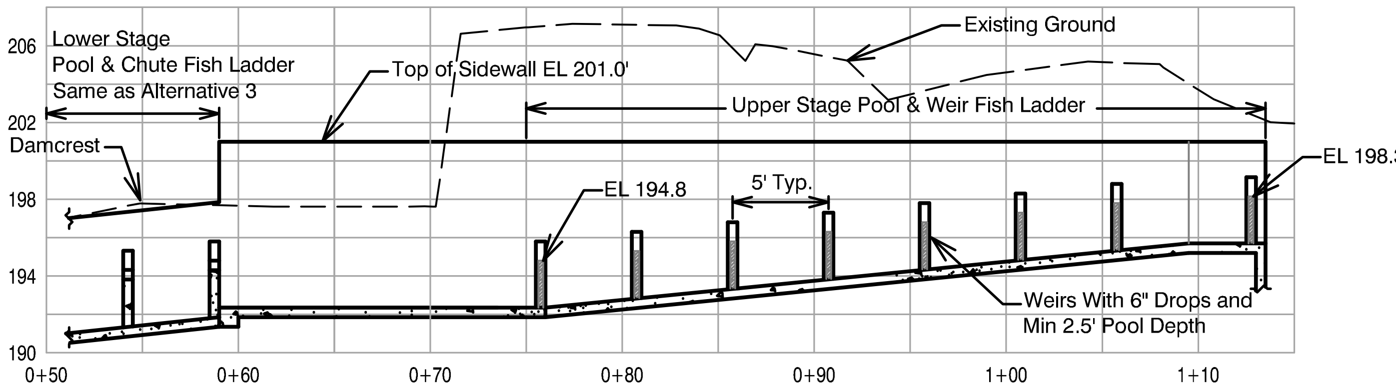
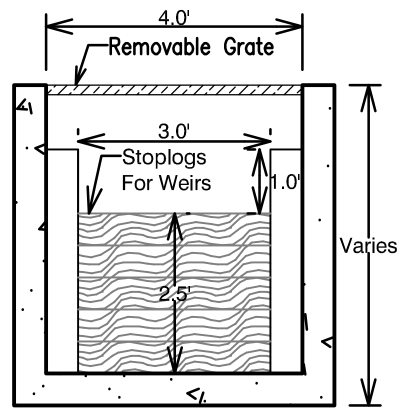


FIGURE 14 - HEMPHILL DAM SITE ALTERNATIVE 4
TWO STAGE FISH LADDER, PLAN VIEW



PROFILE ALONG FISHWAY CENTERLINE (ALTERNATIVE 4)

Scale: NTS



TYPICAL CROSS SECTION
UPPER STAGE FISH LADDER

Scale: N.T.S

FIGURE 15 - HEMPHILL DAM SITE ALTERNATIVE 4
TWO STAGE FISH LADDER,
UPPER STAGE PROFILE & CROSS SECTION

Outstanding Issue for Hemphill Dam Site

Before an alternative can be selected for the Hemphill Dam, it needs to be determined if fish passage must be provided during the irrigation season. Feasibility of Alternatives 1 and 2 is also dependent on the size of rock required to maintain a stable roughened channel bed at the 100-year design flow. To determine this it requires obtaining the current FEMA HEC-RAS files or other data to determine the amount of flow in the channel and on floodplain during 100-year food, and to determine the project's impact on water surface elevations.

If the Advisory Group wishes to pursue Alternative 1, additional topographic survey and vegetation mapping will be required on the adjacent property.

Discussion and Recommendations

NID Gaging Station

Based on our analysis of the developed alternatives, we recommend pusuing Alternative 1 for the NID Gaging Station. The sheetpile (or other structural) cutoff walls will help ensure suitable fish passage conditions during periods of low flow by controlling subsurface flow. The proposed concrete capped sheetpile downstream of the flume will help maintain a stable and consistent cross section suitable for maintaining a stable stage-discharge rating table for the flume. The steeper (4%) slope of the roughened channel avoids placing the downstream end of the roughened channel in an area of unstable and eroding channel banks. The use of chutes instead of weirs allow for passage of both salmonids as well as other native weaker swimming fish species that may not be able to leap.

Hemphill Dam

Selection of a preferred alternative for the Hemphill Dam site requires determining if year-round fish passage must be provided. Assuming year round passage is necessary, both Alternatives 1 and 4 can meet fish passage criteria. Alternative 1 could provide the most reliable fish passage for all salmonid life stages and other native fishes over the widest range of flows given the hydraulic diversity associated with it. However, it requires extending the project onto adjacent property. It will result in the loss of several large trees, which would likely need to be mitigated. It will also involve excavation and off-site disposal of a large amount of soil. There are also some risks of erosion and sedimentation at the bypass channel exits, given historic bank erosion and bar along the north bank. During the Advisory Group meeting in November 2008, the group discussed moving the bypass channel to the south bank, which was believed to be more stable and less prone to overbank flooding. That may be a more preferable location, except that it requires removal of several more mature riparian trees. Another consideration is that during the irrigation season Alternative 1 can only operate over approximately one foot of variation in the headwater elevation. This has the potential of interfering with current NID diversion rates during low flow periods. If the requirements and constraints associated with Alternative 1 are considered too great, then Alternative 4 appears to best alternative to satisfy project objectives.

Alternative 4 is a two-stage ladder with an exit for the non-irrigation season and another for the irrigation seasons. The use of stop log weirs that can be adjusted during the irrigation season would allow NID to operate the upper pool-and-weir ladder over a wide range of headwater elevations. This type of alternative is considered a proven and reliable way of providing passage for adult anadromous and resident salmonids. Juvenile passage requirements for pool-and-chute ladders are not understood as well. Pool-and-weir ladders can also have issues with debris and sediment clogging if not properly sited.

Next Steps

Once a preferred alternative is selected for the NID Gaging Station and Hemphill Dam site, a geotechnical investigation will be conducted to determine foundation and cut-off wall requirements and evaluate slope stability. Additionally, the current FEMA HEC-RAS files or other data is required to determine the amount of flow in the channel and on floodplain during 100-year food, and to determine the project's impact on water surface elevations. Following completion of these tasks, the engineering design drawings will be completed to the 30% level and a basis of design report will be prepared. At this point, the Advisory Group will be provided the 30% plans and design report for review and comment before proceeding with final designs.

References

CDFG (2003). Part IX: Fish passage evaluation at stream crossings. *California Salmonid Stream Habitat Restoration Manual.* California Department of Fish and Game.

Jones & Stoke. 2004. Salmonid Spawning Habitat Surveys for Placer County Streams. March 24, 2004. 75 pages.

NMFS. 2001. Guidelines for salmonid passage at stream crossings. National Marine Fisheries Service SW Region. 14 pages.

The Mines Group. 2005. Auburn Ravine gaging station site selection and fish passage modifications conceptual design report. Prepared for Placer County Planning Department. 46 pages.

APPENDIX 3.3 D

Hemphill Diversion Structure Final Report on Field Study Investigations (Kleinschmidt 2017);

HEMPHILL DIVERSION STRUCTURE

FINAL REPORT ON FIELD STUDY INVESTIGATIONS

Prepared for:

Nevada Irrigation District
Grass Valley, California

Prepared by:

Kleinschmidt

Pittsfield, Maine
www.KleinschmidtGroup.com

September 2017

HEMPHILL DIVERSION STRUCTURE

FINAL REPORT ON FIELD STUDY INVESTIGATIONS

Prepared for:

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September 2017

HEMPHILL DIVERSION STRUCTURE

FINAL REPORT ON FIELD STUDY INVESTIGATIONS

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HEMPHILL DIVERSION STRUCTURE

FINAL REPORT ON FIELD STUDY INVESTIGATIONS

1.0 INTRODUCTION

Nevada Irrigation District's (District) Hemphill Diversion Structure (Structure) has been utilized by the District since its purchase of the facility in 1933. The Structure is an approximately 8-foot-tall, concrete structure located in Auburn Ravine near the community of Lincoln in Placer County, California. Historically, the Structure has been fitted with 3-foot-tall flashboards during the District's irrigation season (April to October) to increase the water surface elevation upstream and direct flow into the Hemphill canal.

The canal intake is located 40 feet upstream of the Structure on river-left (looking downstream). Historic District flow data from the Hemphill canal gauge (BR 220) indicated that the average daily canal flow during irrigation season ranged from 6 to 16 cubic feet per second (cfs). Flows in Auburn Ravine at the Highway 65 gauging station downstream of the Structure can range from 10 cfs to 180 cfs during irrigation season. The peak flow data noted in the 2011 Phase II Raw Water Master Plan (RWMP) indicated that the Hemphill canal would have a peak demand of approximately 18 cfs by the year 2032.

Kleinschmidt developed an Alternatives Analysis in May 2016[1] to identify and evaluate conceptual alternatives for continuing to provide water to the Hemphill canal customers (existing and future demand) with or without the Structure in place. Two options were selected to be carried forward for more detailed analysis: Option 4, Construction of a Permeable Embankment and Option 5, the Ranney Well Option. Both options depend on the permeability of the surrounding soils to provide a flow rate of up to 15 cfs to meet the peak demand of the Hemphill canal. Assessment of the accumulated sediment in the impoundment was also a concern for permitting. To confirm the viability of these two options as well as determine the volume and characteristics of the sediment, a testing program of the site soil and sediment was developed, which included drilling two test wells at the site and assessing the physical and

[1] Kleinschmidt presented the Alternatives Analysis at the May 17, 2016 Engineering Committee Meeting.

chemical characteristics of the accumulated sediments in the impoundment created by the Structure. Sediment samples were obtained for analysis and measurements were made to quantify the volume of sediment in the impoundment. The engineering consulting firm Holdrege & Kull (H&K) was retained by Kleinschmidt to complete the field studies. The results of the field studies are summarized in Section 2 and details are provided in Appendix A (Sediment Characterization Report for Hemphill Diversion Structure) and Appendix B (Geotechnical Engineering Report for Hemphill Diversion Structure).

In addition to the field studies, Kleinschmidt determined the flood levels at the site without the Structure in place using a hydraulic model of Auburn Ravine at the Hemphill canal site. These flood elevation data would be required for the design of any pumping facility. The results of this analysis are described in Section 3.

2.0 DESCRIPTION OF FIELD STUDY INVESTIGATIONS

2.1 HOLDREGE & KULL SEDIMENT CHARACTERIZATION REPORT

H&K performed an impoundment sediment characterization analysis that included physical and chemical testing of the accumulated sediments in the Structure's impoundment. H&K collected eight samples from the impoundment and tested the samples for the presence of organic contaminants (e.g., methylmercury, semi-volatile organic compounds, polychlorinated biphenyls) and inorganic heavy metals (e.g., aluminum hexavalent chromium). Contamination of the sediment with sufficient concentrations of hazardous material would affect the removal of the Structure due to the prohibitive cost of sediment removal and disposal from the impoundment. The analysis of the samples found that all heavy metal concentrations, except for arsenic, were below the screening levels for commercial and residential soil. The total arsenic levels were above screening levels but were within the typical background level range for the region. The total metals concentration was below the level at which they would be considered hazardous waste in California. The analysis of the organic contaminant methylmercury was below the screening level for commercial and residential soils (H&K 2017a).

The sediment characterization study also examined the physical characteristics of the sediment in the impoundment, specifically the moisture content and particle size. Understanding the physical composition of the sediment is necessary to develop the design conditions for the permeable embankment. H&K estimated sediment depth in the impoundment using a hand level and a dynamic cone penetrometer, a device with a cone on one end that is driven into in-situ sediment using a manually applied hammer force, which causes the cone to penetrate a vertical distance based on the sediment material. If the sediment consisted of fine grained material such as silty clay, transport of such material from the sediment into the embankment would reduce the permeability of the embankment over time and eventually make it ineffective at conveying water. H&K found that the sediment is, in general, a poorly graded sand with gravel and few fine materials (26.5 percent gravel, 71.9 percent sand, and 1.6 percent silt/clay particles). The depth of the sediment ranged from 1 foot to 8 feet in the impoundment, with the low-energy areas ranging from 3 feet to 6 feet. The total volume of sediment was estimated to be approximately 8,000 cubic yards.

H&K's opinion is that the results of the chemical and physical analysis of the sediment indicate that the sediment management practices within the impoundment (i.e., not removing sediment post Structure removal) are not likely to significantly affect water quality. The details regarding the methods and procedures of the sediment analysis, as well as more detailed results, are included in Appendix A.

2.2 HOLDREGE & KULL GEOTECHNICAL ENGINEERING REPORT

H&K performed a geotechnical investigation of the embankment adjacent to the Structure to determine the feasibility of constructing either Option 4 or Option 5 from the 2016 Kleinschmidt Alternatives Analysis. The field investigation consisted of drilling two test borings to determine the depth of material to bedrock and the permeability of the natural soil. The first boring was dug approximately 40 feet deep through silty fine sand with gravel. Groundwater was encountered within 10 feet of the ground surface and a weathered parent material (granodiorite) from 20 feet to 40 feet below the surface. The boring supplied a discharge greater than 60 gallons per minute (gpm) from the first 20 feet of the boring below the surface. The second test boring was dug approximately 100 feet deep through successive layers of silty fine sand, dark low plasticity clay and silt, and then silty fine sand within the first 17 feet of the surface. The same weathered parent material encountered in the first boring was encountered at 17 feet and was continuous to 100 feet deep. The water table was again encountered within 10 feet of the surface. H&K sealed the first 22 feet of the boring with cement and did a pump test on the boring from 30 feet to 100 feet, which yielded a discharge ranging from 2.5 gpm to 60 gpm. A laboratory test of the hydraulic conductivity of the soil material, which describes the rate at which the soil can convey water, was 10 times lower than available material for import. Despite the possible need for imported material, the geotechnical investigation concluded that Options 4 and 5 are feasible at the site.

H&K also provided input for sizing a permeable embankment consistent with Kleinschmidt's 2016 Alternatives Analysis Option 4. The permeable embankment would be approximately 30 feet wide, 10 feet deep, and 60 feet long and would require a one foot thick layer on top of four to six-inch diameter angular stone for protection against scour. A permeable embankment with these dimensions at the site could provide between 35 to 43 cfs to the Hemphill canal. H&K noted that an important concern for construction would be groundwater inflow, which would also cause flowing sand and gravel. This may require sheet-piling or shoring during construction, and the groundwater inflow would still occur with shoring, resulting in instability at the base of the excavation. H&K noted that additional detailed analysis of seepage forces in the area of construction would be required (H&K 2017b). More detail regarding the methods and procedures, as well as additional description of the geotechnical results, are contained in the Appendix B.

3.0 HYDRAULIC ANALYSIS

As part of the scope of work for Task Order 1[2], Kleinschmidt determined the 100-year flood level at the Structure using a hydraulic model that applies the U.S. Army Corps of Engineers' HEC-RAS v5.0.1 2-dimensional software package. To progress from conceptual to actual design of the pumping station, Kleinschmidt developed an estimate for the peak water surface elevation upstream of the existing Structure during the 100-year flood, where the pumping station would be sited, to ensure that the pumping station would be situated above a design flood elevation.

3.1 MODEL GEOMETRY DATA

The hydraulic model was developed during the 2016 Alternative Options study for the Structure. The model domain extends approximately 530 feet upstream and 270 feet

[2] Task Order 1 for Hemphill Options 4&5 Analysis Project #7032, executed October 26, 2016.

downstream of the structure. Surveyed elevation data points were converted to a raster elevation grid file using AutoCAD Civil3D. The elevation file from Civil3D was then converted into a usable file format for HEC-RAS using ESRI's ArcGIS ArcMap software. Three-feet by three-feet grids were created to define the upstream river channel, the channel downstream from the Structure, and the canal. The stream grid was assigned a Manning's roughness coefficient (n) equal to 0.04, which is appropriate for an earthen stream channel, winding and sluggish, with cobble bottom and clean banks (Chow 1959). A proposed condition with the Structure and flashboards removed was used. After the Structure is removed, sediment in the impoundment will likely migrate downstream over time; however, the geometry conservatively assumed no downstream migration of sediments. This assumption is appropriately conservative for estimating the peak flood elevation above where the pumping station would be located because as sediments migrate downstream over time, the peak flood elevation will decrease and the pumping station will be at less risk of flooding.

3.2 100-YEAR FLOOD ESTIMATE

Determination of the 100-year flood flow was based on the site flow data provided by the District from their Auburn Ravine gauge. The data included daily averages from October 2005 and April through October 2006 to 2015. As recommended in the U.S. Department of the Interior's "Guidelines for Determining Flood Flow Frequency, Bulletin #17B" (1981), a Log Pearson Type-III statistical analysis was performed using the annual maximum flow recorded over the period of available data. The peak flow estimated using the statistical analysis for the Auburn Ravine at the Hemphill canal was 232 cfs. Because the District can control flow in the Auburn Ravine, the model was used to simulate the site passing the estimated flood flow and flows 100 and 200 cfs above the estimated flood flow to determine the sensitivity of flood levels to the flood flow. This sensitivity was performed due to the highly-controlled nature of the system as well as the lack of data in the months that the gauge is not operating.

3.3 HYDRAULIC STUDY RESULTS

The hydraulic modeling indicates that the peak water surface elevation in Auburn Ravine adjacent to the Hemphill canal during the estimated 100-year flood (232 cfs) would be approximately 198.2 feet.

The results of the simulations using flows 100 cfs and 200 cfs greater than the estimated 100-year flood show that the peak flood elevation would increase by 0.2 foot and 0.5 foot, respectively, adjacent to the canal (Figure 1).

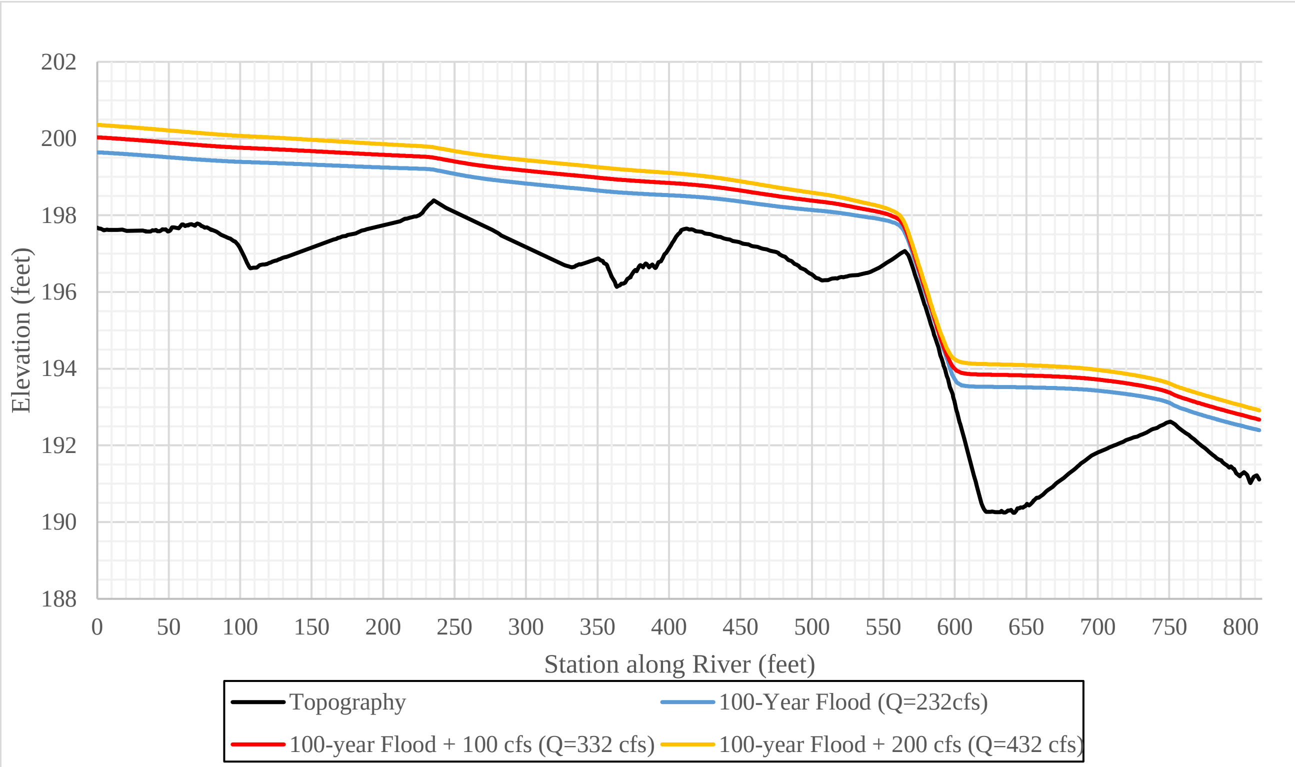

FIGURE 1. HYDRAULIC MODELING FLOW PROFILES

4.0 SUMMARY AND CONCLUSION

The H&K field study investigations confirmed the viability of the permeable embankment (Option 4) or Ranney well (Option 5) from the Alternatives Analysis (Kleinschmidt 2016) for providing flow to the Hemphill canal in the event the Structure is removed. The chemical analysis of the impoundment sediment found no inorganic or organic contaminant exceeding regulatory allowances, and the sediment would not likely have an adverse effect on water quality (see Section 2.1). Final determination regarding removal and disposal of the sediment or allowing it to migrate downstream is subject to the permitting process. The geotechnical investigation found that the hydraulic conductivity of the soils adjacent to the Structure are adequate for developing either a permeable embankment or Ranney Well, which would meet the current and future demands of the Hemphill canal after Structure removal (see Section 2.2). The hydraulic model indicates that the peak 100-year flood elevation adjacent to the Hemphill canal would be approximately 198.2 feet; thus, any pump station building would need to be constructed above this elevation to avoid the possibility of being flooded (see Section 3.3).

The data provided by these studies would be used to prepare a preliminary design for review by the District and the various permitting agencies.

5.0 REFERENCES

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APPENDIX A

SEDIMENT CHARACTERIZATION REPORT FOR HEMPHILL DIVERSION STRUCTURE

SEDIMENT CHARACTERIZATION REPORT

FOR

HEMPHILL DIVERSION STRUCTURE
PLACER COUNTY, CALIFORNIA

JUNE 2017

PREPARED ON BEHALF OF

NID

NEVADA IRRIGATION DISTRICT
1036 WEST MAIN STREET
GRASS VALLEY, CALIFORNIA

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue
Nevada City, California 95959

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Project No. 4794-01
June 2, 2017

Kleinschmidt Associates
P.O. Box 650
Pittsfield, ME 04967

Attention: Mike Schimpff

Reference: ***Hemphill Diversion Structure***
Placer County, California

Subject: ***Sediment Characterization Report***

Dear Mr. Schimpff:

Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results of sediment characterization at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

H&K appreciates the opportunity to provide environmental engineering services for the Hemphill Diversion Structure project. Please contact the undersigned with any questions or comments regarding H&K's investigation.

Sincerely,

HOLDREGE & KULL

REGISTERED PROFESSIONAL ENGINEER
JASON W. MUIR
No. 60167
Exp. 06/18
CIVIL
STATE OF CALIFORNIA

Bryan Botsford	Jason W. Muir, C.E. 60167
Staff Geologist	Associate Engineer

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APPENDICES

Appendix A Analytical Laboratory Reports and Chain of Custody Documentation

Appendix B Laboratory Reports for Particle Size Analysis

ABBREVIATIONS AND ACRONYMS

APN	assessor's parcel number
ATL	Advanced Technology Laboratories, Inc.
bgs	below ground surface
CAM	California Assessment Manual
CalEPA	California Environmental Protection Agency
Caltest	Caltest Laboratory, Inc.
CCR	California Code of Regulations
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
COPC	constituent of potential concern
CrVI	hexavalent chromium
CTR	California Toxics Rule
CVAA	cold-vapor atomic absorption
CVAFS	cold vapor atomic fluorescence spectrometry
CWA	Clean Water Act
CWC	California Water Code
DI	deionized water
DQI	data quality indicators
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
DTSC-SL	DTSC Screening Level
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
GIS	geographic information system
GPS	global positioning system
HSC	California Health and Safety Code
H&K	Holdrege & Kull
HCl	hydrochloric acid
ICP-AES	inductively coupled plasma atomic emission spectroscopy
MDL	method detection limit
MeHg	methylmercury
mg/kg	milligrams per kilogram
MCL	Maximum Contaminant Level
MQO	measurement quality objective
MS	matrix spike

ABBREVIATIONS AND ACRONYMS

MSD	matrix spike duplicate
MSL	mean sea level
mybp	million years before present
ng/L	nanogram per liter
Non 15	Non Chapter 15 Program
NID	Nevada Irrigation District
PCEHD	Placer County Environmental Health Division
PQL	practical quantitation limit
OEHHA	CalEPA Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
QA	quality assurance
QC	quality control
RL	laboratory reporting limit
RPD	relative percent difference
RSL	Regional Screening Level
RWQCB	California Regional Water Quality Control Board
SL	screening level
SP	poorly graded sand
SSP	Site Safety Plan
STLC	Soluble Threshold Limit Concentration
SWRCB	State Water Resources Control Board
THg	total recoverable mercury
Title 22	Title 22 of the California Code of Regulations
TTLC	Total Threshold Limit Concentration
UCL	upper confidence limit
ug/kg	microgram per kilogram
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USCS	Unified Soil Classification System
USGS	United States Geological Survey
WET	Waste Extraction Test
WDR	Waste Discharge Requirement
°C	degrees Celsius
%REC	percent recovery

1 INTRODUCTION

On behalf of Kleinschmidt, Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results of sediment characterization at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

1.1 PURPOSE

The purpose of H&K's investigation was to characterize sediment within the impoundment to inform future permitting and sediment removal activities associated with the project. The investigation in not intended to satisfy all permitting requirements associated with the project; rather, the findings are intended to help scope management alternatives for dam and sediment removal.

1.2 SITE DESCRIPTION

The Nevada Irrigation District (NID) Hemphill Diversion Structure has been utilized by NID dating back to 1933 when the property was purchased. The concrete diversion structure is approximately 8 feet tall, and is periodically fitted with 3-foot-tall flashboards during the irrigation season (April to October) to increase surface water elevation upstream and direct flow into the Hemphill Canal.

The investigation area consists of an approximately 1.5-acre impoundment upstream of the diversion structure where sediment collects. A location map, vicinity map, and site map are presented as Figures 1, 2, and 3, respectively. The site was accessed by traveling northwest on Virginiatown Road, and then driving south approximately 400 feet along an unnamed dirt road to the investigation area.

1.3 RATIONALE FOR SAMPLING STRATEGY

The purpose of H&K's investigation was to characterize sediment within the study area, to evaluate approximate sediment volume within the impoundment, and perform particle size and moisture content analysis for composite sediment samples.

Two composite samples were analyzed for organic and inorganic constituents listed in Section 2. The California Regional Water Quality Control Board (RWQCB) General Order for Maintenance Dredging (R5-2009-0085) typically requires that one composite sample be prepared for each 10,000 cubic yards of material to be dredged, although the actual sampling frequency is subject to change by the reviewing agency. The investigation area comprises approximately 1.5 acres and contains approximately 8,000 cubic yards of sediment. This volume measurement is based on depth measurements determined by dynamic cone penetrometer (DCP) testing and hand-level measurements as described in Section 4.2. Based on this volume estimate, two composite samples were prepared for analysis from the eight sediment sampling locations depicted on Figure 3.

1.4 REGULATORY FRAMEWORK

The California EPA (CalEPA), including the State Water Resources Control Board (SWRCB) and the Department of Toxic Substances Control (DTSC), is responsible for protection of public health and the environment. The SWRCB and its nine Regional Water Quality Control Boards (RWQCBs) have the responsibility for the coordination and control of water quality, including the protection of the beneficial uses of the waters of the State. The site is located within the SWRCB's Central Valley Region. DTSC has the responsibility of managing the State's hazardous waste program to protect public health and the environment.

1.4.1 Water Quality

The regulatory framework governing protection of water quality in California is described in the Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays and Estuaries of California, which is also known as the State Implementation Policy (SWRCB, 2005). Pursuant to the State Implementation Policy, the following water quality objectives and criteria are potentially applicable based on state and federal regulation.

<u>Federal Water Quality Criteria</u>

Federal water quality criteria are set forth in the National Toxics Rule (NTR; EPA 1995) and in the California Toxics Rule (CTR; EPA 2000), which is promulgated by the EPA in 40 CFR 131.38.

<u>Basin Plan Objectives</u>

Water quality objectives are identified in the Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and the San Joaquin River Basin (RWQCB; 2016). The Basin Plan does not identify any existing and potential beneficial uses specifically for Auburn Ravine. However, the following existing and potential beneficial uses are defined for the downstream Sacramento River (Colusa Basin to the "I" Street Bridge):

- Municipal and domestic supply;
- Agricultural water supply;
- Water contact and non-contact recreation;

- Warm and cold freshwater habitat;
- Spawning, reproduction and/or early development of fish; and
- Wildlife habitat.

Water quality objectives corresponding to these beneficial uses include Maximum Contaminant Levels (MCLs) for drinking water specified in Title 22 of the California Code of Regulations (22 CCR), CTR values for protection of human health and aquatic life, and agricultural water quality objectives. The Basin Plan defines water quality objectives for metals as dissolved concentrations except for selenium, molybdenum, and boron, which are defined as total concentrations.

Ambient Water Quality Criteria

EPA ambient water quality recommended criteria and other criteria are commonly used by the RWQCB to interpret narrative objectives in the Basin Plan, such as Office of Environmental Health Hazard Assessment (OEHHA) fish consumption benchmarks, federal and state antidegradation requirements, and waterway-specific benchmarks.

Waste Disposal to Land

The California Water Code (CWC), Division 7, Chapter 4, Article 4, Sections 13260 through 13274, pertains to Waste Discharge Requirements (WDRs) issued by the RWQCB. State regulations pertaining to the treatment, storage, processing, or disposal of solid waste are found in California Code of Regulations (CCR) Title 27, beginning with Section 20005. Pursuant to Title 27 Section 20090, certain activities are exempt from Title 27. For example, discharges of wastewater to land, including evaporation ponds and percolation ponds, are exempt provided that:

- The RWQCB has issued or waived WDRs;
- The discharge complies with the applicable water quality control plan; and
- The wastewater does not need to be managed as a hazardous waste.

The RWQCB Non Chapter 15 (Non 15) Program regulates point discharges that are exempt from Title 27 pursuant to Subsection 20090 and are not subject to the Federal Water Pollution Control Act. The Non 15 Program also regulates the discharge of wastes classified as inert pursuant to Section 20230 of Title 27. Section 20230 defines inert waste as solid waste that:

- Does not contain hazardous waste or soluble pollutants at concentrations in excess of applicable water quality objectives; and
- Does not contain significant quantities of decomposable waste.

Inert wastes do not need to be discharged at classified waste disposal units, and the RWQCB can prescribe individual or general WDRs for discharges of inert wastes.

General Order for Maintenance Dredging (R5-2009-0085)

The General Order for Maintenance Dredging specifies general WDRs regulating maintenance dredging projects within the Central Valley Region that remove and/or place up to 100,000 cubic yards of material.

1.4.2 Human Health

Screening levels related to protection of human health in the case of routine, long term exposure by direct pathways (i.e., ingestion, inhalation and dermal contact) commonly include EPA Regional Screening Levels (RSLs) and DTSC Screening Levels (DTSC-SLs). For inorganics, background concentrations are also used as a basis for comparison.

RSLs and DTSC-SLs include inorganic constituent concentrations that are based on the protection of public health. In California, DTSC-SLs are commonly used in lieu of RSLs when DTSC uses toxicity criteria that are different than the toxicity criteria used by EPA.

The RSLs and DTSC-SLs are considered conservative. Under most circumstances, the presence of a chemical in media at concentrations less than the corresponding RSL or DTSC-SL can be assumed not to pose a significant, long-term (chronic) threat to human health. The presence of a chemical or inorganic constituent at a concentration in excess of a screening level does not necessarily indicate that adverse impacts to human health are occurring or will occur; however, further evaluation of potential human health concerns are generally appropriate if screening values are exceeded.

1.5 LIMITATIONS AND EXCEPTIONS

The information presented in this report is not meant to be comprehensive, to identify all potential concerns, or to eliminate the risk associated with environmental conditions. H&K used professional judgment and experience to arrive at the conclusions presented herein. Therefore, the conclusions are not to be considered scientific certainties. The recommendations provided herein are contingent upon H&K's review of future sampling results and any other pertinent information that becomes available.

No environmental assessment can eliminate all uncertainty. H&K does not warrant the accuracy of information supplied by others, or the use of segregated portions of this plan. Furthermore, the concentrations detected in the samples collected during the site investigation may not be representative of conditions between the locations sampled. Other forms of contamination may be present within the site that the investigation did not detect. Professional judgment and interpretation are inherent in the process and uncertainty is inevitable. Therefore, the findings presented in this report may need to be revised based on the results of future sampling and analysis.

H&K prepared and issued this plan for the exclusive use of our client. Any reliance on this plan by a third party is at the party's sole risk. H&K is not responsible for any other party's interpretations of the reported information.

H&K performed this work in accordance with present, regional, generally accepted standards of care. This report does not represent a legal opinion. No warranty, expressed or implied, including any implied warranty of merchantability or fitness for the purpose is made or intended in connection with the work.

The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. Changes in regulations, interpretations, and/or enforcement policies may occur at any time.

2 INVESTIGATION METHODOLOGY

H&K performed the sediment sampling on March 28 and 29, 2017. The investigation methodology is summarized below, and sample locations are depicted on Figure 3.

2.1 SEDIMENT SAMPLING

Sediment samples were collected as grab samples (independent, discrete samples) from eight locations (HD-SS-1 through HD-SS-8) within the impoundment using a hand-actuated slide hammer fitted with a 4-foot long stainless steel sampling shoe lined with 1.5-inch diameter pre-cleaned, acetate sleeves. Discrete samples were then transferred to laboratory supplied 8-ounce glass jars, placed in thermally-insulated containers, and were transported to H&K's Nevada City office.

Discrete sediment samples HD-SS-1 through HD-SS-4 were composited at H&K's Nevada City laboratory into sample HD-SS-1-4. Discrete sediment samples HD-SS-5 through HD-SS-8 were composited into sample HD-SS-5-8. Composite samples to be analyzed for methylmercury (MeHg) were placed in a thermally-insulated container on dry ice and were transported to Caltest Analytical Laboratories (Caltest, ELAP certification number 1664) of Napa, California. Samples to be analyzed for the remaining constituents were placed in a thermally-insulated container on wet ice and were transported to Advanced Technology Laboratories (ATL, ELAP certification number 1809) of Signal Hill, California.

Sample handling and shipment was performed under chain-of-custody documentation. Equipment decontamination procedures are described in the following section. MeHg sampling and compositing were performed using the clean hands procedure, pursuant to EPA Method 1669.

2.2 DECONTAMINATION

The laboratory testing program contained analysis of organics and metals. Therefore, acetate sample liners were decontaminated as follows, pursuant to methodology set forth by the United States Geological Survey (USGS; personal communication with Charlie Alpers, October 11, 2016). Prior to sampling, acetate sample liners were:

1. Rinsed with de-ionized (DI) water, using a dilute laboratory-grade liquid soap (Liquinox™);
2. Rinsed with 5 percent (%) hydrochloric acid (HCl) solution; and
3. Triple-rinsed with DI water.

The steel sampling equipment was decontaminated before first use and between sample locations.

2.3 LABORATORY ANALYSIS

The laboratory testing program included analysis of the two composite sediment samples HD-SS-1-4 and HD-SS-5-8 for organics, inorganics, and physical properties as described in the following sections.

2.3.1 Inorganics Analysis

The composite sediment samples were analyzed for the heavy metals listed in the RWQCB General Order for Maintenance Dredging (R5-2009-0085), including total CAM 17 (Title 22) metals, total aluminum, and hexavalent chromium. These samples were also analyzed for soluble CAM 17 (Title 22) metals by the Toxicity Characteristic Leaching Procedure (TCLP) and by the Title 22 Waste Extraction Test (WET). The samples were tested for moisture content by ASTM Method D2216 to facilitate dry-weight conversion of constituent concentrations. Inorganics analysis is summarized below.

Table 2.3.1 – Laboratory Testing Program, Inorganics

Analysis	Method
Total CAM 17 (Title 22) Metals	EPA 6010B/7471A
Total Aluminum	EPA 6010B
Total Hexavalent Chromium	EPA 3060A/7199A
Soluble CAM 17 (Title 22) Metals by TCLP	TCLP/EPA 6010B/7471A
Soluble CAM 17 (Title 22) Metals by Standard WET	WET/EPA 6010B/7471A

Notes:
CAM = California Assessment Manual
EPA = United States Environmental Protection Agency
TCLP = Toxicity Characteristic Leaching Procedure
WET = Waste Extraction Test

2.3.2 Organics Analysis

Organics analysis consisted of methylmercury (MeHg) by cold vapor atomic fluorescence spectrometry (CVAFS; EPA Method 1630) and was performed by Caltest Analytical Laboratories. MeHg sampling was performed using the clean hands procedure, pursuant to EPA Method 1669. The laboratory reporting limit (RL) is 0.1 micrograms per kilogram (ug/kg), and the method detection limit (MDL) is 0.05 ug/kg. Organics analysis is summarized below.

Table 2.3.2 – Laboratory Testing Program, Organics

Analysis	Method
Methylmercury	EPA 1630
Semi-volatile organic compounds	EPA 8270C
Carbon Chain	EPA 8015
Polychlorinated biphenyls (PCBs)	EPA 8082
Polycyclic aromatic hydrocarbons (PAHs)	EPA 8310

Notes:
EPA = United States Environmental Protection Agency

2.3.3 Physical Properties

Testing for physical properties included particle size analysis and moisture content determination. Particle size analysis was performed on discrete sediment samples HD-SS-1, HD-SS-2, HD-SS-3, HD-SS-6, and HD-SS-7 for sand-size particles (i.e., all particle sizes retained on the No. 200 sieve) using ASTM Method D422. Moisture content was determined for composite samples HD-SS-1-4 and HD-SS-5-8 using ASTM Method D2216. The frequency of testing for physical properties is summarized below.

Table 2.3.3 – Laboratory Testing Program, Physical Properties

Analysis	Method	Quantity
Particle Size Analysis, Full Sieve	ASTM D422	5
Moisture Content	ASTM D2216	2

Notes:
ASTM = American Society for Testing of Materials

3 DATA QUALITY OBJECTIVES

3.1 MEASUREMENT QUALITY OBJECTIVES

Measurement Quality Objectives (MQOs) are established for field and laboratory measurements to define criteria for calibration and quality control. MQOs are used to assess the viability and usability of data, considering the following Data Quality Indicators (DQIs): precision, accuracy, representativeness, completeness, comparability, and sensitivity.

3.1.1 Laboratory Measurement Quality Objectives

Analysis was performed by the following laboratories:

- Sediment samples were submitted to ATL for analysis of inorganic and organic constituents.
- Sediment samples were submitted to Caltest for analysis of MeHg.

Laboratory MQOs are defined by the contract laboratories. Quality control (QC) reports are included in the laboratory reports presented in Appendix A.

3.2 DATA REVIEW AND VALIDATION

Field personnel were responsible for following H&K's sampling and documentation procedures to facilitate the collection of defensible and justifiable data. Responsibilities for data review and validation are outlined below:

- Field data review and validation was performed by Bryan Botsford, project geologist, and was overseen by Jason Muir, the project manager.
- Laboratory data review and validation was performed by a chemist or laboratory analyst as described in the laboratory quality assurance programs, as summarized in the laboratory reports (Appendix A). Data failing to meet the laboratory acceptance criteria were flagged with a qualifier identifying the associated problem in the laboratory report.
- Secondary validation for field data and review of laboratory quality control reports was performed by the project geologist.
- The project manager is responsible for overall verification and final approval of all data.

Procedures and criteria for review of laboratory data are summarized below.

3.2.1 Precision

H&K assessed the precision of laboratory analysis by comparing the analytical results with matrix spike/matrix spike duplicate (MS/MSD) results for organic analysis, and laboratory duplicate results for inorganic analysis. For laboratory precision, H&K's general MQOs are:

- Relative percent difference (RPD) between duplicate blank spikes less than or equal to 20%.
- RPD between laboratory duplicate samples less than or equal to 30% for analyte concentrations greater than or equal to five times the MDL, and the absolute concentration difference less than or equal to the MDL for analyte concentrations less than five times the MDL.
- RPD between MSDs less than or equal to 40%.

ATL reported RPD exceedances for soluble thallium and antimony analysis by Standard WET, and for soluble cadmium, cobalt, and vanadium by TCLP. The calculations for these constituents are based on raw values. The RPD exceedances are likely attributable to the low concentrations of the constituents. In general, these constituents were detected at trace concentrations or were not detected.

3.2.2 Accuracy

H&K assessed the accuracy of laboratory results by reviewing method blank, reagent and preparation blank, and MS/MSD. The percent recovery (%REC or %R as shown in the following equation) of MS samples was calculated using the following equation:

$$\%R_i = \left(\frac{Y_i}{X_i}\right) \times 100$$

where:

$\%R_i$ = percent recovery for compound i
Y_i = measured analyte concentration in sample i (measured - original sample concentration)
X_i = known analyte concentration in sample i

For matrix spikes, the %REC calculation typically takes into account correcting the matrix spike concentration for the naturally occurring amounts (as measured in the unspiked sample). The calculation may be represented by the following equation:

$$\%R = \frac{(A - B)}{K} \times 100$$

where:

$\%R$ = percent recovery
A = measured value or concentration in the matrix spike
B = measured value or concentration in the unspiked sample
K = known or accepted/true value or concentration in the matrix spike without native amounts present

For laboratory accuracy, the MQOs are:

- Detections less than the RL for field blanks.
- Detections less than ½ the RL for laboratory blanks.
- %REC between 80 and 120%.

Laboratory quality control flags are summarized below. These flags did not signify a negative impact on data usability.

<u>Advanced Technology Laboratories (Work Order 1701344)</u>

- Matrix spike B7C1078-MS1 for soluble cobalt, silver, and antimony by Standard WET was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- Matrix spike B7D0186-MS2 for total hexavalent chromium was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- Matrix spike B7D0044-MS1 for seven EPA 8270C constituents was outside the ATL acceptance criteria for percent recovery limits. The analytical batch was validated by the laboratory control sample.
- The laboratory control sample B7D0044-BS1 for one EPA 8270C constituent was outside of the control limit but was within the Marginal Exceedance (ME) limit.
- Sample dilution was required for soluble metals analysis by TCLP and Standard WET due to possible matrix interference.

<u>Caltest Analytical Laboratory (Work Order S031204)</u>

Caltest reported no QC flags for MeHg analysis.

3.2.3 Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in parameters at a sampling point, or an environmental condition that they are intended to represent. H&K and the contract laboratories addressed the representativeness of data by consistent application of established field and laboratory procedures.

Sample holding times were verified and chain-of-custody forms were checked for completeness. Temperature of samples was measured upon receipt by the laboratory, when applicable. Laboratory blank samples were evaluated for the presence of contaminants. No significant discrepancies were identified.

3.2.4 Comparability

The comparability objective determines whether analytical conditions are sufficiently uniform for each analytical run to ensure that all reported data will be consistent. Comparability is addressed by using similar analytical methods from one investigation to the next.

3.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under normal conditions. H&K considers the data set for this investigation complete based on the sampling rationale presented in Section 1.3.

3.2.6 Sensitivity

The laboratory method detection limit (MDL) is the minimum concentration of an analyte that can be reliably distinguished from background noise for a specific analytical method. The reporting limit (RL), or practical quantitation limit (PQL), represents the lowest concentration of an analyte that can be accurately and reproducibly quantified in a sample matrix. The screening levels described in Section 3.1 are typically several times the MDL to allow for reproducibility. H&K verified the sensitivity of laboratory analysis by comparing the RLs and MDLs reported by the laboratory to the associated screening levels.

4 INVESTIGATION RESULTS

The subsurface conditions described in the following paragraphs are generalized based on H&K's observation of sediment conditions revealed during the subsurface investigation. Sediment within the impoundment was generally described as dark brown (Munsel color 10YR 3/3), saturated, loose, poorly graded sand with gravel (United States Soil Classification System [USCS] symbol SP). The sample locations are depicted on Figure 3.

4.1 LABORATORY RESULTS

4.1.1 Inorganics Analysis

Total CAM 17 Metals

Total metals concentrations detected in the sediment samples are compared to the screening levels described in Section 3.1. The total metals concentrations are below the corresponding DTSC-SLs and RSLs for commercial and residential soil, with the exception of arsenic.

The detected total arsenic concentrations in samples HD-SS-1-4 and HD-SS-5-8 were 2.7 milligrams per kilogram (mg/kg) and 3.0 mg/kg, respectively. These concentrations are within the range of background soil arsenic concentrations for the region (typically up to 17 mg/kg), as determined by H&K's statistical analysis of over 200 data points obtained by H&K from sites in the region as part of DTSC's Voluntary Cleanup Program. Additional information regarding regional background concentrations can be provided upon request.

The total metals concentrations detected in the sediment samples are below the corresponding Total Threshold Limit Concentration (TTLC) values for designation of hazardous waste in California. Results of total metals analysis are presented in Table 1. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

Soluble CAM 17 Metals by Standard WET and TCLP

Soluble metals concentrations by Standard WET and TCLP were below their respective screening levels for designation of hazardous waste. Results of soluble metals analysis by Standard WET and TCLP are presented in Tables 3 and 4. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

4.1.2 Organics Analysis

MeHg concentrations detected in sediment on a wet-weight basis ranged from 0.11 micrograms per kilogram (ug/kg) to 0.13 ug/kg. Converting to dry weight, the concentrations are estimated to range from 0.13 ug/kg to 0.16 ug/kg. The MeHg concentrations detected in sediment samples are below the corresponding screening levels (RSLs) for commercial soil (120 mg/kg) and residential soil (7.8 mg/kg). A milligram per kilogram (mg/kg) is equal to 1,000 micrograms per kilogram (ug/kg). Results of methylmercury (MeHg) analysis are presented in Table 2. Laboratory reports and chain-of-custody documentation are presented in Appendix A.

4.1.3 Physical Properties

Percent Moisture

Percent moisture for samples HD-SS-1-4 and HD-SS-5-8 were 17 and 15 percent, respectively.

Particle Size Analysis

Particle size analysis (ASTM D422) is summarized in Table 5. Laboratory reports are presented in Appendix B.

As listed in Table 5, the average gravel content (average percent retained on a No. 4 sieve) for the five locations was 26.5%. The average sand content (average percent passing the No. 4 sieve and retained on the No. 200 sieve) was 71.9%. The average fines (silt and clay) content (average percent passing the No. 200 sieve) was 1.6%. In general, the sediment samples were described as poorly graded sand with gravel (SP).

4.2 SEDIMENT DEPTH AND VOLUME

Sediment depths within the impoundment were estimated using a dynamic cone penetrometer (DCP) and hand level. Sediment depth measurements within the impoundment ranged from 1 to 8 feet. These measurements were used to estimate average sediment volumes within specific sections of the impoundment. The average sediment depth along the flow line of Auburn Ravine was estimated to be 1 foot, and average sediment depths for low-energy, depositional areas of the impoundment ranged from 3 to 6 feet.

Based on these values and an estimated surface area of 1.5 acres, the impoundment contained approximately 8,000 cubic yards of sediment at the time of the investigation. Approximate sediment depths at each sample location are summarized in Table 6.

5 FINDINGS AND CONCLUSIONS

H&K's opinion is that the investigation was performed in general accordance with our proposal dated November 14, 2016.

The chemical characterization of the sediment did not detect organic or inorganic constituent concentrations that were notably elevated with respect to background conditions. Additionally, the physical characterization of the sediment indicates that the sediment is predominantly coarse-grained (sand and gravel), with only 1.6% on average passing the No. 200 sieve.

H&K concludes that sediment management practices associated with the impoundment are not likely to have a significant impact on water quality given the chemical and physical characterization described herein.

6 REFERENCES

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FIGURES

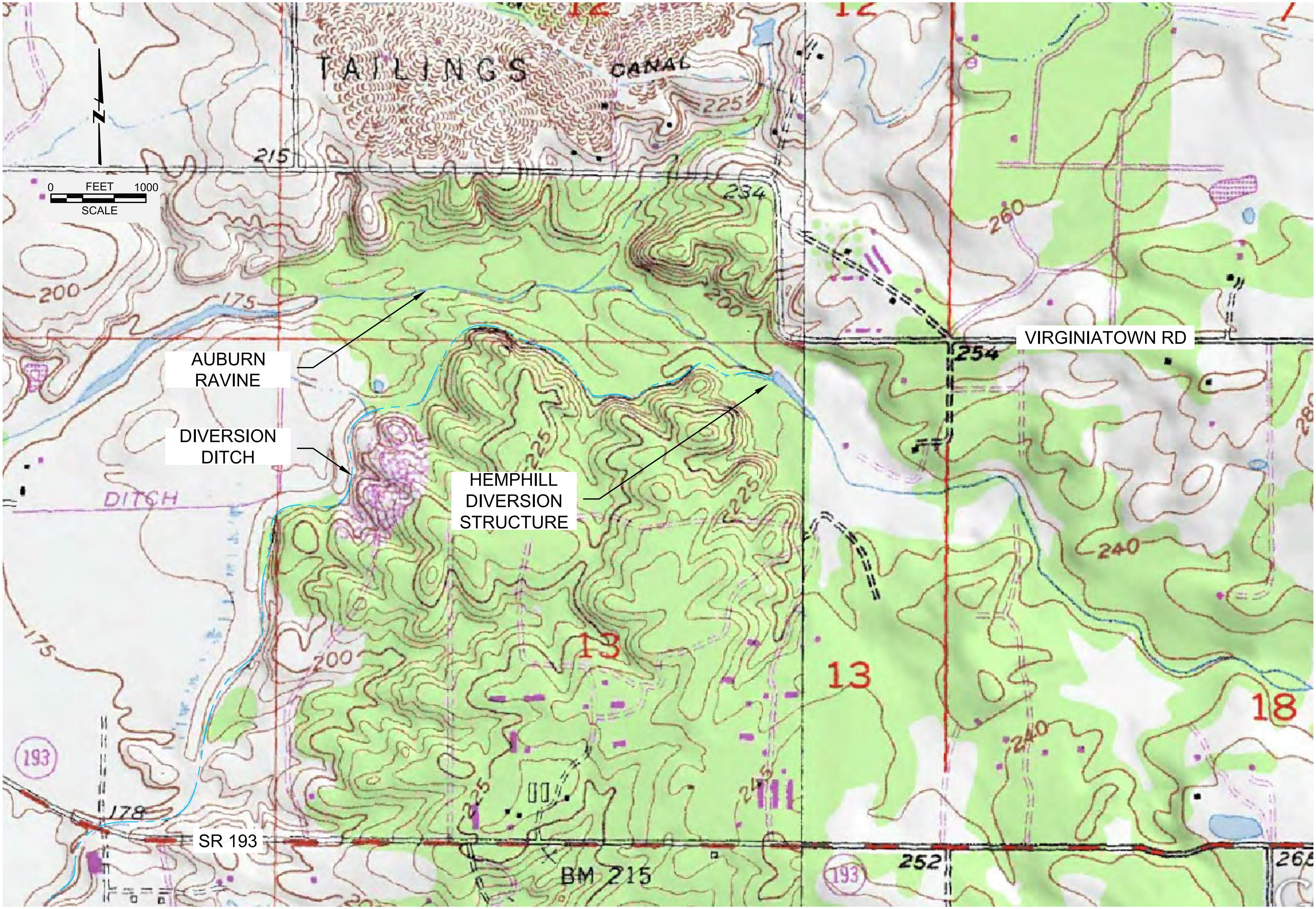
Figure 1 Location Map

Figure 2 Vicinity Map

Figure 3 Site Map

BASE MAP FROM PLACER COUNTY GIS (HTTP://GIS-PLACERCOUNTY.OPENDATA.ARCGIS.COM/); MAY 2017

HOLDREGE & KULL CONSULTING ENGINEERS • GEOLOGISTS 792 SEARLS AVENUE, NEVADA CITY, CALIFORNIA 95959 (530) 478-1305 phone www.HOLDREGEandKULL.com (530) 478-1019 fax NEVADA CITY • TRUCKEE • CHICO • YUBA CITY	LOCATION MAP HEMPHILL DIVERSION STRUCTURE LINCOLN, PLACER COUNTY, CALIFORNIA	DRAWN BY: BOTSFORD CHECKED BY: MUIR H&K PROJECT: 4794-01 DATE: JUNE 2017	FIGURE 1



BASE MAP FROM USGS 7.5-MINUTE TOPOGRAPHIC MAPS OF GOLD HILL AND LINCOLN , CALIFORNIA (1973, 1981)

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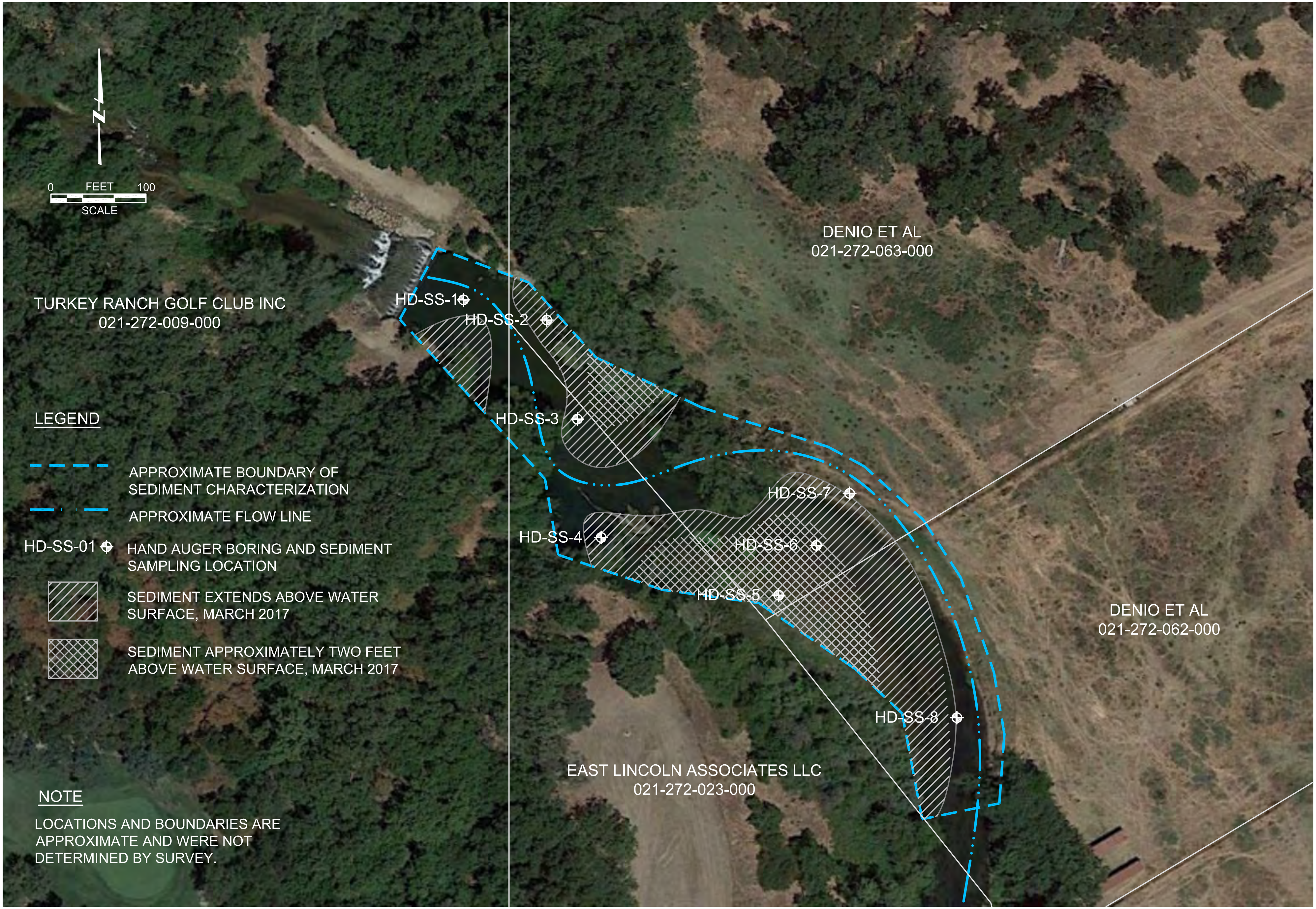
VICINITY MAP

HEMPHILL DIVERSION STRUCTURE

LINCOLN, PLACER COUNTY, CALIFORNIA

DRAWN BY:	BOTSFORD
CHECKED BY:	MUIR
H&K PROJECT:	4794-01
DATE:	JUNE 2017

FIGURE 2



AERIAL IMAGE FROM GOOGLE EARTH, IMAGE DATE JULY 10, 2016

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SITE MAP
HEMPHILL DIVERSION STRUCTURE
LINCOLN, PLACER COUNTY, CALIFORNIA

DRAWN BY:	BOTSFORD
CHECKED BY:	MUIR
H&K PROJECT:	4794-01
DATE:	JUNE 2017

FIGURE
3

TABLES

Table 1 Total Metals in Sediment Samples

Table 2 Methylmercury in Sediment Samples

Table 3 Soluble Metals by Standard WET in Sediment Samples

Table 4 Soluble Metals by TCLP in Sediment Samples

Table 5 Particle Size Analysis

Table 6 Sediment Depth

Table 1 - Total Metals in Sediment Samples
Hemphill Diversion Structure
Placer County, California

			Results																		
Sample ID	**Sample Date**	**Unit**	**Aluminum**	**Antimony, metallic**	**Arsenic, inorganic**	**Barium**	**Beryllium and compounds**	**Cadmium**	**Chromium, total (1)**	**Chromium, hexavalent**	**Cobalt**	**Copper**	**Lead and compounds**	**Mercury, elemental**	**Molybdenum**	**Nickel, soluble salts**	**Selenium**	**Silver**	**Thallium, soluble salts**	**Vanadium and compounds**	**Zinc and compounds**
USEPA Method			*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*3060A/7199*	*6010B*	*6010B*	*6010B*	*7471A*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*	*6010B*
CAS No.			*7429-90-5*	*7440-36-0*	*7440-38-2*	*7440-39-3*	*7440-41-7*	*7440-43-9*	*16065-83-1*	*18540-29-9*	*7440-48-4*	*7440-50-8*	*7439-92-1*	*7439-97-6*	*7439-98-7*	*7440-02-0*	*7782-49-2*	*7440-22-4*	*7440-28-0*	*7440-62-2*	*7440-66-6*
Method Detection Limit			*2.9*	*0.32*	*0.70*	*0.10*	*0.04*	*0.09*	*0.12*	*0.30*	*0.10*	*0.11*	*0.11*	*0.02*	*0.13*	*0.10*	*0.88*	*0.04*	*0.42*	*0.19*	*0.18*
Reporting Limit			*25*	*2.0*	*1.0*	*0.1*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*2.0*	*1.0*	*0.10*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*	*1.0*
Screening Levels	*Residential Soil*		*7.70E+04*	*31*	*0.11*	*15,000*	*15*	*5.2*	*36,000*	*0.3*	*23*	*3,100*	*80*	*1.0*	*390*	*490*	*390*	*390*	*0.78*	*390*	*23,000*
	Commercial Soil		*1.10E+06*	*470*	*0.36*	*2.2E+05*	*210*	*7.3*	*2.7E+05*	*6.3*	*350*	*47,000*	*320*	*4.5*	*5,800*	*3,100*	*5,800*	*1,500*	*12*	*1,000*	*3.5E+05*
	Basis for Screening Level		*RSL*	*RSL*	*DTSC-SL*	*RSL*	*DTSC-SL*	*DTSC-SL*	*DTSC-SL*	*RSL*	*RSL*	*RSL*	*DTSC-SL*	*DTSC-SL*	*RSL*	*DTSC-SL*	*RSL*	*RSL*	*RSL*	*DTSC-SL*	*RSL*
	TTLC		*NE*	*500*	*500*	*10,000*	*10,000*	*100*	*2,500*	*500*	*2,500*	*18,000*	*1,000*	*20*	*3,500*	*2,000*	*100*	*500*	*700*	*2,400*	*5,000*
HD-SS-1-4	03/29/17	mg/kg	2500	0.43 J	**2.7**	16	ND	ND	11	ND	3.9	5.7	2.3	0.04 J	ND	7.8	ND	ND	ND	13	10
HD-SS-5-8	03/29/17	mg/kg	1700	0.39 J	**3.0**	11	ND	ND	8.5	ND	2.4	3.9	1.9	0.02 J	ND	5.1	ND	ND	ND	9.3	7.0

Notes:
1 Total chromium (CAS No. 7440-47-3) results compared to RSLs for Chromium III (CAS No. 16065-83-1)
CAS = Chemical Abstracts Service registry number
DTSC-SL = California Department of Toxic Substances Control (DTSC) Screening Level (SL), as set forth in Human Health Risk Assessment (HHRA) Note 3 (DTSC; June 2016)
J = value was detected between MDL and RL and is an estimated value
mg/kg = milligrams per kilogram
ND = Analyte not detected at or below the Method Detection Limit
RSL = USEPA Region 9 Regional Screening Level
TTLC = Total Threshold Limit Concentration

Table 2 - Methylmercury in Sediment Samples
Hemphill Diversion Structure
Placer County, California

Sample ID	Sample Date	Unit	Moisture Content (%)	Results: Methylmercury (ug/kg, wet weight)	Results: Methylmercury (ug/kg, dry weight[1])
USEPA Method				*1630*	
CAS No.				*22967-92-6*	
Method Detection Limit				*0.05*	
Reporting Limit				*0.10*	
Screening Levels	*Residential Soil*			*7,800*	
	Commercial Soil			*1,200,000*	
	Basis for Screening Level			*RSL*	
HD-SS-1-4	3/29/2017	ug/kg	17	0.13	0.16
HD-SS-5-8	3/29/2017	ug/kg	15	0.11	0.13

Notes:
1 Dry weight estimated from wet weight laboratory result based on listed moisture content.
CAS = Chemical Abstracts Service
RSL = USEPA Region 9 Regional Screening Level
ug/kg = micrograms per kilogram
USEPA = United States Environmental Protection Agency

Table 3 - Soluble Metals in Sediment Samples by Standard WET

Hemphill Diversion Structure

Placer County, California

Parameter	CAS No.	EPA Method	Unit	MDL	RL	Results		Benchmark Value
						HD-SS-1-4	**HD-SS-1-5**	*STLC*
Date Sampled						*03/29/17*	*03/29/17*	
Antimony, metallic	7440-36-0	WET/6010B	mg/L	0.043	2.0	ND	ND	*15*
Arsenic, inorganic	7440-38-2	WET/6010B	mg/L	0.13	1.0	ND	ND	*5*
Barium	7440-39-3	WET/6010B	mg/L	0.016	1.0	0.93	0.77	*100*
Beryllium and compounds	7440-41-7	WET/6010B	mg/L	0.009	1.0	ND	ND	*0.75*
Cadmium	7440-43-9	WET/6010B	mg/L	0.0030	1.0	ND	ND	*1*
Chromium, total (1)	16065-83-1	WET/6010B	mg/L	0.033	1.0	0.081	ND	*5 (560)**
Cobalt	7440-48-4	WET/6010B	mg/L	0.014	1.0	0.11	0.11	*80*
Copper	7440-50-8	WET/6010B	mg/L	0.046	1.0	0.11	0.069	*25*
Lead and compounds	7439-92-1	WET/6010B	mg/L	0.057	1.0	0.099	ND	*5*
Mercury, elemental	7439-97-6	WET/6010B	mg/L	6.70E-04	0.001	ND	ND	*0.2*
Molybdenum	7439-98-7	WET/6010B	mg/L	0.014	1.0	ND	ND	*350*
Nickel, soluble salts	7440-02-0	WET/6010B	mg/L	0.048	1.0	0.16	0.12	*20*
Selenium	7782-49-2	WET/6010B	mg/L	0.068	1.0	ND	ND	*1*
Silver	7440-22-4	WET/6010B	mg/L	0.012	1.0	0.018	ND	*5*
Thallium, soluble salts	7440-28-0	WET/6010B	mg/L	0.051	1.0	0.063	ND	*7*
Vanadium and compounds	7440-62-2	WET/6010B	mg/L	0.022	1.0	0.17	0.096	*24*
Zinc and compounds	7440-66-6	WET/6010B	mg/L	0.041	1.0	0.28	0.22	*250*

Notes:

CAS = Chemical Abstracts Service registry number

MDL = method detection limit

mg/L = milligrams per liter

ND = not detected above listed MDL

RL = laboratory reporting limit

STLC = Soluble Threshold Limit Concentration

J = value was detected between MDL and RL and is an estimated value

1 If the soluble chromium as determined by TCLP is less than 5 mg/L, and the soluble chromium as determined by the STLC test equals or exceeds 560 mg/L, and the waste is not otherwise identified as a RCRA hazardous waste, then the waste is a non-RCRA hazardous waste.

WET = Title 22 Waste Extraction Test using citrate buffer extractant solution

Table 4 - Soluble Metals in Sediment Samples by TCLP
Hemphill Diversion Structure
Placer County, California

Parameter	CAS No.	EPA Method	Unit	MDL	RL	Results		Benchmark Value
						HD-SS-1-4	HD-SS-1-5	*TCLP*
Date Sampled						*03/29/17*	*03/29/17*	
Antimony, metallic	7440-36-0	TCLP/6010B	mg/L	0.011	0.5	ND	ND	*NE*
Arsenic, inorganic	7440-38-2	TCLP/6010B	mg/L	0.033	0.25	ND	ND	*5*
Barium	7440-39-3	TCLP/6010B	mg/L	0.0040	0.25	0.3	0.23 J	*100*
Beryllium and compounds	7440-41-7	TCLP/6010B	mg/L	0.0022	0.25	ND	ND	*NE*
Cadmium	7440-43-9	TCLP/6010B	mg/L	0.0008	0.25	0.0008 J	ND	*1*
Chromium, total (1)	16065-83-1	TCLP/6010B	mg/L	0.0082	0.25	0.013 J	ND	*5*
Cobalt	7440-48-4	TCLP/6010B	mg/L	0.0036	0.25	0.012 J	0.0094 J	*80*
Copper	7440-50-8	TCLP/6010B	mg/L	0.011	0.25	ND	ND	*NE*
Lead and compounds	7439-92-1	TCLP/6010B	mg/L	0.014	0.25	ND	ND	*5*
Mercury, elemental	7439-97-6	TCLP/ 7470A	mg/L	1.30E-04	2.50E-04	ND	ND	*0.2*
Molybdenum	7439-98-7	TCLP/6010B	mg/L	0.0034	0.25	ND	ND	*NE*
Nickel, soluble salts	7440-02-0	TCLP/6010B	mg/L	0.012	0.25	0.016 J	ND	*NE*
Selenium	7782-49-2	TCLP/6010B	mg/L	0.017	0.25	ND	ND	*1*
Silver	7440-22-4	TCLP/6010B	mg/L	0.0031	0.25	ND	ND	*5*
Thallium, soluble salts	7440-28-0	TCLP/6010B	mg/L	0.013	0.25	ND	ND	*NE*
Vanadium and compounds	7440-62-2	TCLP/6010B	mg/L	0.0056	0.25	ND	ND	*NE*
Zinc and compounds	7440-66-6	TCLP/6010B	mg/L	0.01	0.25	0.087 J	0.062 J	*NE*

Notes:
CAS = Chemical Abstracts Service registry number
J = value was detected between MDL and RL and is an estimated value
MDL = method detection limit
mg/L = milligrams per liter
ND = not detected above listed MDL
NE = not established
RL = laboratory reporting limit
TCLP = Toxicity Characteristic Leaching Procedure

Table 5 - Summary of Particle Size Analysis
Hemphill Diversion Structure
Placer County, California

Sample No.	Date	Percent Passing[1] (% by mass)							
		3/8 in	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
HD-SS-1	03/29/17	97.9	87.7	68.9	41.4	18.2	4.8	0.9	0.1
HD-SS-2	03/29/17	95.6	90.2	73.9	38.1	16.5	9.7	6.4	4.1
HD-SS-3	03/29/17	79.9	68.4	54.7	40.1	21.4	8.4	2.9	1.2
HD-SS-6	03/29/17	70.7	57	43.2	23.3	7.4	3.3	2	1.4
HD-SS-7	03/29/17	69.9	64.2	47	35	23.1	10.4	2.7	1.0
Average Percent Passing		82.8	73.5	57.5	35.6	17.3	7.3	3.0	1.6
Average Percent Retained		17.2	26.5	42.5	64.4	82.7	92.7	97.0	98.4
Average gravel[2] content (average percent retained on No. 4 sieve)									**26.5**
Average sand content (average percent passing No. 4 sieve and retained on No. 200 sieve)									**71.9**
Average fines content (silt and clay; average percent passing No. 200 sieve)									**1.6**

Notes:
1 Results are based on ASTM D422 particle size analysis of 1.5-inch diameter sediment column obtained by direct push.
2 Gravel content may be under-represented based on the sampling tools (1.5-inch inside diameter direct push core barrel)
USCS = Unified Soil Classification System

Table 6 - Sediment Depth
Hemphill Diversion Structure
Placer County, California

Location	**Date**	**Sediment Depth** (feet)
HD-SS-1	03/29/17	2
HD-SS-2	03/29/17	3.5
HD-SS-3	03/29/17	7
HD-SS-4	03/29/17	3.5
HD-SS-5	03/29/17	8
HD-SS-6	03/29/17	2
HD-SS-7	03/29/17	1
HD-SS-8	03/29/17	3

Notes:

1 Measurements were approximated using a Dynamic Cone Penotrometer (DCP) testing and hand level.

APPENDIX A

Analytical Laboratory Reports and Chain of Custody Documentation

April 20, 2017

Bryan Botsford
Holdrege & Kull Consulting Engineers & Geologist
792 Searls Avenue
Nevada City, CA 95959
Tel: (530) 478-1305
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ELAP No.: 1838
CSDLAC No.: 10196
ORELAP No.: CA300003
TCEQ No. : T104704502

Re: ATL Work Order Number : 1701344

Client Reference : HEMPHILL DIVERSION, 4794-01

Enclosed are the results for sample(s) received on March 30, 2017 by Advanced Technology Laboratories. The sample(s) are tested for the parameters as indicated on the enclosed chain of custody in accordance with applicable laboratory certifications. The laboratory results contained in this report specifically pertains to the sample(s) submitted.

Thank you for the opportunity to serve the needs of your company. If you have any questions, please feel free to contact me or your Project Manager.

Sincerely,

Eddie Rodriguez
Laboratory Director

The cover letter and the case narrative are an integral part of this analytical report and its absence renders the report invalid. Test results contained within this data package meet the requirements of applicable state-specific certification programs. The report cannot be reproduced without written permission from the client and Advanced Technology Laboratories.

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

SUMMARY OF SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
HD-SS-1-4	1701344-01	Soil	3/29/17 16:00	3/30/17 9:11
HD-SS-5-8	1701344-02	Soil	3/29/17 15:45	3/30/17 9:11

CASE NARRATIVE

Samples for EPA 8310 were subcontracted to AETL with ELAP Cert.# 1541.

Results were J-flagged. "J" is used to flag those results that are between the PQL (Practical Quantitation Limit) and the calculated MDL (Method Detection Limit). Results that are "J" flagged are estimated values since it becomes difficult to accurately quantitate the analyte near the MDL.

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Percent Moisture
Analyst: BL

Analyte	Result (% by Weight)	PQL (% by Weight)	MDL (% by Weight)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Percent Moisture	**17**	0.10	0.10	1	B7D0096	04/04/2017	04/05/17 08:45	

Total Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aluminum	**2500**	25	2.9	1	B7D0065	04/04/2017	04/05/17 10:15	

Title 22 Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	**0.43**	2.0	0.32	1	B7D0065	04/04/2017	04/05/17 10:15	J
Arsenic	**2.7**	1.0	0.70	1	B7D0065	04/04/2017	04/05/17 10:15	
Barium	**16**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Beryllium	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:15	
Cadmium	ND	1.0	0.09	1	B7D0065	04/04/2017	04/05/17 10:15	
Chromium	**11**	1.0	0.12	1	B7D0065	04/04/2017	04/05/17 10:15	
Cobalt	**3.9**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Copper	**5.7**	2.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:15	
Lead	**2.3**	1.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:15	
Molybdenum	ND	1.0	0.13	1	B7D0065	04/04/2017	04/05/17 10:15	
Nickel	**7.8**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:15	
Selenium	ND	1.0	0.88	1	B7D0065	04/04/2017	04/05/17 10:15	
Silver	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:15	
Thallium	ND	1.0	0.42	1	B7D0065	04/04/2017	04/05/17 10:15	
Vanadium	**13**	1.0	0.19	1	B7D0065	04/04/2017	04/05/17 10:15	
Zinc	**10**	1.0	0.18	1	B7D0065	04/04/2017	04/05/17 10:15	

TCLP Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.50	0.011	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Arsenic	ND	0.25	0.033	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Barium	**0.30**	0.25	0.0040	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Beryllium	ND	0.25	0.0022	5	B7D0101	04/05/2017	04/05/17 18:23	D1

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

TCLP Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Cadmium	**0.0008**	0.25	0.0008	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Chromium	**0.013**	0.25	0.0082	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Cobalt	**0.012**	0.25	0.0036	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Copper	ND	0.25	0.011	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Lead	ND	0.25	0.014	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Molybdenum	ND	0.25	0.0034	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Nickel	**0.016**	0.25	0.012	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J
Selenium	ND	0.25	0.017	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Silver	ND	0.25	0.0031	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Thallium	ND	0.25	0.013	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Vanadium	ND	0.25	0.0056	5	B7D0101	04/05/2017	04/05/17 18:23	D1
Zinc	**0.087**	0.25	0.010	5	B7D0101	04/05/2017	04/05/17 18:23	D1, J

STLC Metals by ICP-AES by EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	0.043	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Arsenic	ND	1.0	0.13	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Barium	**0.93**	1.0	0.016	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Beryllium	ND	1.0	0.0090	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Cadmium	ND	1.0	0.0030	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Chromium	**0.081**	1.0	0.033	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Cobalt	**0.11**	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Copper	**0.11**	1.0	0.046	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Lead	**0.099**	1.0	0.057	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Molybdenum	ND	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Nickel	**0.16**	1.0	0.048	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Selenium	ND	1.0	0.068	20	B7C1078	04/02/2017	04/03/17 13:09	D1
Silver	**0.018**	1.0	0.012	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Thallium	**0.063**	1.0	0.051	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Vanadium	**0.17**	1.0	0.022	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J
Zinc	**0.28**	1.0	0.041	20	B7C1078	04/02/2017	04/03/17 13:09	D1, J

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Hexavalent Chromium by EPA 7196A/3060A

Analyst: LV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Hexavalent Chromium	ND	1.0	0.30	1	B7D0186	04/07/2017	04/07/17 16:31	

Mercury by AA (Cold Vapor) EPA 7471A

Analyst: KEK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.04**	0.10	0.02	1	B7D0067	04/04/2017	04/05/17 11:14	J

STLC Mercury by AA (Cold Vapor) EPA 7470A

Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	1.0	0.67	1	B7D0117	04/05/2017	04/06/17 12:28	

TCLP Mercury by AA (Cold Vapor) by EPA 7470A

Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	0.13	1	B7D0104	04/05/2017	04/06/17 10:56	

Hydrocarbon Chain Distribution by EPA 8015B (Modified)

Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
C8-C10	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C10-C18	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C18-C28	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C28-C36	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C36-C40	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
C8-C40 Total	ND	10	10	1	B7C1043	03/31/2017	04/03/17 10:45	
Surrogate: p-Terphenyl	*101 %*	*47 - 157*			B7C1043	03/31/2017	*04/03/17 10:45*	

Polychlorinated Biphenyls by EPA 8082

Analyst: RL

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1016	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Polychlorinated Biphenyls by EPA 8082

Analyst: RL

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1221	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1232	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1242	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1248	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1254	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1260	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1262	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Aroclor 1268	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:22	
Surrogate: Decachlorobiphenyl	*93.9 %*	*26 - 137*			B7C1049	03/31/2017	*03/31/17 12:22*	
Surrogate: Tetrachloro-m-xylene	*87.3 %*	*28 - 102*			B7C1049	03/31/2017	*03/31/17 12:22*	

Semivolatile Organic Compounds by EPA 8270C

Analyst: SP

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,2,4-Trichlorobenzene	ND	330	71	1	B7D0044	04/03/2017	04/04/17 01:46	
1,2-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
1,3-Dichlorobenzene	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	
1,4-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4,5-Trichlorophenol	ND	330	61	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4,6-Trichlorophenol	ND	330	220	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dichlorophenol	ND	1600	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dimethylphenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dinitrophenol	ND	1600	86	1	B7D0044	04/03/2017	04/04/17 01:46	
2,4-Dinitrotoluene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
2,6-Dinitrotoluene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Chloronaphthalene	ND	330	59	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Chlorophenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Methylnaphthalene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Methylphenol	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Nitroaniline	ND	1600	200	1	B7D0044	04/03/2017	04/04/17 01:46	
2-Nitrophenol	ND	330	110	1	B7D0044	04/03/2017	04/04/17 01:46	
3,3´-Dichlorobenzidine	ND	660	280	1	B7D0044	04/03/2017	04/04/17 01:46	
3-Nitroaniline	ND	1600	44	1	B7D0044	04/03/2017	04/04/17 01:46	
4,6-Dinitro-2-methyphenol	ND	1600	300	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Bromophenyl-phenylether	ND	330	50	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Chloro-3-methylphenol	ND	660	110	1	B7D0044	04/03/2017	04/04/17 01:46	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
4-Chloroaniline	ND	660	53	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Chlorophenyl-phenylether	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Methylphenol	ND	330	66	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Nitroaniline	ND	1600	290	1	B7D0044	04/03/2017	04/04/17 01:46	
4-Nitrophenol	ND	330	150	1	B7D0044	04/03/2017	04/04/17 01:46	
Acenaphthene	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Acenaphthylene	ND	330	51	1	B7D0044	04/03/2017	04/04/17 01:46	
Anthracene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzidine (M)	ND	1600	1400	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(a)anthracene	ND	330	39	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(a)pyrene	ND	330	45	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(b)fluoranthene	ND	330	55	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(g,h,i)perylene	ND	330	38	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzo(k)fluoranthene	ND	330	52	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzoic acid	ND	1600	890	1	B7D0044	04/03/2017	04/04/17 01:46	
Benzyl alcohol	ND	660	67	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-chloroethoxy)methane	ND	330	59	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-Chloroethyl)ether	ND	330	57	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-chloroisopropyl)ether	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	
bis(2-ethylhexyl)phthalate	ND	330	83	1	B7D0044	04/03/2017	04/04/17 01:46	
Butylbenzylphthalate	ND	330	250	1	B7D0044	04/03/2017	04/04/17 01:46	
Chrysene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 01:46	
Di-n-butylphthalate	ND	330	230	1	B7D0044	04/03/2017	04/04/17 01:46	
Di-n-octylphthalate	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Dibenz(a,h)anthracene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 01:46	
Dibenzofuran	ND	330	55	1	B7D0044	04/03/2017	04/04/17 01:46	
Diethyl phthalate	ND	330	47	1	B7D0044	04/03/2017	04/04/17 01:46	
Dimethyl phthalate	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
Fluoranthene	ND	330	47	1	B7D0044	04/03/2017	04/04/17 01:46	
Fluorene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorobenzene	ND	330	41	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorobutadiene	ND	660	61	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachlorocyclopentadiene	ND	660	64	1	B7D0044	04/03/2017	04/04/17 01:46	
Hexachloroethane	ND	330	71	1	B7D0044	04/03/2017	04/04/17 01:46	
Indeno(1,2,3-cd)pyrene	ND	330	44	1	B7D0044	04/03/2017	04/04/17 01:46	
Isophorone	ND	330	57	1	B7D0044	04/03/2017	04/04/17 01:46	
N-Nitroso-di-n propylamine	ND	330	65	1	B7D0044	04/03/2017	04/04/17 01:46	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

Client Sample ID HD-SS-1-4
Lab ID: 1701344-01

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
N-Nitrosodiphenylamine	ND	330	48	1	B7D0044	04/03/2017	04/04/17 01:46	
Naphthalene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 01:46	
Nitrobenzene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 01:46	
Pentachlorophenol	ND	1600	190	1	B7D0044	04/03/2017	04/04/17 01:46	
Phenanthrene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 01:46	
Phenol	ND	330	130	1	B7D0044	04/03/2017	04/04/17 01:46	
Pyrene	ND	330	53	1	B7D0044	04/03/2017	04/04/17 01:46	
Pyridine	ND	1600	270	1	B7D0044	04/03/2017	04/04/17 01:46	
Surrogate: 1,2-Dichlorobenzene-d4	*44.6 %*		*22 - 107*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2,4,6-Tribromophenol	*65.1 %*		*12 - 129*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Chlorophenol-d4	*44.8 %*		*34 - 102*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Fluorobiphenyl	*54.1 %*		*25 - 116*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 2-Fluorophenol	*39.1 %*		*32 - 101*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: 4-Terphenyl-d14	*82.5 %*		*34 - 125*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: Nitrobenzene-d5	*38.3 %*		*30 - 115*		B7D0044	04/03/2017	*04/04/17 01:46*	
Surrogate: Phenol-d5	*40.5 %*		*34 - 104*		B7D0044	04/03/2017	*04/04/17 01:46*	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Percent Moisture
Analyst: BL

Analyte	Result (% by Weight)	PQL (% by Weight)	MDL (% by Weight)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Percent Moisture	**15**	0.10	0.10	1	B7D0096	04/04/2017	04/05/17 08:45	

Total Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aluminum	**1700**	25	2.9	1	B7D0065	04/04/2017	04/05/17 10:18	

Title 22 Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	**0.39**	2.0	0.32	1	B7D0065	04/04/2017	04/05/17 10:18	J
Arsenic	**3.0**	1.0	0.70	1	B7D0065	04/04/2017	04/05/17 10:18	
Barium	**11**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Beryllium	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:18	
Cadmium	ND	1.0	0.09	1	B7D0065	04/04/2017	04/05/17 10:18	
Chromium	**8.5**	1.0	0.12	1	B7D0065	04/04/2017	04/05/17 10:18	
Cobalt	**2.4**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Copper	**3.9**	2.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:18	
Lead	**1.9**	1.0	0.11	1	B7D0065	04/04/2017	04/05/17 10:18	
Molybdenum	ND	1.0	0.13	1	B7D0065	04/04/2017	04/05/17 10:18	
Nickel	**5.1**	1.0	0.10	1	B7D0065	04/04/2017	04/05/17 10:18	
Selenium	ND	1.0	0.88	1	B7D0065	04/04/2017	04/05/17 10:18	
Silver	ND	1.0	0.04	1	B7D0065	04/04/2017	04/05/17 10:18	
Thallium	ND	1.0	0.42	1	B7D0065	04/04/2017	04/05/17 10:18	
Vanadium	**9.3**	1.0	0.19	1	B7D0065	04/04/2017	04/05/17 10:18	
Zinc	**7.0**	1.0	0.18	1	B7D0065	04/04/2017	04/05/17 10:18	

TCLP Metals by ICP-AES EPA 6010B
Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	0.50	0.011	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Arsenic	ND	0.25	0.033	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Barium	**0.23**	0.25	0.0040	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J
Beryllium	ND	0.25	0.0022	5	B7D0101	04/05/2017	04/05/17 18:25	D1

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

TCLP Metals by ICP-AES EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Cadmium	ND	0.25	0.0008	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Chromium	ND	0.25	0.0082	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Cobalt	**0.0094**	0.25	0.0036	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J
Copper	ND	0.25	0.011	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Lead	ND	0.25	0.014	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Molybdenum	ND	0.25	0.0034	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Nickel	ND	0.25	0.012	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Selenium	ND	0.25	0.017	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Silver	ND	0.25	0.0031	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Thallium	ND	0.25	0.013	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Vanadium	ND	0.25	0.0056	5	B7D0101	04/05/2017	04/05/17 18:25	D1
Zinc	**0.062**	0.25	0.010	5	B7D0101	04/05/2017	04/05/17 18:25	D1, J

STLC Metals by ICP-AES by EPA 6010B

Analyst: GO

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Antimony	ND	2.0	0.043	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Arsenic	ND	1.0	0.13	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Barium	**0.77**	1.0	0.016	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Beryllium	ND	1.0	0.0090	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Cadmium	ND	1.0	0.0030	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Chromium	ND	1.0	0.033	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Cobalt	**0.11**	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Copper	**0.069**	1.0	0.046	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Lead	ND	1.0	0.057	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Molybdenum	ND	1.0	0.014	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Nickel	**0.12**	1.0	0.048	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Selenium	ND	1.0	0.068	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Silver	ND	1.0	0.012	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Thallium	ND	1.0	0.051	20	B7C1078	04/02/2017	04/03/17 13:10	D1
Vanadium	**0.096**	1.0	0.022	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J
Zinc	**0.22**	1.0	0.041	20	B7C1078	04/02/2017	04/03/17 13:10	D1, J

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Hexavalent Chromium by EPA 7196A/3060A
Analyst: LV

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Hexavalent Chromium	ND	1.0	0.30	1	B7D0186	04/07/2017	04/07/17 16:31	

Mercury by AA (Cold Vapor) EPA 7471A
Analyst: KEK

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	**0.02**	0.10	0.02	1	B7D0067	04/04/2017	04/05/17 11:16	J

STLC Mercury by AA (Cold Vapor) EPA 7470A
Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	1.0	0.67	1	B7D0117	04/05/2017	04/06/17 12:38	

TCLP Mercury by AA (Cold Vapor) by EPA 7470A
Analyst: KEK

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Mercury	ND	0.20	0.13	1	B7D0104	04/05/2017	04/06/17 11:05	

Hydrocarbon Chain Distribution by EPA 8015B (Modified)
Analyst: CR

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
C8-C10	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C10-C18	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C18-C28	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C28-C36	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C36-C40	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
C8-C40 Total	ND	10	10	1	B7C1043	03/31/2017	04/03/17 11:02	
Surrogate: p-Terphenyl	*105 %*	*47 - 157*			B7C1043	03/31/2017	*04/03/17 11:02*	

Polychlorinated Biphenyls by EPA 8082
Analyst: RL

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1016	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8

Lab ID: 1701344-02

Polychlorinated Biphenyls by EPA 8082 **Analyst: RL**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
Aroclor 1221	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1232	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1242	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1248	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1254	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1260	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1262	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Aroclor 1268	ND	16	1.5	1	B7C1049	03/31/2017	03/31/17 12:41	
Surrogate: Decachlorobiphenyl	*89.3 %*	*26 - 137*			B7C1049	03/31/2017	*03/31/17 12:41*	
Surrogate: Tetrachloro-m-xylene	*86.7 %*	*28 - 102*			B7C1049	03/31/2017	*03/31/17 12:41*	

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
1,2,4-Trichlorobenzene	ND	330	71	1	B7D0044	04/03/2017	04/04/17 02:13	
1,2-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
1,3-Dichlorobenzene	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	
1,4-Dichlorobenzene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4,5-Trichlorophenol	ND	330	61	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4,6-Trichlorophenol	ND	330	220	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dichlorophenol	ND	1600	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dimethylphenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dinitrophenol	ND	1600	86	1	B7D0044	04/03/2017	04/04/17 02:13	
2,4-Dinitrotoluene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
2,6-Dinitrotoluene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Chloronaphthalene	ND	330	59	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Chlorophenol	ND	330	120	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Methylnaphthalene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Methylphenol	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Nitroaniline	ND	1600	200	1	B7D0044	04/03/2017	04/04/17 02:13	
2-Nitrophenol	ND	330	110	1	B7D0044	04/03/2017	04/04/17 02:13	
3,3´-Dichlorobenzidine	ND	660	280	1	B7D0044	04/03/2017	04/04/17 02:13	
3-Nitroaniline	ND	1600	44	1	B7D0044	04/03/2017	04/04/17 02:13	
4,6-Dinitro-2-methyphenol	ND	1600	300	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Bromophenyl-phenylether	ND	330	50	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Chloro-3-methylphenol	ND	660	110	1	B7D0044	04/03/2017	04/04/17 02:13	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
4-Chloroaniline	ND	660	53	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Chlorophenyl-phenylether	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Methylphenol	ND	330	66	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Nitroaniline	ND	1600	290	1	B7D0044	04/03/2017	04/04/17 02:13	
4-Nitrophenol	ND	330	150	1	B7D0044	04/03/2017	04/04/17 02:13	
Acenaphthene	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Acenaphthylene	ND	330	51	1	B7D0044	04/03/2017	04/04/17 02:13	
Anthracene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzidine (M)	ND	1600	1400	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(a)anthracene	ND	330	39	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(a)pyrene	ND	330	45	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(b)fluoranthene	ND	330	55	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(g,h,i)perylene	ND	330	38	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzo(k)fluoranthene	ND	330	52	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzoic acid	ND	1600	890	1	B7D0044	04/03/2017	04/04/17 02:13	
Benzyl alcohol	ND	660	67	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-chloroethoxy)methane	ND	330	59	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-Chloroethyl)ether	ND	330	57	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-chloroisopropyl)ether	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	
bis(2-ethylhexyl)phthalate	ND	330	83	1	B7D0044	04/03/2017	04/04/17 02:13	
Butylbenzylphthalate	ND	330	250	1	B7D0044	04/03/2017	04/04/17 02:13	
Chrysene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 02:13	
Di-n-butylphthalate	ND	330	230	1	B7D0044	04/03/2017	04/04/17 02:13	
Di-n-octylphthalate	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Dibenz(a,h)anthracene	ND	330	43	1	B7D0044	04/03/2017	04/04/17 02:13	
Dibenzofuran	ND	330	55	1	B7D0044	04/03/2017	04/04/17 02:13	
Diethyl phthalate	ND	330	47	1	B7D0044	04/03/2017	04/04/17 02:13	
Dimethyl phthalate	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
Fluoranthene	ND	330	47	1	B7D0044	04/03/2017	04/04/17 02:13	
Fluorene	ND	330	49	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorobenzene	ND	330	41	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorobutadiene	ND	660	61	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachlorocyclopentadiene	ND	660	64	1	B7D0044	04/03/2017	04/04/17 02:13	
Hexachloroethane	ND	330	71	1	B7D0044	04/03/2017	04/04/17 02:13	
Indeno(1,2,3-cd)pyrene	ND	330	44	1	B7D0044	04/03/2017	04/04/17 02:13	
Isophorone	ND	330	57	1	B7D0044	04/03/2017	04/04/17 02:13	
N-Nitroso-di-n propylamine	ND	330	65	1	B7D0044	04/03/2017	04/04/17 02:13	

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Client Sample ID HD-SS-5-8
Lab ID: 1701344-02

Semivolatile Organic Compounds by EPA 8270C **Analyst: SP**

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Dilution	Batch	Prepared	Date/Time Analyzed	Notes
N-Nitrosodiphenylamine	ND	330	48	1	B7D0044	04/03/2017	04/04/17 02:13	
Naphthalene	ND	330	60	1	B7D0044	04/03/2017	04/04/17 02:13	
Nitrobenzene	ND	330	67	1	B7D0044	04/03/2017	04/04/17 02:13	
Pentachlorophenol	ND	1600	190	1	B7D0044	04/03/2017	04/04/17 02:13	
Phenanthrene	ND	330	46	1	B7D0044	04/03/2017	04/04/17 02:13	
Phenol	ND	330	130	1	B7D0044	04/03/2017	04/04/17 02:13	
Pyrene	ND	330	53	1	B7D0044	04/03/2017	04/04/17 02:13	
Pyridine	ND	1600	270	1	B7D0044	04/03/2017	04/04/17 02:13	
Surrogate: 1,2-Dichlorobenzene-d4	*58.1 %*	*22 - 107*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2,4,6-Tribromophenol	*72.1 %*	*12 - 129*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Chlorophenol-d4	*58.6 %*	*34 - 102*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Fluorobiphenyl	*65.0 %*	*25 - 116*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 2-Fluorophenol	*51.0 %*	*32 - 101*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: 4-Terphenyl-d14	*87.3 %*	*34 - 125*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: Nitrobenzene-d5	*50.0 %*	*30 - 115*			B7D0044	04/03/2017	*04/04/17 02:13*	
Surrogate: Phenol-d5	*51.8 %*	*34 - 104*			B7D0044	04/03/2017	*04/04/17 02:13*	

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792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

QUALITY CONTROL SECTION

Percent Moisture - Quality Control

Analyte	Result % by Weight	PQL % by Weight	MDL % by Weight	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0096 - No_Prep_WC1_S										
Duplicate (B7D0096-DUP1)			**Source: 1701378-48**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Percent Moisture	17.0407	0.10	0.10		16.5787			2.75	30	

Certificate of Analysis

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792 Searls Avenue	Report To :	Bryan Botsford
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Total Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S										
Blank (B7D0065-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	ND	25	2.9							
LCS (B7D0065-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	935.432	25	2.9	1000.00		93.5	80 - 120			
Matrix Spike (B7D0065-MS1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	4179.73	25	2.9	1000.00	2510.67	167	0 - 256			
Matrix Spike Dup (B7D0065-MSD1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Aluminum	4212.62	25	2.9	1000.00	2510.67	170	0 - 256	0.784	20	

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792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Title 22 Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S										
Blank (B7D0065-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	ND	2.0	0.32							
Arsenic	ND	1.0	0.70							
Barium	ND	1.0	0.10							
Beryllium	ND	1.0	0.04							
Cadmium	ND	1.0	0.09							
Chromium	ND	1.0	0.12							
Cobalt	ND	1.0	0.10							
Copper	ND	2.0	0.11							
Lead	0.295674	1.0	0.11							J
Molybdenum	ND	1.0	0.13							
Nickel	ND	1.0	0.10							
Selenium	ND	1.0	0.88							
Silver	ND	1.0	0.04							
Thallium	ND	1.0	0.42							
Vanadium	ND	1.0	0.19							
Zinc	ND	1.0	0.18							
LCS (B7D0065-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	45.6765	2.0	0.32	50.0000		91.4	80 - 120			
Arsenic	44.7096	1.0	0.70	50.0000		89.4	80 - 120			
Barium	48.3258	1.0	0.10	50.0000		96.7	80 - 120			
Beryllium	45.9726	1.0	0.04	50.0000		91.9	80 - 120			
Cadmium	45.1568	1.0	0.09	50.0000		90.3	80 - 120			
Chromium	48.3751	1.0	0.12	50.0000		96.8	80 - 120			
Cobalt	47.5870	1.0	0.10	50.0000		95.2	80 - 120			
Copper	48.3351	2.0	0.11	50.0000		96.7	80 - 120			
Lead	45.7866	1.0	0.11	50.0000		91.6	80 - 120			
Molybdenum	45.7345	1.0	0.13	50.0000		91.5	80 - 120			
Nickel	48.2670	1.0	0.10	50.0000		96.5	80 - 120			
Selenium	43.8344	1.0	0.88	50.0000		87.7	80 - 120			
Silver	47.1694	1.0	0.04	50.0000		94.3	80 - 120			
Thallium	46.8958	1.0	0.42	50.0000		93.8	80 - 120			
Vanadium	48.0524	1.0	0.19	50.0000		96.1	80 - 120			
Zinc	44.0427	1.0	0.18	50.0000		88.1	80 - 120			
Matrix Spike (B7D0065-MS1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	94.7916	2.0	0.32	125.000	0.430838	75.5	34 - 103			
Arsenic	99.9034	1.0	0.70	125.000	2.71269	77.8	59 - 103			
Barium	125.834	1.0	0.10	125.000	16.2192	87.7	30 - 134			
Beryllium	101.406	1.0	0.04	125.000	ND	81.1	62 - 105			
Cadmium	98.9064	1.0	0.09	125.000	ND	79.1	53 - 102			
Chromium	121.696	1.0	0.12	125.000	11.1892	88.4	51 - 111			

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Title 22 Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0065 - EPA 3050B_S (continued)										
Matrix Spike (B7D0065-MS1) - Continued			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Cobalt	100.965	1.0	0.10	125.000	3.85307	77.7	55 - 105			
Copper	115.870	2.0	0.11	125.000	5.69214	88.1	53 - 126			
Lead	104.715	1.0	0.11	125.000	2.25476	82.0	34 - 129			
Molybdenum	96.3304	1.0	0.13	125.000	ND	77.1	57 - 105			
Nickel	108.170	1.0	0.10	125.000	7.80796	80.3	49 - 109			
Selenium	96.8726	1.0	0.88	125.000	ND	77.5	57 - 99			
Silver	104.231	1.0	0.04	125.000	ND	83.4	64 - 105			
Thallium	99.3931	1.0	0.42	125.000	ND	79.5	46 - 105			
Vanadium	123.571	1.0	0.19	125.000	13.1716	88.3	60 - 109			
Zinc	107.197	1.0	0.18	125.000	10.1497	77.6	29 - 122			
Matrix Spike Dup (B7D0065-MSD1)			**Source: 1701344-01**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Antimony	96.2474	2.0	0.32	125.000	0.430838	76.7	34 - 103	1.52	20	
Arsenic	101.601	1.0	0.70	125.000	2.71269	79.1	59 - 103	1.69	20	
Barium	130.328	1.0	0.10	125.000	16.2192	91.3	30 - 134	3.51	20	
Beryllium	103.615	1.0	0.04	125.000	ND	82.9	62 - 105	2.16	20	
Cadmium	101.696	1.0	0.09	125.000	ND	81.4	53 - 102	2.78	20	
Chromium	131.130	1.0	0.12	125.000	11.1892	96.0	51 - 111	7.46	20	
Cobalt	104.713	1.0	0.10	125.000	3.85307	80.7	55 - 105	3.64	20	
Copper	124.350	2.0	0.11	125.000	5.69214	94.9	53 - 126	7.06	20	
Lead	106.246	1.0	0.11	125.000	2.25476	83.2	34 - 129	1.45	20	
Molybdenum	98.3335	1.0	0.13	125.000	ND	78.7	57 - 105	2.06	20	
Nickel	113.129	1.0	0.10	125.000	7.80796	84.3	49 - 109	4.48	20	
Selenium	96.9952	1.0	0.88	125.000	ND	77.6	57 - 99	0.126	20	
Silver	106.747	1.0	0.04	125.000	ND	85.4	64 - 105	2.39	20	
Thallium	100.058	1.0	0.42	125.000	ND	80.0	46 - 105	0.666	20	
Vanadium	133.509	1.0	0.19	125.000	13.1716	96.3	60 - 109	7.73	20	
Zinc	112.302	1.0	0.18	125.000	10.1497	81.7	29 - 122	4.65	20	

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Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

TCLP Metals by ICP-AES EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S										
Blank (B7D0101-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Antimony	ND	0.10	0.0021							
Arsenic	ND	0.050	0.0067							
Barium	ND	0.050	0.0008							
Beryllium	ND	0.050	0.0004							
Cadmium	ND	0.050	0.0002							
Chromium	ND	0.050	0.0016							
Cobalt	ND	0.050	0.0007							
Copper	ND	0.050	0.0023							
Lead	ND	0.050	0.0028							
Molybdenum	ND	0.050	0.0007							
Nickel	ND	0.050	0.0024							
Selenium	ND	0.050	0.0034							
Silver	ND	0.050	0.0006							
Thallium	0.003550	0.050	0.0026							J
Vanadium	ND	0.050	0.0011							
Zinc	2.7952E-3	0.050	0.0021							J
Blank (B7D0101-BLK2)					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.10	0.0021							
Arsenic	ND	0.050	0.0067							
Barium	0.000847	0.050	0.0008							J
Beryllium	ND	0.050	0.0004							
Cadmium	ND	0.050	0.0002							
Chromium	ND	0.050	0.0016							
Cobalt	0.001349	0.050	0.0007							J
Copper	ND	0.050	0.0023							
Lead	3.0343E-3	0.050	0.0028							J
Molybdenum	ND	0.050	0.0007							
Nickel	ND	0.050	0.0024							
Selenium	0.004733	0.050	0.0034							J
Silver	ND	0.050	0.0006							
Thallium	ND	0.050	0.0026							
Vanadium	ND	0.050	0.0011							
Zinc	0.048844	0.050	0.0021							J
LCS (B7D0101-BS1)					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	0.877537	0.10	0.0021	1.00000		87.8	80 - 120			
Arsenic	0.890416	0.050	0.0067	1.00000		89.0	80 - 120			
Barium	0.957112	0.050	0.0008	1.00000		95.7	80 - 120			
Beryllium	0.926064	0.050	0.0004	1.00000		92.6	80 - 120			
Cadmium	0.887194	0.050	0.0002	1.00000		88.7	80 - 120			
Chromium	0.942946	0.050	0.0016	1.00000		94.3	80 - 120			

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Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S (continued)										
LCS (B7D0101-BS1) - Continued					Prepared: 4/5/2017 Analyzed: 4/5/2017					
Cobalt	0.935314	0.050	0.0007	1.00000		93.5	80 - 120			
Copper	0.945332	0.050	0.0023	1.00000		94.5	80 - 120			
Lead	0.887995	0.050	0.0028	1.00000		88.8	80 - 120			
Molybdenum	0.900678	0.050	0.0007	1.00000		90.1	80 - 120			
Nickel	0.903059	0.050	0.0024	1.00000		90.3	80 - 120			
Selenium	0.868501	0.050	0.0034	1.00000		86.9	80 - 120			
Silver	0.945697	0.050	0.0006	1.00000		94.6	80 - 120			
Thallium	0.927058	0.050	0.0026	1.00000		92.7	80 - 120			
Vanadium	0.938949	0.050	0.0011	1.00000		93.9	80 - 120			
Zinc	0.879988	0.050	0.0021	1.00000		88.0	80 - 120			
Duplicate (B7D0101-DUP1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.50	0.011		ND			NR	20	
Arsenic	ND	0.25	0.033		ND			NR	20	
Barium	0.701242	0.25	0.0040		0.632801			10.3	20	
Beryllium	ND	0.25	0.0022		ND			NR	20	
Cadmium	0.003651	0.25	0.0008		0.004074			11.0	20	J
Chromium	0.009419	0.25	0.0082		8.4779E-3			10.5	20	J
Cobalt	0.008144	0.25	0.0036		0.007607			6.81	20	J
Copper	0.048419	0.25	0.011		0.041762			14.8	20	J
Lead	0.041521	0.25	0.014		0.043901			5.57	20	J
Molybdenum	ND	0.25	0.0034		ND			NR	20	
Nickel	0.014367	0.25	0.012		ND			NR	20	J
Selenium	ND	0.25	0.017		0.025140			NR	20	
Silver	ND	0.25	0.0031		ND			NR	20	
Thallium	ND	0.25	0.013		ND			NR	20	
Vanadium	0.011755	0.25	0.0056		0.011783			0.241	20	J
Zinc	1.17649	0.25	0.010		1.08018			8.54	20	
Duplicate (B7D0101-DUP2)			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	ND	0.50	0.011		ND			NR	20	
Arsenic	ND	0.25	0.033		ND			NR	20	
Barium	0.690250	0.25	0.0040		0.664084			3.86	20	
Beryllium	ND	0.25	0.0022		ND			NR	20	
Cadmium	0.005997	0.25	0.0008		0.004592			26.5	20	R, J
Chromium	0.045520	0.25	0.0082		0.048918			7.20	20	J
Cobalt	0.016187	0.25	0.0036		0.008873			58.4	20	R, J
Copper	0.082036	0.25	0.011		0.089933			9.18	20	J
Lead	0.157194	0.25	0.014		0.168966			7.22	20	J
Molybdenum	ND	0.25	0.0034		ND			NR	20	
Nickel	0.026704	0.25	0.012		0.028330			5.91	20	J
Selenium	ND	0.25	0.017		0.018021			NR	20	

TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S (continued)										
Duplicate (B7D0101-DUP2) - Continued			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Silver	ND	0.25	0.0031		ND			NR	20	
Thallium	ND	0.25	0.013		ND			NR	20	
Vanadium	0.032269	0.25	0.0056		0.025254			24.4	20	R, J
Zinc	1.42586	0.25	0.010		1.46978			3.03	20	
Matrix Spike (B7D0101-MS1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	2.23725	0.50	0.011	2.50000	ND	89.5	76 - 118			
Arsenic	2.37185	0.25	0.033	2.50000	ND	94.9	74 - 123			
Barium	3.15683	0.25	0.0040	2.50000	0.632801	101	76 - 117			
Beryllium	2.33279	0.25	0.0022	2.50000	ND	93.3	84 - 114			
Cadmium	2.37203	0.25	0.0008	2.50000	0.004074	94.7	73 - 115			
Chromium	2.41100	0.25	0.0082	2.50000	8.4779E-3	96.1	76 - 117			
Cobalt	2.23307	0.25	0.0036	2.50000	0.007607	89.0	78 - 113			
Copper	2.43788	0.25	0.011	2.50000	0.041762	95.8	70 - 132			
Lead	2.34773	0.25	0.014	2.50000	0.043901	92.2	78 - 109			
Molybdenum	2.27022	0.25	0.0034	2.50000	ND	90.8	84 - 111			
Nickel	2.32620	0.25	0.012	2.50000	ND	93.0	66 - 125			
Selenium	2.36662	0.25	0.017	2.50000	0.025140	93.7	76 - 117			
Silver	2.43570	0.25	0.0031	2.50000	ND	97.4	64 - 133			
Thallium	2.27173	0.25	0.013	2.50000	ND	90.9	63 - 118			
Vanadium	2.42603	0.25	0.0056	2.50000	0.011783	96.6	76 - 119			
Zinc	3.44803	0.25	0.010	2.50000	1.08018	94.7	56 - 131			
Matrix Spike (B7D0101-MS2)			**Source: 1701286-10**		Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	2.13711	0.50	0.011	2.50000	ND	85.5	76 - 118			
Arsenic	2.25333	0.25	0.033	2.50000	ND	90.1	74 - 123			
Barium	3.00116	0.25	0.0040	2.50000	0.664084	93.5	76 - 117			
Beryllium	2.21807	0.25	0.0022	2.50000	ND	88.7	84 - 114			
Cadmium	2.17569	0.25	0.0008	2.50000	0.004592	86.8	73 - 115			
Chromium	2.28514	0.25	0.0082	2.50000	0.048918	89.4	76 - 117			
Cobalt	2.13008	0.25	0.0036	2.50000	0.008873	84.8	78 - 113			
Copper	2.32860	0.25	0.011	2.50000	0.089933	89.5	70 - 132			
Lead	2.35472	0.25	0.014	2.50000	0.168966	87.4	78 - 109			
Molybdenum	2.12916	0.25	0.0034	2.50000	ND	85.2	84 - 111			
Nickel	2.17806	0.25	0.012	2.50000	0.028330	86.0	66 - 125			
Selenium	2.24266	0.25	0.017	2.50000	0.018021	89.0	76 - 117			
Silver	2.26939	0.25	0.0031	2.50000	ND	90.8	64 - 133			
Thallium	2.17857	0.25	0.013	2.50000	ND	87.1	63 - 118			
Vanadium	2.26794	0.25	0.0056	2.50000	0.025254	89.7	76 - 119			
Zinc	3.56060	0.25	0.010	2.50000	1.46978	83.6	56 - 131			
Matrix Spike Dup (B7D0101-MSD1)			**Source: 1701285-11**		Prepared: 4/5/2017 Analyzed: 4/5/2017					

TCLP Metals by ICP-AES EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0101 - EPA 3010A_S (continued)										
Matrix Spike Dup (B7D0101-MSD1) - Continued		**Source: 1701285-11**			Prepared: 4/5/2017 Analyzed: 4/5/2017					
Antimony	2.23153	0.50	0.011	2.50000	ND	89.3	76 - 118	0.256	20	
Arsenic	2.37364	0.25	0.033	2.50000	ND	94.9	74 - 123	0.0755	20	
Barium	3.13436	0.25	0.0040	2.50000	0.632801	100	76 - 117	0.714	20	
Beryllium	2.35294	0.25	0.0022	2.50000	ND	94.1	84 - 114	0.860	20	
Cadmium	2.36156	0.25	0.0008	2.50000	0.004074	94.3	73 - 115	0.443	20	
Chromium	2.41288	0.25	0.0082	2.50000	8.4779E-3	96.2	76 - 117	0.0777	20	
Cobalt	2.23208	0.25	0.0036	2.50000	0.007607	89.0	78 - 113	0.0442	20	
Copper	2.44283	0.25	0.011	2.50000	0.041762	96.0	70 - 132	0.203	20	
Lead	2.35137	0.25	0.014	2.50000	0.043901	92.3	78 - 109	0.155	20	
Molybdenum	2.27123	0.25	0.0034	2.50000	ND	90.8	84 - 111	0.0443	20	
Nickel	2.32229	0.25	0.012	2.50000	ND	92.9	66 - 125	0.168	20	
Selenium	2.34901	0.25	0.017	2.50000	0.025140	93.0	76 - 117	0.747	20	
Silver	2.44514	0.25	0.0031	2.50000	ND	97.8	64 - 133	0.387	20	
Thallium	2.28912	0.25	0.013	2.50000	ND	91.6	63 - 118	0.762	20	
Vanadium	2.42256	0.25	0.0056	2.50000	0.011783	96.4	76 - 119	0.143	20	
Zinc	3.40212	0.25	0.010	2.50000	1.08018	92.9	56 - 131	1.34	20	

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Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

STLC Metals by ICP-AES by EPA 6010B - Quality Control

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction										
Blank (B7C1078-BLK1)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.050151	2.0	0.043							J
Arsenic	ND	1.0	0.13							
Barium	ND	1.0	0.016							
Beryllium	ND	1.0	0.0090							
Cadmium	ND	1.0	0.0030							
Chromium	ND	1.0	0.033							
Cobalt	ND	1.0	0.014							
Copper	ND	1.0	0.046							
Lead	ND	1.0	0.057							
Molybdenum	ND	1.0	0.014							
Nickel	0.063914	1.0	0.048							J
Selenium	ND	1.0	0.068							
Silver	0.013944	1.0	0.012							J
Thallium	ND	1.0	0.051							
Vanadium	0.040634	1.0	0.022							J
Zinc	0.122525	1.0	0.041							J
Blank (B7C1078-BLK2)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.059868	2.0	0.043							J
Arsenic	ND	1.0	0.13							
Barium	ND	1.0	0.016							
Beryllium	ND	1.0	0.0090							
Cadmium	ND	1.0	0.0030							
Chromium	ND	1.0	0.033							
Cobalt	ND	1.0	0.014							
Copper	ND	1.0	0.046							
Lead	ND	1.0	0.057							
Molybdenum	ND	1.0	0.014							
Nickel	0.067941	1.0	0.048							J
Selenium	ND	1.0	0.068							
Silver	ND	1.0	0.012							
Thallium	0.060929	1.0	0.051							J
Vanadium	ND	1.0	0.022							
Zinc	0.078381	1.0	0.041							J
LCS (B7C1078-BS1)					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	1.82798			2.00000		91.4	80 - 120			
Arsenic	1.98034			2.00000		99.0	80 - 120			
Barium	1.88523			2.00000		94.3	80 - 120			
Beryllium	1.73779			2.00000		86.9	80 - 120			
Cadmium	1.84265			2.00000		92.1	80 - 120			
Chromium	1.86322			2.00000		93.2	80 - 120			

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792 Searls Avenue	Report To :	Bryan Botsford
Nevada City , CA 95959	Reported :	04/20/2017

STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)		Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction (continued)										
LCS (B7C1078-BS1) - Continued					Prepared: 4/2/2017 Analyzed: 4/3/2017					
Cobalt	1.88571			2.00000		94.3	80 - 120			
Copper	1.84467			2.00000		92.2	80 - 120			
Lead	1.85836			2.00000		92.9	80 - 120			
Molybdenum	1.78079			2.00000		89.0	80 - 120			
Nickel	1.91425			2.00000		95.7	80 - 120			
Selenium	1.89227			2.00000		94.6	80 - 120			
Silver	1.78646			2.00000		89.3	80 - 120			
Thallium	1.85673			2.00000		92.8	80 - 120			
Vanadium	1.93004			2.00000		96.5	80 - 120			
Zinc	2.04736			2.00000		102	80 - 120			
Duplicate (B7C1078-DUP1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	ND	2.0	0.043		ND			NR	20	
Arsenic	0.161800	1.0	0.13		ND			NR	20	J
Barium	4.92183	1.0	0.016		5.02878			2.15	20	
Beryllium	ND	1.0	0.0090		ND			NR	20	
Cadmium	ND	1.0	0.0030		ND			NR	20	
Chromium	0.078292	1.0	0.033		0.073157			6.78	20	J
Cobalt	0.145718	1.0	0.014		0.145591			0.0872	20	J
Copper	0.329341	1.0	0.046		0.325014			1.32	20	J
Lead	7.61916	1.0	0.057		7.64520			0.341	20	
Molybdenum	ND	1.0	0.014		ND			NR	20	
Nickel	0.262102	1.0	0.048		0.244437			6.97	20	J
Selenium	ND	1.0	0.068		ND			NR	20	
Silver	ND	1.0	0.012		ND			NR	20	
Thallium	0.058605	1.0	0.051		0.115567			65.4	20	R, J
Vanadium	0.123607	1.0	0.022		0.114256			7.86	20	J
Zinc	1.67097	1.0	0.041		1.65464			0.982	20	
Duplicate (B7C1078-DUP2)			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	0.088438	2.0	0.043		0.112024			23.5	20	R, J
Arsenic	0.143204	1.0	0.13		ND			NR	20	J
Barium	4.62679	1.0	0.016		4.44828			3.93	20	
Beryllium	ND	1.0	0.0090		ND			NR	20	
Cadmium	ND	1.0	0.0030		ND			NR	20	
Chromium	0.152154	1.0	0.033		0.125246			19.4	20	J
Cobalt	0.147372	1.0	0.014		0.152264			3.27	20	J
Copper	2.79652	1.0	0.046		2.67873			4.30	20	
Lead	4.88944	1.0	0.057		4.83917			1.03	20	
Molybdenum	0.074684	1.0	0.014		0.072496			2.97	20	J
Nickel	0.316865	1.0	0.048		0.311014			1.86	20	J
Selenium	ND	1.0	0.068		ND			NR	20	

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STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Analyte	Result (mg/L)	PQL (mg/L)	MDL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1078 - STLC_S Extraction (continued)										
Duplicate (B7C1078-DUP2) - Continued			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Silver	ND	1.0	0.012		ND			NR	20	
Thallium	0.098560	1.0	0.051		ND			NR	20	J
Vanadium	0.203791	1.0	0.022		0.192608			5.64	20	J
Zinc	21.9967	1.0	0.041		21.2374			3.51	20	
Matrix Spike (B7C1078-MS1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	2.34603			2.50000	-0.025343	93.8	88 - 107			
Arsenic	2.55466			2.50000	0.101013	98.1	90 - 110			
Barium	7.02859			2.50000	5.02878	80.0	62 - 113			
Beryllium	2.21040			2.50000	0.003286	88.3	74 - 118			
Cadmium	2.44139			2.50000	-3.1588E-3	97.7	74 - 121			
Chromium	2.37048			2.50000	0.073157	91.9	74 - 121			
Cobalt	2.40564			2.50000	0.145591	90.4	92 - 112			M1
Copper	2.52468			2.50000	0.325014	88.0	62 - 129			
Lead	9.27105			2.50000	7.64520	65.0	44 - 130			
Molybdenum	2.25636			2.50000	0.005667	90.0	76 - 123			
Nickel	2.53496			2.50000	0.244437	91.6	83 - 116			
Selenium	2.20189			2.50000	-0.107188	88.1	84 - 114			
Silver	1.84361			2.50000	0.005043	73.5	78 - 115			M1
Thallium	2.26490			2.50000	0.115567	86.0	67 - 123			
Vanadium	2.47731			2.50000	0.114256	94.5	86 - 109			
Zinc	3.94691			2.50000	1.65464	91.7	34 - 149			
Matrix Spike (B7C1078-MS2)			**Source: 1701046-JLRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					
Antimony	2.26085			2.50000	0.112024	86.0	88 - 107			M1
Arsenic	2.43135			2.50000	0.111184	92.8	90 - 110			
Barium	6.53784			2.50000	4.44828	83.6	62 - 113			
Beryllium	2.19160			2.50000	0.003797	87.5	74 - 118			
Cadmium	2.43835			2.50000	0.000232	97.5	74 - 121			
Chromium	2.40197			2.50000	0.125246	91.1	74 - 121			
Cobalt	2.38915			2.50000	0.152264	89.5	92 - 112			M1
Copper	4.73455			2.50000	2.67873	82.2	62 - 129			
Lead	6.72464			2.50000	4.83917	75.4	44 - 130			
Molybdenum	2.29002			2.50000	0.072496	88.7	76 - 123			
Nickel	2.56251			2.50000	0.311014	90.1	83 - 116			
Selenium	2.25139			2.50000	-0.116243	90.1	84 - 114			
Silver	2.23158			2.50000	-0.008342	89.3	78 - 115			
Thallium	2.23273			2.50000	-0.014281	89.3	67 - 123			
Vanadium	2.56846			2.50000	0.192608	95.0	86 - 109			
Zinc	22.2568			2.50000	21.2374	40.8	34 - 149			
Matrix Spike Dup (B7C1078-MSD1)			**Source: 1701046-IDRE1**		Prepared: 4/2/2017 Analyzed: 4/3/2017					

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STLC Metals by ICP-AES by EPA 6010B - Quality Control (cont'd)

Batch B7C1078 - STLC_S Extraction (continued)

Matrix Spike Dup (B7C1078-MSD1) - Continued **Source: 1701046-IDRE1** Prepared: 4/2/2017 Analyzed: 4/3/2017

Analyte	Result (mg/L)	PQL (mg/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Antimony	2.26470		2.50000	-0.025343	90.6	88 - 107	3.53	20	
Arsenic	2.47403		2.50000	0.101013	94.9	90 - 110	3.21	20	
Barium	7.23567		2.50000	5.02878	88.3	62 - 113	2.90	20	
Beryllium	2.26184		2.50000	0.003286	90.3	74 - 118	2.30	20	
Cadmium	2.36964		2.50000	-3.1588E-3	94.8	74 - 121	2.98	20	
Chromium	2.43216		2.50000	0.073157	94.4	74 - 121	2.57	20	
Cobalt	2.45051		2.50000	0.145591	92.2	92 - 112	1.85	20	
Copper	2.59431		2.50000	0.325014	90.8	62 - 129	2.72	20	
Lead	9.50332		2.50000	7.64520	74.3	44 - 130	2.47	20	
Molybdenum	2.30132		2.50000	0.005667	91.8	76 - 123	1.97	20	
Nickel	2.56762		2.50000	0.244437	92.9	83 - 116	1.28	20	
Selenium	2.32381		2.50000	-0.107188	93.0	84 - 114	5.39	20	
Silver	2.12041		2.50000	0.005043	84.6	78 - 115	14.0	20	
Thallium	2.30100		2.50000	0.115567	87.4	67 - 123	1.58	20	
Vanadium	2.53893		2.50000	0.114256	97.0	86 - 109	2.46	20	
Zinc	3.98240		2.50000	1.65464	93.1	34 - 149	0.895	20	

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Hexavalent Chromium by EPA 7196A/3060A - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0186 - EPA 3060A_S (WC)										
Blank (B7D0186-BLK1)					Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	ND	1.0	0.30							
LCS (B7D0186-BS1)					Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	47.4000	1.0	0.30	50.0000		94.8	80 - 120			
Matrix Spike (B7D0186-MS1)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	46.9000	1.0	0.30	50.0000	ND	93.8	75 - 125			
Matrix Spike (B7D0186-MS2)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	855.000	50	15	1608.00	ND	53.2	75 - 125			M2
Matrix Spike Dup (B7D0186-MSD1)			**Source: 1701344-01**		Prepared: 4/7/2017 Analyzed: 4/7/2017					
Hexavalent Chromium	48.0000	1.0	0.30	50.0000	ND	96.0	75 - 125	2.32	20	

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Mercury by AA (Cold Vapor) EPA 7471A - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0067 - EPA 7471_S										
Blank (B7D0067-BLK1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	ND	0.10	0.02							
LCS (B7D0067-BS1)					Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.804973	0.10	0.02	0.833333		96.6	80 - 120			
Matrix Spike (B7D0067-MS1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.896547	0.10	0.02	0.833333	0.017073	106	70 - 130			
Matrix Spike Dup (B7D0067-MSD1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.894267	0.10	0.02	0.833333	0.017073	105	70 - 130	0.255	20	
Post Spike (B7D0067-PS1)			**Source: 1701328-03**		Prepared: 4/4/2017 Analyzed: 4/5/2017					
Mercury	0.005565			5.00000E-3	0.000205	107	85 - 115			

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STLC Mercury by AA (Cold Vapor) EPA 7470A - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0117 - EPA 245.1/7470_S										
Blank (B7D0117-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	ND	0.20	0.13							
LCS (B7D0117-BS1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.3773	0.20	0.13	10.0000		104	80 - 120			
Matrix Spike (B7D0117-MS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	48.1666	1.0	0.67	50.0000	ND	96.3	70 - 130			
Matrix Spike Dup (B7D0117-MSD1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	44.9584	1.0	0.67	50.0000	ND	89.9	70 - 130	6.89	20	
Post Spike (B7D0117-PS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	4.96628			5.00000	0.006231	99.2	85 - 115			

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TCLP Mercury by AA (Cold Vapor) by EPA 7470A - Quality Control

Analyte	Result (ug/L)	PQL (ug/L)	MDL (ug/L)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0104 - EPA 245.1/7470_S										
Blank (B7D0104-BLK1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	ND	0.20	0.13							
LCS (B7D0104-BS1)					Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	9.87486	0.20	0.13	10.0000		98.7	80 - 120			
Matrix Spike (B7D0104-MS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.2618	0.20	0.13	10.0000	ND	103	70 - 130			
Matrix Spike Dup (B7D0104-MSD1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	10.3470	0.20	0.13	10.0000	ND	103	70 - 130	0.827	20	
Post Spike (B7D0104-PS1)			**Source: 1701344-01**		Prepared: 4/5/2017 Analyzed: 4/6/2017					
Mercury	4.81955			5.00000	-6.5049E-3	96.4	85 - 115			

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Hydrocarbon Chain Distribution by EPA 8015B (Modified) - Quality Control

Analyte	Result (mg/kg)	PQL (mg/kg)	MDL (mg/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1043 - GCSEMI_DRO_S										
Blank (B7C1043-BLK1)					Prepared: 3/31/2017 Analyzed: 4/3/2017					
C8-C10	ND	10	10							
C10-C18	ND	10	10							
C18-C28	ND	10	10							
C28-C36	ND	10	10							
C36-C40	ND	10	10							
C8-C40 Total	ND	10	10							
Surrogate: p-Terphenyl	*79.82*			*80.0000*		*99.8*	*47 - 157*			
LCS (B7C1043-BS1)					Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1188.25	10	10	1000.00		119	36 - 164			
Surrogate: p-Terphenyl	*79.34*			*80.0000*		*99.2*	*47 - 157*			
Matrix Spike (B7C1043-MS1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1177.06	10	10	1000.00	ND	118	21 - 179			
Surrogate: p-Terphenyl	*78.09*			*80.0000*		*97.6*	*47 - 157*			
Matrix Spike Dup (B7C1043-MSD1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 4/3/2017					
DRO	1142.11	10	10	1000.00	ND	114	21 - 179	3.01	20	
Surrogate: p-Terphenyl	*76.51*			*80.0000*		*95.6*	*47 - 157*			

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Polychlorinated Biphenyls by EPA 8082 - Quality Control

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7C1049 - GCSEMI_PCB/PEST_S										
Blank (B7C1049-BLK1)					Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	ND	16	1.5							
Aroclor 1221	ND	16	1.5							
Aroclor 1232	ND	16	1.5							
Aroclor 1242	ND	16	1.5							
Aroclor 1248	ND	16	1.5							
Aroclor 1254	ND	16	1.5							
Aroclor 1260	ND	16	1.5							
Aroclor 1262	ND	16	1.5							
Aroclor 1268	ND	16	1.5							
Surrogate: Decachlorobiphenyl	*14.73*			*16.6667*		*88.4*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*14.26*			*16.6667*		*85.6*	*28 - 102*			
LCS (B7C1049-BS1)					Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	158.877	16	1.5	166.667		95.3	70 - 107			
Aroclor 1260	171.249	16	1.5	166.667		103	69 - 120			
Surrogate: Decachlorobiphenyl	*15.88*			*16.6667*		*95.3*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*16.84*			*16.6667*		*101*	*28 - 102*			
Matrix Spike (B7C1049-MS1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	143.238	16	1.5	166.667	ND	85.9	34 - 120			
Aroclor 1260	159.156	16	1.5	166.667	ND	95.5	39 - 128			
Surrogate: Decachlorobiphenyl	*14.83*			*16.6667*		*89.0*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*14.57*			*16.6667*		*87.4*	*28 - 102*			
Matrix Spike Dup (B7C1049-MSD1)			**Source: 1701344-01**		Prepared: 3/31/2017 Analyzed: 3/31/2017					
Aroclor 1016	138.398	16	1.5	166.667	ND	83.0	34 - 120	3.44	20	
Aroclor 1260	154.396	16	1.5	166.667	ND	92.6	39 - 128	3.04	20	
Surrogate: Decachlorobiphenyl	*14.47*			*16.6667*		*86.8*	*26 - 137*			
Surrogate: Tetrachloro-m-xylene	*13.87*			*16.6667*		*83.2*	*28 - 102*			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S										
Blank (B7D0044-BLK1)					Prepared: 4/3/2017 Analyzed: 4/3/2017					
1,2,4-Trichlorobenzene	ND	330	71							
1,2-Dichlorobenzene	ND	330	60							
1,3-Dichlorobenzene	ND	330	65							
1,4-Dichlorobenzene	ND	330	60							
2,4,5-Trichlorophenol	ND	330	61							
2,4,6-Trichlorophenol	ND	330	220							
2,4-Dichlorophenol	ND	1600	120							
2,4-Dimethylphenol	ND	330	120							
2,4-Dinitrophenol	ND	1600	86							
2,4-Dinitrotoluene	ND	330	46							
2,6-Dinitrotoluene	ND	330	49							
2-Chloronaphthalene	ND	330	59							
2-Chlorophenol	ND	330	120							
2-Methylnaphthalene	ND	330	67							
2-Methylphenol	ND	330	67							
2-Nitroaniline	ND	1600	200							
2-Nitrophenol	ND	330	110							
3,3´-Dichlorobenzidine	ND	660	280							
3-Nitroaniline	ND	1600	44							
4,6-Dinitro-2-methyphenol	ND	1600	300							
4-Bromophenyl-phenylether	ND	330	50							
4-Chloro-3-methylphenol	ND	660	110							
4-Chloroaniline	ND	660	53							
4-Chlorophenyl-phenylether	ND	330	48							
4-Methylphenol	ND	330	66							
4-Nitroaniline	ND	1600	290							
4-Nitrophenol	ND	330	150							
Acenaphthene	ND	330	48							
Acenaphthylene	ND	330	51							
Anthracene	ND	330	49							
Benzidine (M)	ND	1600	1400							
Benzo(a)anthracene	ND	330	39							
Benzo(a)pyrene	ND	330	45							
Benzo(b)fluoranthene	ND	330	55							
Benzo(g,h,i)perylene	ND	330	38							
Benzo(k)fluoranthene	ND	330	52							
Benzoic acid	ND	1600	890							
Benzyl alcohol	ND	660	67							
bis(2-chloroethoxy)methane	ND	330	59							
bis(2-Chloroethyl)ether	ND	330	57							
bis(2-chloroisopropyl)ether	ND	330	65							

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
Blank (B7D0044-BLK1) - Continued						Prepared: 4/3/2017 Analyzed: 4/3/2017				
bis(2-ethylhexyl)phthalate	ND	330	83							
Butylbenzylphthalate	ND	330	250							
Chrysene	ND	330	43							
Di-n-butylphthalate	ND	330	230							
Di-n-octylphthalate	ND	330	48							
Dibenz(a,h)anthracene	ND	330	43							
Dibenzofuran	ND	330	55							
Diethyl phthalate	ND	330	47							
Dimethyl phthalate	ND	330	46							
Fluoranthene	ND	330	47							
Fluorene	ND	330	49							
Hexachlorobenzene	ND	330	41							
Hexachlorobutadiene	ND	660	61							
Hexachlorocyclopentadiene	ND	660	64							
Hexachloroethane	ND	330	71							
Indeno(1,2,3-cd)pyrene	ND	330	44							
Isophorone	ND	330	57							
N-Nitroso-di-n propylamine	ND	330	65							
N-Nitrosodiphenylamine	ND	330	48							
Naphthalene	ND	330	60							
Nitrobenzene	ND	330	67							
Pentachlorophenol	ND	1600	190							
Phenanthrene	ND	330	46							
Phenol	ND	330	130							
Pyrene	ND	330	53							
Pyridine	ND	1600	270							
Surrogate: 1,2-Dichlorobenzene-d	*2134*			*3333.33*		*64.0*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2441*			*3333.33*		*73.2*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2140*			*3333.33*		*64.2*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2331*			*3333.33*		*69.9*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1909*			*3333.33*		*57.3*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2886*			*3333.33*		*86.6*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1820*			*3333.33*		*54.6*	*30 - 115*			
Surrogate: Phenol-d5	*1911*			*3333.33*		*57.3*	*34 - 104*			
LCS (B7D0044-BS1)						Prepared: 4/3/2017 Analyzed: 4/4/2017				
1,2,4-Trichlorobenzene	2889.67	330	71	3333.33		86.7	58 - 105			
1,2-Dichlorobenzene	2795.67	330	60	3333.33		83.9	58 - 99			
1,3-Dichlorobenzene	2740.67	330	65	3333.33		82.2	57 - 100			
1,4-Dichlorobenzene	2697.67	330	60	3333.33		80.9	57 - 93			
2,4,5-Trichlorophenol	2950.33	330	61	3333.33		88.5	63 - 128			

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

LCS (B7D0044-BS1) - Continued Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
2,4,6-Trichlorophenol	2662.00	330	220	3333.33		79.9	51 - 156			
2,4-Dichlorophenol	2520.00	1600	120	3333.33		75.6	56 - 140			
2,4-Dimethylphenol	2215.67	330	120	3333.33		66.5	47 - 134			
2,4-Dinitrophenol	2799.67	1600	86	3333.33		84.0	49 - 159			
2,4-Dinitrotoluene	3672.67	330	46	3333.33		110	66 - 132			
2,6-Dinitrotoluene	3616.00	330	49	3333.33		108	65 - 130			
2-Chloronaphthalene	3157.33	330	59	3333.33		94.7	65 - 112			
2-Chlorophenol	2116.33	330	120	3333.33		63.5	47 - 132			
2-Methylnaphthalene	3158.33	330	67	3333.33		94.8	62 - 118			
2-Methylphenol	2189.33	330	67	3333.33		65.7	54 - 113			
2-Nitroaniline	2305.00	1600	200	3333.33		69.2	53 - 152			
2-Nitrophenol	2497.33	330	110	3333.33		74.9	46 - 149			
3,3´-Dichlorobenzidine	2920.33	660	280	3333.33		87.6	45 - 155			
3-Nitroaniline	3078.00	1600	44	3333.33		92.3	58 - 126			
4,6-Dinitro-2-methyphenol	3209.00	1600	300	3333.33		96.3	55 - 175			
4-Bromophenyl-phenylether	3113.33	330	50	3333.33		93.4	62 - 118			
4-Chloro-3-methylphenol	2517.33	660	110	3333.33		75.5	61 - 145			
4-Chloroaniline	2537.67	660	53	3333.33		76.1	57 - 115			
4-Chlorophenyl-phenylether	2780.33	330	48	3333.33		83.4	60 - 117			
4-Methylphenol	2379.33	330	66	3333.33		71.4	58 - 120			
4-Nitroaniline	3063.33	1600	290	3333.33		91.9	62 - 132			
4-Nitrophenol	2018.67	330	150	3333.33		60.6	46 - 181			
Acenaphthene	2634.33	330	48	3333.33		79.0	53 - 120			
Acenaphthylene	2538.67	330	51	3333.33		76.2	57 - 112			
Anthracene	2887.33	330	49	3333.33		86.6	63 - 122			
Benzidine (M)	3996.67	1600	1400	3333.33		120	0 - 204			
Benzo(a)anthracene	2665.33	330	39	3333.33		80.0	59 - 120			
Benzo(a)pyrene	2875.33	330	45	3333.33		86.3	60 - 132			
Benzo(b)fluoranthene	2609.00	330	55	3333.33		78.3	59 - 128			
Benzo(g,h,i)perylene	2871.00	330	38	3333.33		86.1	56 - 122			
Benzo(k)fluoranthene	2760.33	330	52	3333.33		82.8	53 - 130			
Benzoic acid	2224.33	1600	890	3333.33		66.7	11 - 132			
Benzyl alcohol	2959.67	660	67	3333.33		88.8	64 - 120			
bis(2-chloroethoxy)methane	1989.67	330	59	3333.33		59.7	55 - 101			
bis(2-Chloroethyl)ether	1939.00	330	57	3333.33		58.2	55 - 100			
bis(2-chloroisopropyl)ether	1640.67	330	65	3333.33		49.2	30 - 126			
bis(2-ethylhexyl)phthalate	2530.67	330	83	3333.33		75.9	62 - 130			
Butylbenzylphthalate	2880.33	330	250	3333.33		86.4	61 - 136			
Chrysene	2960.33	330	43	3333.33		88.8	54 - 122			
Di-n-butylphthalate	2716.33	330	230	3333.33		81.5	68 - 126			
Di-n-octylphthalate	2568.33	330	48	3333.33		77.0	57 - 145			
Dibenz(a,h)anthracene	2753.33	330	43	3333.33		82.6	52 - 136			

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
LCS (B7D0044-BS1) - Continued					Prepared: 4/3/2017 Analyzed: 4/4/2017					
Dibenzofuran	3490.33	330	55	3333.33		105	66 - 118			
Diethyl phthalate	2836.00	330	47	3333.33		85.1	66 - 127			
Dimethyl phthalate	2688.33	330	46	3333.33		80.6	65 - 121			
Fluoranthene	2871.00	330	47	3333.33		86.1	60 - 120			
Fluorene	2597.33	330	49	3333.33		77.9	55 - 119			
Hexachlorobenzene	3717.33	330	41	3333.33		112	64 - 119			
Hexachlorobutadiene	2549.33	660	61	3333.33		76.5	48 - 101			
Hexachlorocyclopentadiene	3206.67	660	64	3333.33		96.2	46 - 123			
Hexachloroethane	2616.33	330	71	3333.33		78.5	57 - 104			
Indeno(1,2,3-cd)pyrene	2905.33	330	44	3333.33		87.2	60 - 140			
Isophorone	1879.00	330	57	3333.33		56.4	49 - 118			
N-Nitroso-di-n propylamine	1838.33	330	65	3333.33		55.2	56 - 118			L4
N-Nitrosodiphenylamine	2874.00	330	48	3333.33		86.2	66 - 126			
Naphthalene	2318.67	330	60	3333.33		69.6	51 - 103			
Nitrobenzene	2278.67	330	67	3333.33		68.4	62 - 111			
Pentachlorophenol	2748.67	1600	190	3333.33		82.5	54 - 144			
Phenanthrene	2790.00	330	46	3333.33		83.7	58 - 120			
Phenol	1987.67	330	130	3333.33		59.6	46 - 139			
Pyrene	2820.67	330	53	3333.33		84.6	59 - 122			
Pyridine	1546.33	1600	270	3333.33		46.4	26 - 90			J
Surrogate: 1,2-Dichlorobenzene-d	*2049*			*3333.33*		*61.5*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2680*			*3333.33*		*80.4*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2076*			*3333.33*		*62.3*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2264*			*3333.33*		*67.9*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1817*			*3333.33*		*54.5*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2751*			*3333.33*		*82.5*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1775*			*3333.33*		*53.3*	*30 - 115*			
Surrogate: Phenol-d5	*1825*			*3333.33*		*54.8*	*34 - 104*			
Matrix Spike (B7D0044-MS1)			**Source: 1701386-03**		Prepared: 4/3/2017 Analyzed: 4/4/2017					
1,2,4-Trichlorobenzene	2178.00	330	71	3333.33	ND	65.3	53 - 106			
1,2-Dichlorobenzene	2028.00	330	60	3333.33	ND	60.8	52 - 99			
1,3-Dichlorobenzene	1987.67	330	65	3333.33	ND	59.6	52 - 98			
1,4-Dichlorobenzene	1952.00	330	60	3333.33	ND	58.6	48 - 96			
2,4,5-Trichlorophenol	2218.00	330	61	3333.33	ND	66.5	51 - 138			
2,4,6-Trichlorophenol	2035.00	330	220	3333.33	ND	61.1	46 - 162			
2,4-Dichlorophenol	1903.33	1600	120	3333.33	ND	57.1	49 - 141			
2,4-Dimethylphenol	1732.33	330	120	3333.33	ND	52.0	39 - 138			
2,4-Dinitrophenol	2033.33	1600	86	3333.33	ND	61.0	4 - 170			
2,4-Dinitrotoluene	2839.00	330	46	3333.33	ND	85.2	57 - 132			
2,6-Dinitrotoluene	2792.33	330	49	3333.33	ND	83.8	45 - 146			

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists	Project Number :	HEMPHILL DIVERSION, 4794-01
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Nevada City , CA 95959	Reported :	04/20/2017

Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
Matrix Spike (B7D0044-MS1) - Continued			**Source: 1701386-03**		Prepared: 4/3/2017 Analyzed: 4/4/2017					
2-Chloronaphthalene	2457.67	330	59	3333.33	ND	73.7	59 - 115			
2-Chlorophenol	1516.33	330	120	3333.33	ND	45.5	46 - 126			M2
2-Methylnaphthalene	2434.00	330	67	3333.33	ND	73.0	58 - 116			
2-Methylphenol	1600.33	330	67	3333.33	ND	48.0	50 - 112			M2
2-Nitroaniline	1732.67	1600	200	3333.33	ND	52.0	44 - 156			
2-Nitrophenol	1891.00	330	110	3333.33	ND	56.7	39 - 153			
3,3´-Dichlorobenzidine	2303.33	660	280	3333.33	ND	69.1	24 - 165			
3-Nitroaniline	2359.67	1600	44	3333.33	ND	70.8	47 - 135			
4,6-Dinitro-2-methyphenol	2439.00	1600	300	3333.33	ND	73.2	17 - 199			
4-Bromophenyl-phenylether	2415.33	330	50	3333.33	ND	72.5	57 - 119			
4-Chloro-3-methylphenol	1925.00	660	110	3333.33	ND	57.8	47 - 157			
4-Chloroaniline	1955.00	660	53	3333.33	ND	58.7	42 - 120			
4-Chlorophenyl-phenylether	2155.00	330	48	3333.33	ND	64.7	56 - 116			
4-Methylphenol	1781.00	330	66	3333.33	ND	53.4	52 - 119			
4-Nitroaniline	2320.33	1600	290	3333.33	ND	69.6	41 - 153			
4-Nitrophenol	1553.00	330	150	3333.33	ND	46.6	31 - 186			
Acenaphthene	1989.00	330	48	3333.33	ND	59.7	46 - 119			
Acenaphthylene	1921.67	330	51	3333.33	ND	57.7	51 - 114			
Anthracene	2266.67	330	49	3333.33	ND	68.0	55 - 126			
Benzidine (M)	3051.33	1600	1400	3333.33	ND	91.5	0 - 179			
Benzo(a)anthracene	2101.67	330	39	3333.33	ND	63.1	52 - 120			
Benzo(a)pyrene	2228.00	330	45	3333.33	ND	66.8	52 - 129			
Benzo(b)fluoranthene	2058.67	330	55	3333.33	ND	61.8	49 - 128			
Benzo(g,h,i)perylene	2235.00	330	38	3333.33	ND	67.1	45 - 123			
Benzo(k)fluoranthene	2131.67	330	52	3333.33	ND	64.0	44 - 127			
Benzoic acid	1202.67	1600	890	3333.33	ND	36.1	0 - 159			J
Benzyl alcohol	2207.33	660	67	3333.33	ND	66.2	53 - 124			
bis(2-chloroethoxy)methane	1497.67	330	59	3333.33	ND	44.9	47 - 105			M2
bis(2-Chloroethyl)ether	1426.67	330	57	3333.33	ND	42.8	49 - 101			M2
bis(2-chloroisopropyl)ether	1223.00	330	65	3333.33	ND	36.7	30 - 122			
bis(2-ethylhexyl)phthalate	2003.67	330	83	3333.33	ND	60.1	37 - 153			
Butylbenzylphthalate	2260.33	330	250	3333.33	ND	67.8	49 - 151			
Chrysene	2341.33	330	43	3333.33	ND	70.2	50 - 119			
Di-n-butylphthalate	2167.00	330	230	3333.33	ND	65.0	55 - 138			
Di-n-octylphthalate	2071.67	330	48	3333.33	ND	62.2	46 - 153			
Dibenz(a,h)anthracene	2178.67	330	43	3333.33	ND	65.4	42 - 139			
Dibenzofuran	2683.00	330	55	3333.33	ND	80.5	56 - 125			
Diethyl phthalate	2218.33	330	47	3333.33	ND	66.6	60 - 126			
Dimethyl phthalate	2028.33	330	46	3333.33	ND	60.8	58 - 123			
Fluoranthene	2223.67	330	47	3333.33	ND	66.7	53 - 121			
Fluorene	1960.00	330	49	3333.33	ND	58.8	49 - 120			
Hexachlorobenzene	2928.00	330	41	3333.33	ND	87.8	60 - 119			

Certificate of Analysis

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
Batch B7D0044 - MSSEMI_S (continued)										
Matrix Spike (B7D0044-MS1) - Continued			**Source: 1701386-03**		Prepared: 4/3/2017 Analyzed: 4/4/2017					
Hexachlorobutadiene	1950.00	660	61	3333.33	ND	58.5	48 - 98			
Hexachlorocyclopentadiene	2394.33	660	64	3333.33	ND	71.8	33 - 123			
Hexachloroethane	1888.33	330	71	3333.33	ND	56.6	52 - 103			
Indeno(1,2,3-cd)pyrene	2266.00	330	44	3333.33	ND	68.0	47 - 141			
Isophorone	1451.33	330	57	3333.33	ND	43.5	43 - 117			
N-Nitroso-di-n propylamine	1429.67	330	65	3333.33	ND	42.9	43 - 125			M2
N-Nitrosodiphenylamine	2291.67	330	48	3333.33	ND	68.8	49 - 142			
Naphthalene	1747.00	330	60	3333.33	ND	52.4	41 - 111			
Nitrobenzene	1718.33	330	67	3333.33	ND	51.6	55 - 114			M2
Pentachlorophenol	2190.67	1600	190	3333.33	ND	65.7	40 - 163			
Phenanthrene	2224.00	330	46	3333.33	ND	66.7	49 - 125			
Phenol	1440.33	330	130	3333.33	ND	43.2	43 - 134			
Pyrene	2215.00	330	53	3333.33	ND	66.5	52 - 124			
Pyridine	1126.00	1600	270	3333.33	ND	33.8	31 - 90			J
Surrogate: 1,2-Dichlorobenzene-d	*1497*			*3333.33*		*44.9*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*2048*			*3333.33*		*61.4*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*1507*			*3333.33*		*45.2*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*1784*			*3333.33*		*53.5*	*25 - 116*			
Surrogate: 2-Fluorophenol	*1291*			*3333.33*		*38.7*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*2152*			*3333.33*		*64.6*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*1333*			*3333.33*		*40.0*	*30 - 115*			
Surrogate: Phenol-d5	*1338*			*3333.33*		*40.1*	*34 - 104*			
Matrix Spike Dup (B7D0044-MSD1)			**Source: 1701386-03**		Prepared: 4/3/2017 Analyzed: 4/4/2017					
1,2,4-Trichlorobenzene	3268.33	330	71	3333.33	ND	98.0	53 - 106	40.0	20	R
1,2-Dichlorobenzene	3022.67	330	60	3333.33	ND	90.7	52 - 99	39.4	20	R
1,3-Dichlorobenzene	2951.00	330	65	3333.33	ND	88.5	52 - 98	39.0	20	R
1,4-Dichlorobenzene	2924.00	330	60	3333.33	ND	87.7	48 - 96	39.9	20	R
2,4,5-Trichlorophenol	3294.67	330	61	3333.33	ND	98.8	51 - 138	39.1	20	R
2,4,6-Trichlorophenol	2975.67	330	220	3333.33	ND	89.3	46 - 162	37.5	20	R
2,4-Dichlorophenol	2940.00	1600	120	3333.33	ND	88.2	49 - 141	42.8	20	R
2,4-Dimethylphenol	2560.00	330	120	3333.33	ND	76.8	39 - 138	38.6	20	R
2,4-Dinitrophenol	2627.67	1600	86	3333.33	ND	78.8	4 - 170	25.5	20	R
2,4-Dinitrotoluene	4002.00	330	46	3333.33	ND	120	57 - 132	34.0	20	R
2,6-Dinitrotoluene	3995.67	330	49	3333.33	ND	120	45 - 146	35.5	20	R
2-Chloronaphthalene	3549.00	330	59	3333.33	ND	106	59 - 115	36.3	20	R
2-Chlorophenol	2325.33	330	120	3333.33	ND	69.8	46 - 126	42.1	20	R
2-Methylnaphthalene	3609.33	330	67	3333.33	ND	108	58 - 116	38.9	20	R
2-Methylphenol	2500.67	330	67	3333.33	ND	75.0	50 - 112	43.9	20	R
2-Nitroaniline	2534.67	1600	200	3333.33	ND	76.0	44 - 156	37.6	20	R
2-Nitrophenol	2893.33	330	110	3333.33	ND	86.8	39 - 153	41.9	20	R

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Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

Matrix Spike Dup (B7D0044-MSD1) - Continued **Source: 1701386-03** Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
3,3´-Dichlorobenzidine	3272.67	660	280	3333.33	ND	98.2	24 - 165	34.8	20	R
3-Nitroaniline	3349.00	1600	44	3333.33	ND	100	47 - 135	34.7	20	R
4,6-Dinitro-2-methyphenol	3503.33	1600	300	3333.33	ND	105	17 - 199	35.8	20	R
4-Bromophenyl-phenylether	3494.33	330	50	3333.33	ND	105	57 - 119	36.5	20	R
4-Chloro-3-methylphenol	2899.67	660	110	3333.33	ND	87.0	47 - 157	40.4	20	R
4-Chloroaniline	2925.00	660	53	3333.33	ND	87.8	42 - 120	39.8	20	R
4-Chlorophenyl-phenylether	3021.67	330	48	3333.33	ND	90.7	56 - 116	33.5	20	R
4-Methylphenol	2724.33	330	66	3333.33	ND	81.7	52 - 119	41.9	20	R
4-Nitroaniline	3329.67	1600	290	3333.33	ND	99.9	41 - 153	35.7	20	R
4-Nitrophenol	2146.00	330	150	3333.33	ND	64.4	31 - 186	32.1	20	R
Acenaphthene	2899.00	330	48	3333.33	ND	87.0	46 - 119	37.2	20	R
Acenaphthylene	2829.00	330	51	3333.33	ND	84.9	51 - 114	38.2	20	R
Anthracene	3144.33	330	49	3333.33	ND	94.3	55 - 126	32.4	20	R
Benzidine (M)	4363.00	1600	1400	3333.33	ND	131	0 - 179	35.4	20	R
Benzo(a)anthracene	2940.33	330	39	3333.33	ND	88.2	52 - 120	33.3	20	R
Benzo(a)pyrene	3127.67	330	45	3333.33	ND	93.8	52 - 129	33.6	20	R
Benzo(b)fluoranthene	2923.67	330	55	3333.33	ND	87.7	49 - 128	34.7	20	R
Benzo(g,h,i)perylene	3159.00	330	38	3333.33	ND	94.8	45 - 123	34.3	20	R
Benzo(k)fluoranthene	2895.00	330	52	3333.33	ND	86.9	44 - 127	30.4	20	R
Benzoic acid	1262.00	1600	890	3333.33	ND	37.9	0 - 159	4.81	20	J
Benzyl alcohol	3386.67	660	67	3333.33	ND	102	53 - 124	42.2	20	R
bis(2-chloroethoxy)methane	2276.33	330	59	3333.33	ND	68.3	47 - 105	41.3	20	R
bis(2-Chloroethyl)ether	2142.33	330	57	3333.33	ND	64.3	49 - 101	40.1	20	R
bis(2-chloroisopropyl)ether	1820.00	330	65	3333.33	ND	54.6	30 - 122	39.2	20	R
bis(2-ethylhexyl)phthalate	2886.33	330	83	3333.33	ND	86.6	37 - 153	36.1	20	R
Butylbenzylphthalate	3240.67	330	250	3333.33	ND	97.2	49 - 151	35.6	20	R
Chrysene	3281.67	330	43	3333.33	ND	98.5	50 - 119	33.4	20	R
Di-n-butylphthalate	3093.67	330	230	3333.33	ND	92.8	55 - 138	35.2	20	R
Di-n-octylphthalate	2902.67	330	48	3333.33	ND	87.1	46 - 153	33.4	20	R
Dibenz(a,h)anthracene	3103.67	330	43	3333.33	ND	93.1	42 - 139	35.0	20	R
Dibenzofuran	3843.33	330	55	3333.33	ND	115	56 - 125	35.6	20	R
Diethyl phthalate	3082.33	330	47	3333.33	ND	92.5	60 - 126	32.6	20	R
Dimethyl phthalate	2976.33	330	46	3333.33	ND	89.3	58 - 123	37.9	20	R
Fluoranthene	3112.67	330	47	3333.33	ND	93.4	53 - 121	33.3	20	R
Fluorene	2785.00	330	49	3333.33	ND	83.6	49 - 120	34.8	20	R
Hexachlorobenzene	4109.67	330	41	3333.33	ND	123	60 - 119	33.6	20	M2
Hexachlorobutadiene	2898.00	660	61	3333.33	ND	86.9	48 - 98	39.1	20	R
Hexachlorocyclopentadiene	3616.33	660	64	3333.33	ND	108	33 - 123	40.7	20	R
Hexachloroethane	2816.33	330	71	3333.33	ND	84.5	52 - 103	39.5	20	R
Indeno(1,2,3-cd)pyrene	3249.00	330	44	3333.33	ND	97.5	47 - 141	35.6	20	R
Isophorone	2238.00	330	57	3333.33	ND	67.1	43 - 117	42.6	20	R
N-Nitroso-di-n propylamine	2153.00	330	65	3333.33	ND	64.6	43 - 125	40.4	20	R

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Semivolatile Organic Compounds by EPA 8270C - Quality Control (cont'd)

Batch B7D0044 - MSSEMI_S (continued)

Matrix Spike Dup (B7D0044-MSD1) - Continued **Source: 1701386-03** Prepared: 4/3/2017 Analyzed: 4/4/2017

Analyte	Result (ug/kg)	PQL (ug/kg)	MDL (ug/kg)	Spike Level	Source Result	% Rec	% Rec Limits	RPD	RPD Limit	Notes
N-Nitrosodiphenylamine	3229.67	330	48	3333.33	ND	96.9	49 - 142	34.0	20	R
Naphthalene	2605.00	330	60	3333.33	ND	78.2	41 - 111	39.4	20	R
Nitrobenzene	2568.67	330	67	3333.33	ND	77.1	55 - 114	39.7	20	R
Pentachlorophenol	3124.67	1600	190	3333.33	ND	93.7	40 - 163	35.1	20	R
Phenanthrene	3065.67	330	46	3333.33	ND	92.0	49 - 125	31.8	20	R
Phenol	2180.00	330	130	3333.33	ND	65.4	43 - 134	40.9	20	R
Pyrene	3020.00	330	53	3333.33	ND	90.6	52 - 124	30.8	20	R
Pyridine	1733.33	1600	270	3333.33	ND	52.0	31 - 90	42.5	20	R
Surrogate: 1,2-Dichlorobenzene-d	*2252*			*3333.33*		*67.6*	*22 - 107*			
Surrogate: 2,4,6-Tribromophenol	*3001*			*3333.33*		*90.0*	*12 - 129*			
Surrogate: 2-Chlorophenol-d4	*2313*			*3333.33*		*69.4*	*34 - 102*			
Surrogate: 2-Fluorobiphenyl	*2604*			*3333.33*		*78.1*	*25 - 116*			
Surrogate: 2-Fluorophenol	*2013*			*3333.33*		*60.4*	*32 - 101*			
Surrogate: 4-Terphenyl-d14	*3058*			*3333.33*		*91.8*	*34 - 125*			
Surrogate: Nitrobenzene-d5	*2071*			*3333.33*		*62.1*	*30 - 115*			
Surrogate: Phenol-d5	*2042*			*3333.33*		*61.3*	*34 - 104*			

Certificate of Analysis

Holdrege & Kull Consulting Engineers & Geologists		Project Number :	HEMPHILL DIVERSION, 4794-01
792 Searls Avenue		Report To :	Bryan Botsford
Nevada City , CA 95959		Reported :	04/20/2017

Notes and Definitions

R	RPD value outside acceptance criteria. Calculation is based on raw values.
M2	Matrix spike recovery outside of acceptance limit due to possible matrix interference. The analytical batch was validated by the laboratory control sample.
M1	Matrix spike recovery outside of acceptance limit. The analytical batch was validated by the laboratory control sample.
L4	Laboratory Control Sample outside of control limit but within Marginal Exceedance (ME) limit.
J	Analyte detected below the Practical Quantitation Limit but above or equal to the Method Detection Limit. Result is an estimated concentration.
D1	Sample required dilution due to possible matrix interference.
ND	Analyte is not detected at or above the Practical Quantitation Limit (PQL). When client requests quantitation against MDL, analyte is not detected at or above the Method Detection Limit (MDL)
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
NR	Not Reported
RPD	Relative Percent Difference
CA2	CA-ELAP (CDPH)
OR1	OR-NELAP (OSPHL)
TX1	TX-NELAP (TCEQ)

Notes:
(1) The reported MDL and PQL are based on prep ratio variation and analytical dilution.
(2) The suffix [2C] of specific analytes signifies that the reported result is taken from the instrument's second column.
(3) Results are wet unless otherwise specified.

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Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Number of Pages	**3**
Date Received	**03/31/2017**
Date Reported	**04/11/2017**

Telephone: **(562)989-4045**
Attention: **Carmen Aguila**

Job Number	Order Date	Client
87151	03/31/2017	ATL

Project ID: 1701344
Project Name: PO# SC11455

Enclosed please find results of analyses of 2 soil samples which were analyzed as specified on the attached chain of custody. If there are any questions, please do not hesitate to call.

Checked By: ____________

Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

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Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attention: Carmen Aguila

Project ID: 1701344
Date Received 03/31/2017
Date Reported 04/11/2017

Job Number	Order Date	Client
87151	03/31/2017	ATL

CERTIFICATE OF ANALYSIS
CASE NARRATIVE

AETL received 2 samples with the following specification on 03/31/2017.

Lab ID	Sample ID	Sample Date	Matrix	Quantity Of Containers
87151.01	1701344-01	03/29/2017	Soil	1
87151.02	1701344-02	03/29/2017	Soil	1

Method ^ Submethod	*Req Date*	*Priority*	*TAT*	*Units*
(8310)	04/07/2017	2	Normal	mg/Kg

The samples were analyzed as specified on the enclosed chain of custody.
No analytical non-conformances were encountered.

Unless otherwise noted, all results of soil and solid samples are based on wet weight.

Checked By: ______________ Approved By: C. Razmara

Cyrus Razmara, Ph.D.
Laboratory Director

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ANALYTICAL RESULTS

Ordered By

Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attn: Carmen Aguila
Page: 2

Project ID: 1701344
Project Name: PO# SC11455

AETL Job Number	Submitted	Client
87151	03/31/2017	ATL

Method: (8310), Polynuclear Aromatic Hydrocarbons (SW-846)

QC Batch No: 040617IB1

Our Lab I.D.			Method Blank	**87151.01**	**87151.02**		
Client Sample I.D.				1701344-01	1701344-02		
Date Sampled				03/29/2017	03/29/2017		
Date Prepared			04/06/2017	04/06/2017	04/06/2017		
Preparation Method			3550B	3550B	3550B		
Date Analyzed			04/06/2017	04/06/2017	04/06/2017		
Matrix			Soil	Soil	Soil		
Units			mg/Kg	mg/Kg	mg/Kg		
Dilution Factor			1	1	1		
Analytes	**MDL**	**PQL**	**Results**	**Results**	**Results**		
Benzo(a)anthracene	0.010	0.020	ND	ND	ND		
Benzo(a)pyrene	0.010	0.020	ND	ND	ND		
Benzo(b)fluoranthene	0.010	0.020	ND	ND	ND		
Benzo(k)fluoranthene	0.010	0.020	ND	ND	ND		
Chrysene	0.010	0.020	ND	ND	ND		
Dibenzo(a,h)anthracene	0.010	0.020	ND	ND	ND		
Indeno(1,2,3-cd)pyrene	0.010	0.020	ND	ND	ND		
Acenaphthene	0.010	0.020	ND	ND	ND		
Acenaphthylene	0.010	0.020	ND	ND	ND		
Anthracene	0.010	0.020	ND	ND	ND		
Benzo(g,h,i)perylene	0.010	0.020	ND	ND	ND		
Fluoranthene	0.010	0.020	ND	ND	ND		
Fluorene	0.010	0.020	ND	ND	ND		
Naphthalene	0.010	0.020	ND	ND	ND		
Phenanthrene	0.010	0.020	ND	ND	ND		
Pyrene	0.010	0.020	ND	ND	ND		
Our Lab I.D.			Method Blank	**87151.01**	**87151.02**		
Surrogates	**%Rec.Limit**		**% Rec.**	**% Rec.**	**% Rec.**		
p-Terphenyl-D14	75-125		109	107	108		

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QUALITY CONTROL RESULTS

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Advanced Technology Laboratories
3275 Walnut Avenue
Signal Hill, CA 90755-5225

Telephone: (562)989-4045
Attn: Carmen Aguila
Page: 3
Project ID: 1701344
Project Name: PO# SC11455

AETL Job Number	Submitted	Client
87151	03/31/2017	ATL

Method: (8310), Polynuclear Aromatic Hydrocarbons (SW-846)

QC Batch No: 040617IB1; Dup or Spiked Sample: 87151.02; LCS: Clean Sand; QC Prepared: 04/06/2017; QC Analyzed: 04/06/2017; Units: mg/Kg

Analytes	Sample Result	MS Concen	MS Recov	MS % REC	MS DUP Concen	MS DUP Recov	MS DUP % REC	RPD %	MS/MSD % Limit	MS RPD % Limit
Benzo(a)anthracene	0.00	0.0500	0.0450	90.0	0.0500	0.0430	86.0	4.55	75-125	<20
Benzo(a)pyrene	0.00	0.0500	0.0425	85.0	0.0500	0.0409	81.8	3.84	75-125	<20
Naphthalene	0.00570	0.500	0.476	94.1	0.500	0.468	92.5	1.71	75-125	<20
Surrogates										
p-Terphenyl-D14	0.00	0.400	0.428	107	0.400	0.416	104	2.80	75-125	<20

QC Batch No: 040617IB1; Dup or Spiked Sample: 87151.02; LCS: Clean Sand; QC Prepared: 04/06/2017; QC Analyzed: 04/06/2017; Units: mg/Kg

Analytes	LCS Concen	LCS Recov	LCS % REC	LCS DUP Concen	LCS DUP Recov	LCS DUP % REC	LCS RPD % REC	LCS/LCSD % Limit	LCS RPD % Limit	
Benzo(a)anthracene	0.0500	0.0448	89.6	0.0500	0.0450	90.0	<1	75-125	<20	
Benzo(a)pyrene	0.0500	0.0427	85.4	0.0500	0.0419	83.8	1.89	75-125	<20	
Naphthalene	0.500	0.457	91.4	0.500	0.461	92.2	<1	75-125	<20	
LCS										
Acenaphthene	0.500	0.420	83.4	0.500	0.420	83.0	<1	75-125	<20	
Acenaphthylene	1.00	0.910	90.5	1.00	0.900	90.4	<1	75-125	<20	
Anthracene	0.0500	0.0500	98.8	0.0500	0.0500	99.2	<1	75-125	<20	
Benzo(b)fluoranthene	0.100	0.0900	91.7	0.100	0.0900	91.6	<1	75-125	<20	
Benzo(g,h,i)perylene	0.100	0.0900	94.4	0.100	0.0900	94.3	<1	75-125	<20	
Benzo(k)fluoranthene	0.0500	0.0500	96.2	0.0500	0.0500	96.2	<1	75-125	<20	
Chrysene	0.0500	0.0500	92.2	0.0500	0.0400	78.6	15.9	75-125	<20	
Dibenzo(a,h)anthracene	0.100	0.0900	89.8	0.100	0.0900	87.9	2.14	75-125	<20	
Fluoranthene	0.100	0.0900	86.1	0.100	0.0900	85.4	<1	75-125	<20	
Fluorene	0.100	0.0900	86.8	0.100	0.0900	87.3	<1	75-125	<20	
Indeno(1,2,3-cd)pyrene	0.0500	0.0400	78.6	0.0500	0.0400	81.4	3.50	75-125	<20	
Phenanthrene	0.0500	0.0400	86.6	0.0500	0.0400	86.4	<1	75-125	<20	
Pyrene	0.0500	0.0500	92.8	0.0500	0.0500	92.0	<1	75-125	<20	
Surrogates										
p-Terphenyl-D14	0.400	0.424	106	0.400	0.424	106	<1	75-125	<20	

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Data Qualifiers and Descriptors

Data Qualifier:

#:	Recovery is not within acceptable control limits.
*:	In the QC section, sample results have been taken directly from the ICP reading. No preparation factor has been applied.
B:	Analyte was present in the Method Blank.
D:	Result is from a diluted analysis.
E:	Result is beyond calibration limits and is estimated.
H:	Analysis was performed over the allowed holding time due to circumstances which were beyond laboratory control.
J:	Analyte was detected . However, the analyte concentration is an estimated value, which is between the Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).
M:	Matrix spike recovery is outside control limits due to matrix interference. Laboratory Control Sample recovery was acceptable.
MCL:	Maximum Contaminant Level
NS:	No Standard Available
S6:	Surrogate recovery is outside control limits due to matrix interference.
S8:	The analysis of the sample required a dilution such that the surrogate concentration was diluted below the method acceptance criteria.
X:	Results represent LCS and LCSD data.

Definition:

%Limi:	Percent acceptable limits.
%REC:	Percent recovery.
Con.L:	Acceptable Control Limits
Conce:	Added concentration to the sample.
LCS:	Laboratory Control Sample
MDL:	Method Detection Limit is a statistically derived number which is specific for each instrument, each method, and each compound. It indicates a distinctively detectable quantity with 99% probability.

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Data Qualifiers and Descriptors

MS:	Matrix Spike
MS DU:	Matrix Spike Duplicate
ND:	Analyte was not detected in the sample at or above MDL.
PQL:	Practical Quantitation Limit or ML (Minimum Level as per RWQCB) is the minimum concentration that can be quantified with more than 99% confidence. Taking into account all aspects of the entire analytical instrumentation and practice.
Recov:	Recovered concentration in the sample.
RPD:	Relative Percent Difference

ADVANCED TECHNOLOGY LABORATORIES

SUBCONTRACT ORDER

Work Order: 1701344 87151

SENDING LABORATORY:	RECEIVING LABORATORY:
Advanced Technology Laboratories	AETL
3275 Walnut Avenue	2834 North Naomi Street
Signal Hill, CA 90755	Burbank, CA 91504
Phone: 562.989.4045	Phone :(818) 845-8200
Fax: 562.989.6348	Fax: (818) 845-8840
Project Manager: Carmen Aguila (Carmen@atlglobal.com)	PO#: SC11455 - STANDARD TAT
Sampler: BOTSFORD	

IMPORTANT : Please include Work Order # and PO # in your invoice.

Analysis	Due	Expires	Sampled	Comments
ATL Lab#: 1701344-01 / HD-SS-1-4		**Soil**	**03/29/17 16:00**	87151.01
8310_SUB	04/07/17 17:00	04/12/17 16:00		
[Polynuclear Aromatic Hydrocarbons]				
1-Glass Jar - 4 oz				
ATL Lab#: 1701344-02 / HD-SS-5-8		**Soil**	**03/29/17 15:45**	87151.02
8310_SUB	04/07/17 17:00	04/12/17 15:45		
[Polynuclear Aromatic Hydrocarbons]				
1-Glass Jar - 4 oz				

Released By	Date	Received By	Date
	3/31/17	Arpine Hovanesian	3/31/17 0800
	3/31/17 0915		03/31/17 0915

Page 1 of 1

American Environmental Testing Laboratory Inc.

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COOLER RECEIPT FORM

Client Name: ATL

Project Name:

AETL Job Number: 87151

Date Received: 03/31/17 Received by: Artin

Carrier: ☒ AETL Courier ☐ Client ☐ GSO ☐ FedEx ☐ UPS

☐Others:

Samples were received in: ☒ Cooler (1) ☐ Other (Specify):

Inside temperature of shipping container No 1: 3.3, No 2: ____, No 3: ____

Type of sample containers: ☐ VOA, ☐ Glass bottles, ☒ Wide mouth jars, ☐ HDPE bottles, ☐ Metal sleeves, ☐ Others (Specify):

How are samples preserved: ☐ None, ☐ Ice, ☒ Blue Ice, ☐ Dry Ice

X None, _ HNO_3, _ NaOH, _ ZnOAc, _ HCl, _ $Na_2S_2O_3$, _ MeOH

_ Other (Specify):

	Yes	No, explain below	Name, if client was notified.
1. Are the COCs Correct?	X		
2. Are the Sample labels legible?	X		
3. Do samples match the COC?	X		
4. Are the required analyses clear?	X		
5. Is there enough samples for required analysis?	X		
6. Are samples sealed with evidence tape?		X	
7. Are sample containers in good condition?	X		
8. Are samples preserved?	X		
9. Are samples preserved properly for the intended analysis?	X		
10. Are the VOAs free of headspace?	NA		
11. Are the jars free of headspace?	✓		

Explain all "No" answers for above questions:

ADVANCED TECHNOLOGY LABORATORIES
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Tel: (562) 989-4045 • Fax: (562) 989-4040

CHAIN OF CUSTODY RECORD

Page 1 of 1

Instruction: Complete all shaded areas.

For Laboratory Use Only				ATLCOC Ver:20130715		
Method of Transport	Sample Conditions Upon Receipt					
	Condition	Y	N	Condition	Y	N
☐Client ☐ATL	1. CHILLED	☑	☐	5. # OF SAMPLES MATCH COC	☐	☐
☑FedEx ☐OnTrac	2. HEADSPACE (VOA)	☐	☐	6. PRESERVED	☐	☐
☐GSO	3. CONTAINER INTACT	☐	☐	7. COOLER TEMP, deg C: 5.6		
☐Other:	4. SEALED	☐	☐			

CUSTOMER

Company: HOLDREGE & KULL
Address: 792 SEARLS AVENUE
City: NEVADA CITY State: CA Zip: 95959
Tel: (530) 478-1305
Fax: (530) 478-1019

SEND REPORT TO:
Attn: BRYAN BOTSFORD Email: BBOTSFORD@HANDK.NET
Company: HOLDREGE & KULL
Address: 792 SEARLS AVENUE
City: NEVADA CITY State: CA Zip: 95959

SEND INVOICE TO: ☐same as SEND REPORT TO
Attn: CHERYL FISK Email: CFISK@HANDK.NET
Company: "
Address: "
City: "
State: " Zip:

PROJECT SAMPLES

Project Name: HEMPHILL DIVERSION
Quote #:
Special Instructions/Comments:
Project No.: 4794-01
PO #:
Sampler: BOTSFORD

QA/QC: ☐Routine ☐Caltrans ☐Legal ☐RWQCB ☐Level IV

Encircle or Write Requested Analysis: 6010 / 7000 (Title 22 Metals); TOTAL MERCURY (7471A) RL 0.0025 mg/kg; Select Analysis; Select Analysis; Select Analysis; Select Analysis; Select Analysis; Total aluminum; hexavalent chromium; Soluble T22 metals by WET + TCLP; MOISTURE (D2216); SVOCs 8270C; carbon chain (8015); PCBs (8082); PAHs (8310); Enter Custom Analysis

Encircle Sample Matrix: Soil; Select Solid Matrix; Select Water Matrix; Select Wastewater Matrix; Select Aqueous Matrix; Enter Custom Matrix

Container: # ; Type: 1=Tube; 2=VOA; 3=Liter; 4=Pint; 5=Jar; 6=Tedlar; 7=Canister; Material: 1=Glass; 2=Plastic; 3=Metal

Preservative: 1=HCl; 2=HNO3; 3=H2SO4; 4=4C; 5=Zn(Ac)2; 6=NaOH; 7=NA2S2O3

ITEM	Lab No.	Sample ID / Location	Date	Time	6010 / 7000 (Title 22 Metals)	TOTAL MERCURY (7471A) RL 0.0025 mg/kg	Total aluminum	hexavalent chromium	Soluble T22 metals by WET + TCLP	MOISTURE (D2216)	SVOCs 8270C	carbon chain (8015)	PCBs (8082)	PAHs (8310)	Soil	TAT	#	Type	Material	Preservative	REMARKS
1	1701344-01	HD-SS-1-4	3/29/17	4:00	X	X	X	X	X	X	X	X	X	X	X	5	1		1		
2	↓ -02	HD-SS-5-8	3/29/17	3:45	X	X	X	X	X	X	X	X	X	X	X	5	1		1		
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

TERMS

1. Sample receiving hours: 7:30 AM to 7:30 PM Monday - Friday; Saturday 8:00 AM to 12:00 PM.
2. Samples submitted AFTER 3:00 PM are considered received the following business day at 8:00 AM.
3. The following turnaround time conditions apply:
   - TAT = 0 : 300% Surcharge SAME BUSINESS DAY if received by 9:00 AM
   - TAT = 1 : 100% Surcharge NEXT BUSINESS DAY (COB 5:00 PM)
   - TAT = 2 : 50% Surcharge 2ND BUSINESS DAY (COB 5:00 PM)
   - TAT = 3 : 30% Surcharge 3RD BUSINESS DAY (COB 5:00 PM)
   - TAT = 4 : 20% Surcharge 4TH BUSINESS DAY (COB 5:00 PM)
   - TAT = 5 : NO SURCHARGE 5th BUSINESS DAY (COB 5:00 PM)
4. Weekend, holiday, after-hours work --- ask for quote.
5. Subcontract TAT is 10 - 15 business days. Projects requiring shorter TATs will incur a surcharge respective to the subcontract lab --- ask for quote.
6. Liquid and solid samples will be disposed of after 45 calendar days from receipt of samples; air samples will be disposed of after 14 calendar days after receipt of samples.
7. Electronic records maintained for five (5) years from report date.
8. Hard copy reports will be disposed of after 45 calendar days from report date.
9. Storage and Report Fees:
   - Liquid & solid samples: Complimentary storage for forty-five (45) calendar days from receipt of samples; $2/sample/month if extended storage or hold is requested.
   - Air samples: Complimentary storage for ten (10) calendar days from receipt of samples; $20/ sample/week if extended storage is requested.
   - Hard copy and regenerated reports/EDDs: $17.50 per hard copy report requested; $50.00 per regenerated/reformatted report; $35 per reprocessed EDD.
10. Rush TCLP/STLC samples: add 2 days to analysis TAT for extraction procedure.
11. Unanalyzed samples will incur a disposal fee of $7 per sample.

As the authorized agent of the company above, I hereby purchase laboratory services from ATL as shown above and hereby guarantee payment as quoted.

BRYAN BOTSFORD
Submitter Print Name
Signature

CUSTODY

Relinquished by: (Signature and Printed Name)	Date:	Time:	Received by: (Signature and Printed Name)	Date:	Time:
BRYAN BOTSFORD	3/29/17	4:15pm		3/30/17	09:11

Page 50 of 50

Friday, April 14, 2017

Bryan Botsford
Holdrege & Kull Consulting Engineers and Geologists
792 Searls Avenue
Nevada City, CA 95959

Re	Lab Order:	S031204	Collected By:	BRYAN BOTSFORD
	Project ID:	HEMPHILL DIVERSION STRUCTURE	PO/Contract #:	VISA/$500.00

Dear Bryan Botsford:

Enclosed are the analytical results for sample(s) received by the laboratory on Thursday, March 30, 2017. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Enclosures

Project Manager: Eli N. Greenwald

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1885 North Kelly Road • Napa, California 94558
(707) 258-4000 • Fax (707) 226-1001 • e-mail: info@caltestlabs.com

SAMPLE SUMMARY

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Lab ID	Sample ID	Matrix	Date Collected	Date Received
S031204001	**HD-SS-1-4**	Solid	03/29/2017 16:00	03/30/2017 09:20
S031204002	**HD-SS-5-8**	Solid	03/29/2017 15:45	03/30/2017 09:20

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NARRATIVE

Lab Order: S031204

Project ID: HEMPHILL DIVERSION STRUCTURE

General Qualifiers and Notes

Caltest authorizes this report to be reproduced only in its entirety. Results are specific to the sample(s) as submitted and only to the parameter(s) reported.

Caltest certifies that all test results for wastewater and hazardous waste analyses meet all applicable NELAC requirements; all microbiology and drinking water testing meet applicable ELAP requirements, unless stated otherwise.

All analyses performed by EPA Methods or Standard Methods (SM) 20th Edition except where noted (SMOL=online edition).

Caltest collects samples in compliance with 40 CFR, EPA Methods, Cal. Title 22, and Standard Methods.

Dilution Factors (DF) reported greater than '1' have been used to adjust the result, Reporting Limit (RL), and Method Detection Limit (MDL).

All Solid, sludge, and/or biosolids data is reported in Wet Weight, unless otherwise specified.

Filtrations performed at Caltest for dissolved metals (excluding mercury) and/or pH analysis are not performed within the 15 minute holding time as specified by 40CFR 136.3 table II.

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

ND - Non Detect - indicates analytical result has not been detected.

RL - Reporting Limit is the quantitation limit at which the laboratory is able to detect an analyte. An analyte not detected at or above the RL is reported as ND unless otherwise noted or qualified. For analyses pertaining to the State Implementation Plan of the California Toxics Rule, the Caltest Reporting Limit (RL) is equivalent to the Minimum Level (ML). A standard is always run at or below the ML. Where Reporting Limits are elevated due to dilution, the ML calibration criteria has been met.

J - reflects estimated analytical result value detected below the Reporting Limit (RL) and above the Method Detection Limit (MDL). The 'J' flag is equivalent to the DNQ Estimated Concentration flag.

E - indicates an estimated analytical result value.

B - indicates the analyte has been detected in the blank associated with the sample.

NC - means not able to be calculated for RPD or Spike Recoveries.

SS - compound is a Surrogate Spike used per laboratory quality assurance manual.

NOTE: This document represents a complete Analytical Report for the samples referenced herein and should be retained as a permanent record thereof.

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ANALYTICAL RESULTS

Lab Order: S031204

Project ID: HEMPHILL DIVERSION STRUCTURE

Solid results are reported on a wet weight basis.

Lab ID **S031204001** Date Collected 3/29/2017 16:00 Matrix Solid

Sample ID **HD-SS-1-4** Date Received 3/30/2017 09:20 Results are expressed as wet weight values

Parameters	Result Units	R. L.	MDL	DF Prepared	Batch	Analyzed	Batch	Qual
Methyl Mercury Analysis	**Prep Method:**	EPA 1630		**Prep by:**	JS			
	Analytical Method:	EPA 1630				**Analyzed by:**	JS	
Methyl Mercury (as Hg)	0.13 ug/kg	0.10	0.05	1 04/12/17 00:00	MPR 15060	04/13/17 00:00	MHG 5573	

Lab ID **S031204002** Date Collected 3/29/2017 15:45 Matrix Solid

Sample ID **HD-SS-5-8** Date Received 3/30/2017 09:20 Results are expressed as wet weight values

Parameters	Result Units	R. L.	MDL	DF Prepared	Batch	Analyzed	Batch	Qual
Methyl Mercury Analysis	**Prep Method:**	EPA 1630		**Prep by:**	JS			
	Analytical Method:	EPA 1630				**Analyzed by:**	JS	
Methyl Mercury (as Hg)	0.11 ug/kg	0.10	0.05	1 04/12/17 00:00	MPR 15060	04/13/17 00:00	MHG 5573	

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QUALITY CONTROL DATA

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Analysis Description:	Methyl Mercury Analysis	**QC Batch:**	MPR/15060
Analysis Method:	EPA 1630	**QC Batch Method:**	EPA 1630

METHOD BLANK: 752705

Parameter	Blank Result	Reporting Limit	MDL	Units	Qualifiers
Methyl Mercury (as Hg)	ND	0.10	0.05	ug/kg	

LABORATORY CONTROL SAMPLE: 752706

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% REC Limits	Qualifier
Methyl Mercury (as Hg)	ug/kg	75	75.5	101	45-130	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 752708 752709

Parameter	Units	S031204001 Result	Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limit	RPD	Max RPD	Qualifiers
Methyl Mercury (as Hg)	ug/kg	0.13	1	1.16	1.24	103	111	30-130	6.7	50	

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QUALITY CONTROL DATA QUALIFIERS

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

QUALITY CONTROL PARAMETER QUALIFIERS

Results Qualifiers: Report fields may contain codes and non-numeric data correlating to one or more of the following definitions:

NS - means not spiked and will not have recoveries reported for Analyte Spike Amounts

QC Codes Keys: These descriptors are used to help identify the specific QC samples and clarify the report.

MB - Method Blank

Method Blanks are reported to the same Method Detection Limits (MDLs) or Reporting Limits (RLs) as the analytical samples in the corresponding QC batch.

LCS/LCSD - Laboratory Control Spike / Laboratory Control Spike Duplicate

DUP - Duplicate of Original Sample Matrix

MS/MSD - Matrix Spike / Matrix Spike Duplicate

RPD - Relative Percent Difference

%Recovery - Spike Recovery stated as a percentage

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QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab Order: S031204
Project ID: HEMPHILL DIVERSION STRUCTURE

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
S031204001	**HD-SS-1-4**	EPA 1630	MPR/15060	EPA 1630	MHG/5573
S031204002	**HD-SS-5-8**	EPA 1630	MPR/15060	EPA 1630	MHG/5573

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SAMPLE CHAIN OF CUSTODY

PAGE 1 OF 1

LAB ORDER #: SO 31204

PROJECT # / PROJECT NAME: HEMPHILL DIVERSION STRUCTURE (4794-01)

P.O. #:

CLIENT: HOLDREGE + KULL

REPORT TO: BRYAN BOTSFORD

ADDRESS: 729 SEARLS AVE CITY: NEVADA CITY STATE: CA ZIP: 95959

BILLING ADDRESS: "

PHONE #: 5304781305 FAX PHONE: 5304781019

SAMPLER (PRINT & SIGN NAME): BRYAN BOTSFORD

ANALYSES REQUESTED: MeHg (1630)

TURN-AROUND TIME: ☒ STANDARD ☐ RUSH

DUE DATE: 4/30/17

CALTEST #	DATE SAMPLED	TIME SAMPLED	MATRIX	CONTAINER AMOUNT/TYPE	PRESERVATIVE	SAMPLE IDENTIFICATION SITE	CLIENT LAB #	COMP. or GRAB	MeHg (1630)						REMARKS
	3/29	4:00	SOIL	8OZ (2)	NA	HD-SS-1-4		COMP	X						
	3/29	3:45	SOIL	8OZ (2)	NA	HD-SS-5-8		COMP	X						

By submittal of sample(s), client agrees to abide by the Terms and Conditions set forth on the reverse of this document.

RELINQUISHED BY	DATE/TIME	RECEIVED BY	RELINQUISHED BY	DATE/TIME	RECEIVED BY
[signature]	3/29/17 4:15pm	FedEx	FedEx	3/30/17 0920	[signature]

FOR LAB USE ONLY

Samples: WC___ MICRO___ BIO___ AA___ SV___ VOA___

TEMP: 2.0 SEALED: Y ✓ / N___ INTACT: Y ✓ / N___

BD: BIO___ WC___ AA___

CC: AA___ SV___ VOA___

SIL: HP___ PT___ QT___ VOA___

W/HNO_3___ H_2SO_4___ NaOH___

PIL: HNO_3___ H_2SO_4___ NaOH___ HCL___

COMMENTS

MATRIX: AQ = Aqueous Nondrinking Water, Digested Metals; FE = Low R.L.s, Aqueous Nondrinking Water, Digested Metals; DW = Drinking Water; SL = Soil, Sludge, Solid; FP = Free Product

CONTAINER TYPES: AL = Amber Liter; AHL = 500 ml Amber; PT = Pint (Plastic); QT=Quart (Plastic); HG = Half Gallon (Plastic); SJ = Soil Jar; B4 = 4 oz. BACT; BT = Brass Tube; VOA = 40 mL.VOA; OTC = Other Type Container

R___ PR___ M___ F___

REV. 11/03

WHITE - LABORATORY YELLOW - CLIENT COPY TO ACCOMPANY FINAL REPORT PINK - CLIENT COPY AS RECEIPT

APPENDIX B

Laboratory Reports for Particle Size Analysis

Particle Size Distribution

ASTM D422

Project No.: **4794-01**	Project Name: **Hemphill**		Date: **4/7/2017**
Sample No.: **HD-SS-1**	Boring/Trench: **-**	Depth, (ft.): **-**	Tested By: **MLH**
Description: **Strong Brown (7.5YR 4/6) Poorly Graded Sand**			Checked By: **MLH**
Sample Location: **0**			Lab. No.: **15-17-082**

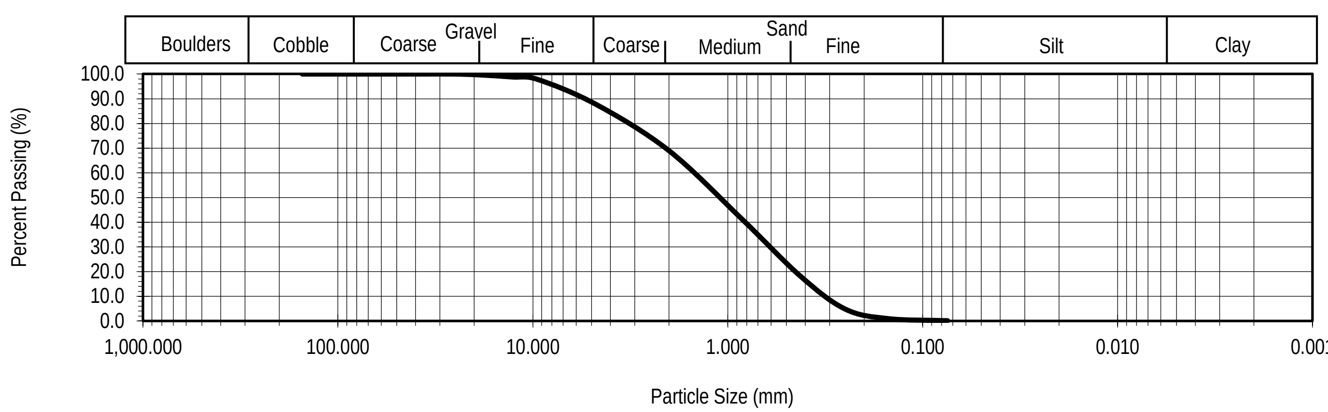
Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	4,024.3	100.0
3 Inch	3.0000	76.2	0.00	0.0	4,024.3	100.0
2 Inch	2.0000	50.8	0.00	0.0	4,024.3	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	4,024.3	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	4,024.3	100.0
3/4 Inch	0.7500	19.1	12.80	12.8	4,011.5	99.7
1/2 Inch	0.5000	12.7	35.50	48.3	3,976.0	98.8
3/8 Inch	0.3750	9.5	36.00	84.3	3,940.0	97.9
#4	0.1870	4.7500	408.90	493.2	3,531.1	87.7
#10	0.0787	2.0000	757.68	1,250.9	2,773.4	68.9
#20	0.0335	0.8500	1,106.74	2,357.6	1,666.7	41.4
#40	0.0167	0.4250	933.61	3,291.2	733.1	18.2
#60	0.0098	0.2500	538.94	3,830.2	194.1	4.8
#100	0.0059	0.1500	156.38	3,986.5	37.7	0.9
#200	0.0030	0.0750	33.51	4,020.1	4.2	0.1

Cc = 0.76

Cu = 4.62

Hydrometer

Particle Size Gradation



HOLDREGE & KULL

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Particle Size Distribution

ASTM D422

Project No.: **4794-01** Project Name: **Hemphill** Date: **4/7/2017**
Sample No.: **HD-SS-2** Boring/Trench: **-** Depth, (ft.): **-** Tested By: **MLH**
Description: **Dark Brown (10YR 3/3) Poorly Graded Sand** Checked By: **MLH**
Sample Location: **0** Lab. No.: **15-17-082**

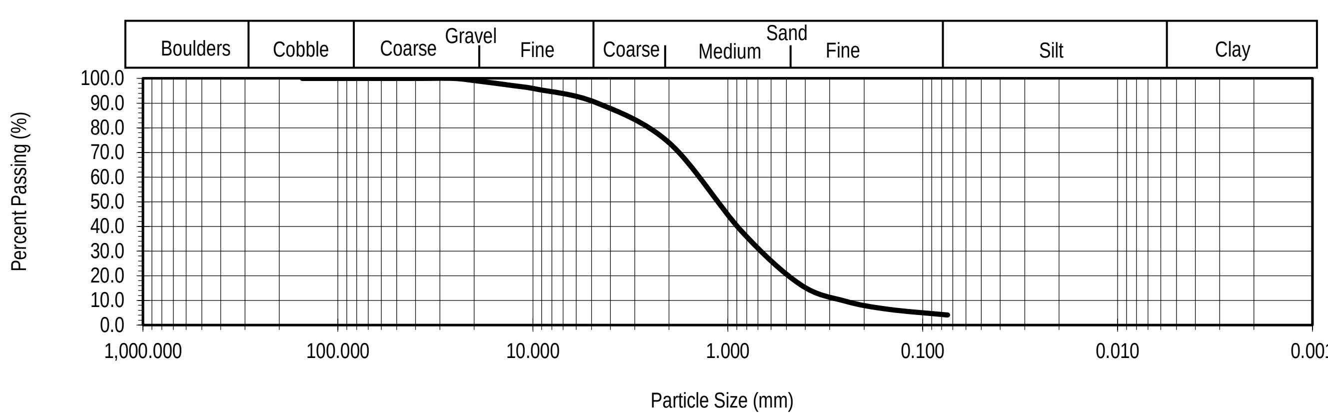
Sieve Size (U.S. Standard)	Particle Diameter: Inches (in.)	Particle Diameter: Millimeter (mm)	Dry Weight on Sieve: Retained On Sieve (gm)	Dry Weight on Sieve: Accumulated On Sieve (gm)	Dry Weight on Sieve: Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	6,205.8	100.0
3 Inch	3.0000	76.2	0.00	0.0	6,205.8	100.0
2 Inch	2.0000	50.8	0.00	0.0	6,205.8	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	6,205.8	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	6,205.8	100.0
3/4 Inch	0.7500	19.1	66.80	66.8	6,139.0	98.9
1/2 Inch	0.5000	12.7	112.50	179.3	6,026.5	97.1
3/8 Inch	0.3750	9.5	91.60	270.9	5,934.9	95.6
#4	0.1870	4.7500	335.20	606.1	5,599.7	90.2
#10	0.0787	2.0000	1,012.80	1,618.9	4,586.9	73.9
#20	0.0335	0.8500	2,225.00	3,843.9	2,361.9	38.1
#40	0.0167	0.4250	1,339.86	5,183.8	1,022.0	16.5
#60	0.0098	0.2500	419.47	5,603.2	602.6	9.7
#100	0.0059	0.1500	205.48	5,808.7	397.1	6.4
#200	0.0030	0.0750	142.25	5,951.0	254.8	4.1

Cc = 1.19

Cu = 5.77

Hydrometer

Particle Size Gradation



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Particle Size Distribution

ASTM D422

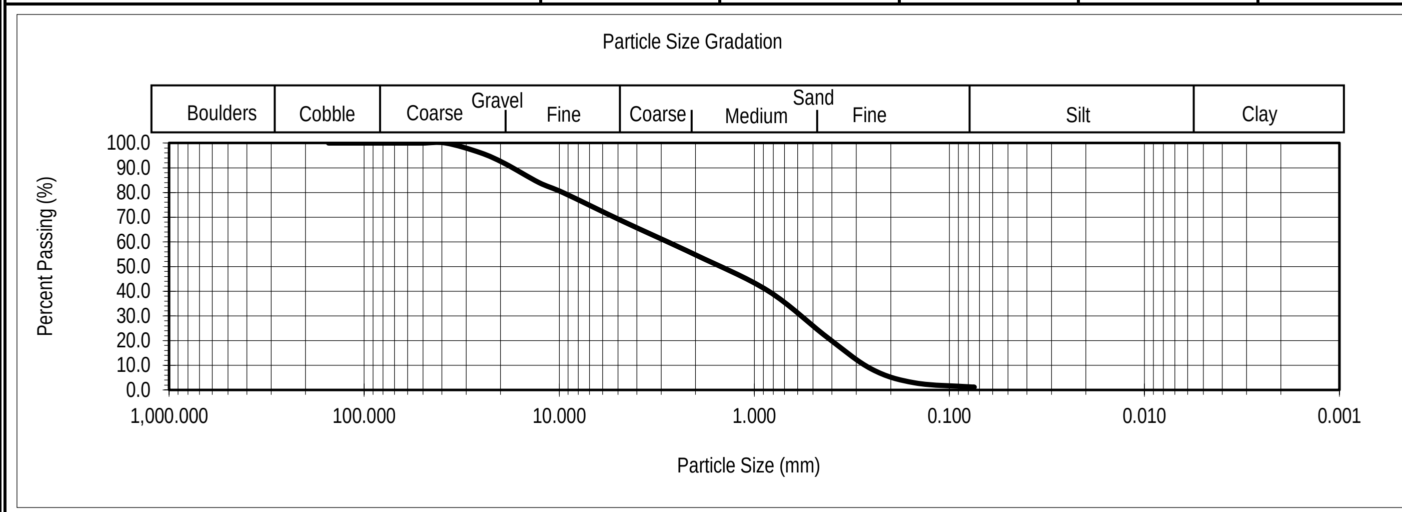
Project No.: **4794-01** Project Name: **Hemphill** Date: **4/7/2017**
Sample No.: **HD-SS-3** Boring/Trench: **-** Depth, (ft.): **-** Tested By: **MLH**
Description: **Brown (7.5YR 4/3) Poorly Graded Sand with Gravel** Checked By: **MLH**
Sample Location: **0** Lab. No.: **15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	8,646.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	8,646.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	8,646.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	8,646.1	100.0
1.0 Inch	1.0000	25.4	336.40	336.4	8,309.7	96.1
3/4 Inch	0.7500	19.1	377.20	713.6	7,932.5	91.7
1/2 Inch	0.5000	12.7	670.20	1,383.8	7,262.3	84.0
3/8 Inch	0.3750	9.5	355.80	1,739.6	6,906.5	79.9
#4	0.1870	4.7500	990.90	2,730.5	5,915.6	68.4
#10	0.0787	2.0000	1,185.44	3,915.9	4,730.2	54.7
#20	0.0335	0.8500	1,260.22	5,176.2	3,470.0	40.1
#40	0.0167	0.4250	1,616.59	6,792.8	1,853.4	21.4
#60	0.0098	0.2500	1,125.43	7,918.2	727.9	8.4
#100	0.0059	0.1500	480.08	8,398.3	247.9	2.9
#200	0.0030	0.0750	146.80	8,545.1	101.1	1.2

Cc = 0.47

Cu = 10.58

Hydrometer



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Particle Size Distribution

ASTM D422

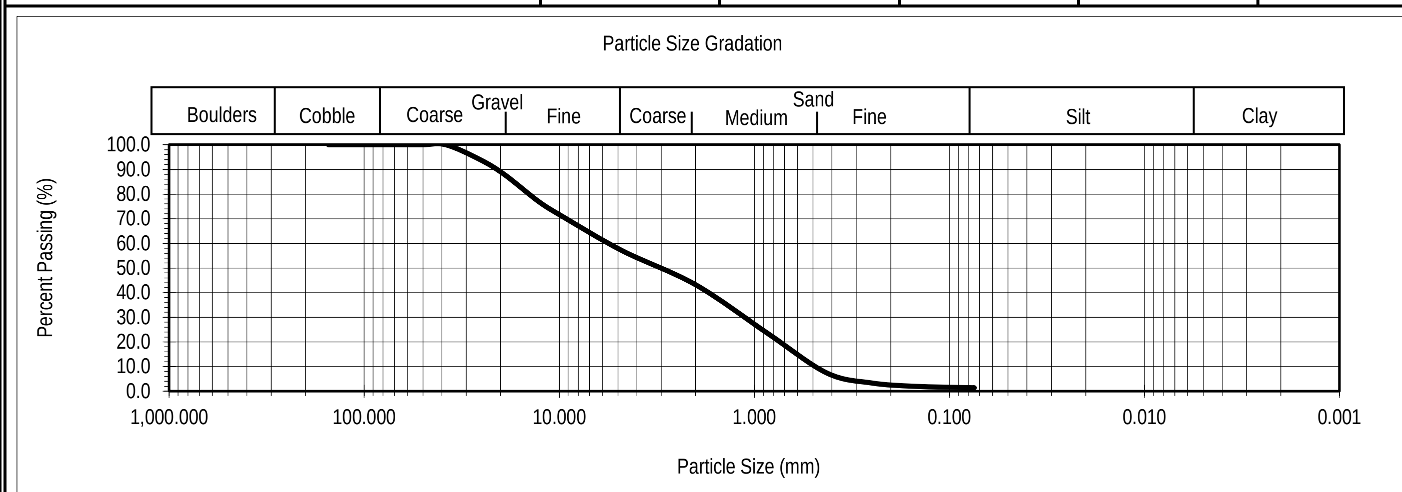
Project No.: **4794-01**	Project Name: **Hemphill**		Date: **4/7/2017**
Sample No.: **HD-SS-6**	Boring/Trench: **-**	Depth, (ft.): **-**	Tested By: **MLH**
Description: **Brown (7.5YR 4/4) Poorly Graded Sand with Gravel**			Checked By: **MLH**
Sample Location: **0**			Lab. No.: **15-17-082**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	9,035.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	9,035.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	9,035.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	9,035.1	100.0
1.0 Inch	1.0000	25.4	548.30	548.3	8,486.8	93.9
3/4 Inch	0.7500	19.1	548.80	1,097.1	7,938.0	87.9
1/2 Inch	0.5000	12.7	993.40	2,090.5	6,944.6	76.9
3/8 Inch	0.3750	9.5	557.10	2,647.6	6,387.5	70.7
#4	0.1870	4.7500	1,238.80	3,886.4	5,148.7	57.0
#10	0.0787	2.0000	1,245.37	5,131.8	3,903.4	43.2
#20	0.0335	0.8500	1,794.47	6,926.2	2,108.9	23.3
#40	0.0167	0.4250	1,441.59	8,367.8	667.3	7.4
#60	0.0098	0.2500	367.12	8,735.0	300.2	3.3
#100	0.0059	0.1500	121.85	8,856.8	178.3	2.0
#200	0.0030	0.0750	53.80	8,910.6	124.5	1.4

Cc = 0.52

Cu = 11.98

Hydrometer



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Particle Size Distribution

ASTM D422

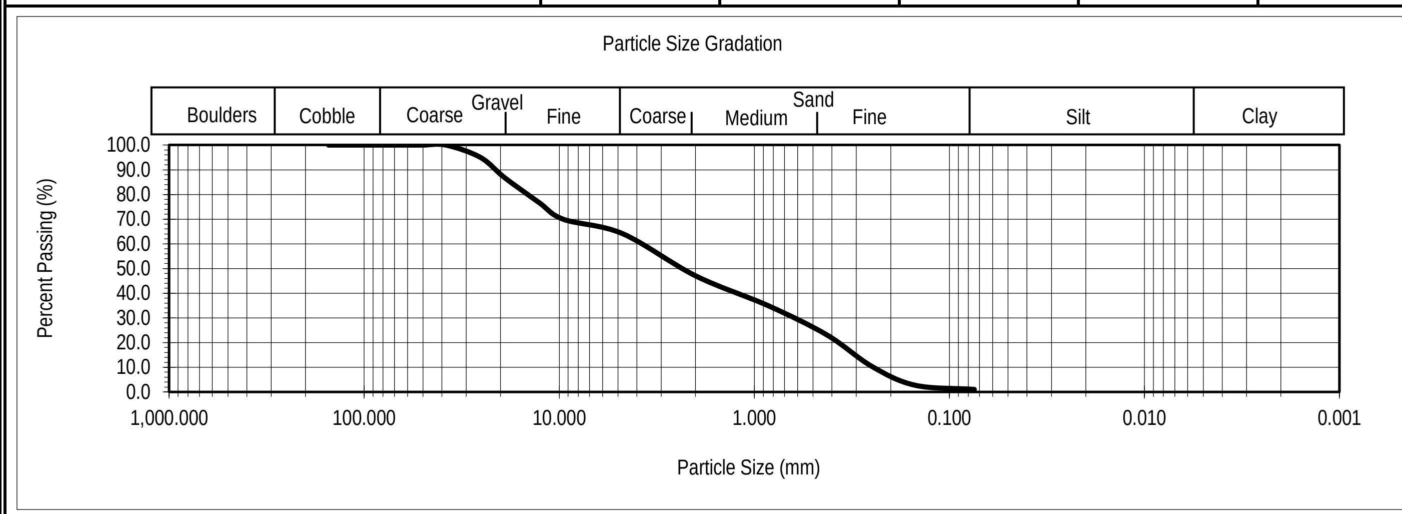
Project No.:	**4794-01**	Project Name: **Hemphill**	Date: **4/7/2017**
Sample No.:	**HD-SS-7**	Boring/Trench: **-** Depth, (ft.): **-**	Tested By: **MLH**
Description:	**Dark Brown (10YR 3/3) Poorly Graded Sand with Gravel**		Checked By: **MLH**
Sample Location:	**0**		Lab. No.: **15-17-082**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	5,902.5	100.0
3 Inch	3.0000	76.2	0.00	0.0	5,902.5	100.0
2 Inch	2.0000	50.8	0.00	0.0	5,902.5	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	5,902.5	100.0
1.0 Inch	1.0000	25.4	292.60	292.6	5,609.9	95.0
3/4 Inch	0.7500	19.1	487.30	779.9	5,122.6	86.8
1/2 Inch	0.5000	12.7	593.40	1,373.3	4,529.2	76.7
3/8 Inch	0.3750	9.5	400.80	1,774.1	4,128.4	69.9
#4	0.1870	4.7500	341.30	2,115.4	3,787.1	64.2
#10	0.0787	2.0000	1,010.91	3,126.3	2,776.1	47.0
#20	0.0335	0.8500	712.38	3,838.7	2,063.8	35.0
#40	0.0167	0.4250	698.66	4,537.4	1,365.1	23.1
#60	0.0098	0.2500	752.89	5,290.2	612.2	10.4
#100	0.0059	0.1500	451.23	5,741.5	161.0	2.7
#200	0.0030	0.0750	99.10	5,840.6	61.9	1.0

Cc = 0.44

Cu = 15.83

Hydrometer



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APPENDIX B

GEOTECHNICAL ENGINEERING REPORT FOR HEMPHILL DIVERSION STRUCTURE

GEOTECHNICAL ENGINEERING REPORT

FOR

HEMPHILL DIVERSION STRUCTURE
PLACER COUNTY, CALIFORNIA

JUNE 2017

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

792 Searls Avenue
Nevada City, California 95959

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Project No. 4794-01
June 23, 2017

Kleinschmidt Associates
P.O. Box 650
Pittsfield, ME 04967

Attention: Mike Schimpff and Kelly Schaeffer

Reference: ***Hemphill Diversion Structure***
Placer County, California

Subject: ***Geotechnical Engineering Report***

Dear Mr. Schimpff and Ms. Schaeffer:

Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results of our hydraulic conductivity testing, sampling, and analysis at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

H&K appreciates the opportunity to provide geotechnical engineering services for the Hemphill Diversion Structure project. Please contact the undersigned with any questions or comments regarding H&K's investigation.

Sincerely,

HOLDREGE & KULL

Prepared by:

Vladimir Bautista
Staff Engineer

Reviewed by:

Charles R. Kull, G.E. 2359
Principal Engineer

REGISTERED PROFESSIONAL ENGINEER CHARLES R. KULL No. 2359 GEOTECHNICAL STATE OF CALIFORNIA

F:\1 Projects\4794 Hemphill Diversion Structure\11 Geotechnical Engineering Report\4794-01 Hemphill Diversion Structure, Gtk & Hydraulics Report.docx

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FIGURES

Figure 1 Conceptual Infiltration Bed Details

APPENDICES

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Appendix B Laboratory Results for Hydraulic Conductivity Testing
Appendix C Proposal

1 INTRODUCTION

On behalf of Kleinschmidt, Holdrege & Kull (H&K) prepared this report to summarize site investigation procedures and to present the results our hydraulic conductivity testing, sampling, and analysis at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine in Placer County, California. The site investigation was performed in general accordance with H&K's scope of work in our *Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure* dated November 14, 2016 and authorized by Kleinschmidt on December 21, 2016.

1.1 PURPOSE

The purpose of H&K's hydraulic conductivity testing is to determine the feasibility of constructing a subsurface inflow structure that will be capable of conveying up to 20 cubic feet per second (CFS), or the equivalent to 6,732 gallons per minute (gpm), to the Hemphill Canal. The challenge is to provide these flows while protecting the salmon and smolt in Auburn Ravine.

1.2 SITE DESCRIPTION

The Nevada Irrigation District (NID) Hemphill Diversion Structure has been utilized by NID dating back to 1933 when the property was purchased. The concrete diversion structure is approximately 8 feet tall, and is periodically fitted with 3-foot-tall flashboards during the irrigation season (April to October) to increase surface water elevation upstream and direct flow into the Hemphill Canal.

The investigation area consists of an approximately 1.5-acre impoundment upstream of the diversion structure where sediment collects. The site was accessed by traveling northwest on Virginiatown Road, and then driving south approximately 400 feet along an unnamed dirt road to the investigation area.

2 FIELD INVESTIGATION

We performed our field investigation on March 28 and 29, 2017. During our field investigation, we observed the local topography, surface conditions, and performed a limited subsurface investigation. The following sections summarize surface and subsurface conditions observed during our field investigation.

2.1 SURFACE CONDITIONS

At the time of our investigation, the project site appeared to be undeveloped, except for the diversion structure. The site consisted of mostly vegetation, such as large trees and shrubs on nearby eroded banks north of the diversion structure. Debris from erosion of these unstable river overbanks and fallen trees was discovered throughout the project site, and a sediment surface was encountered behind the diversion structure. Samples were collected in the area of the sediment surface. Site topography varied, and the stream flowed southwest of the Hemphill structure. The condition of Auburn Ravine was observed after a record rain season, which saw flooding and massive erosion.

2.2 SUBSURFACE SOIL CONDITIONS

The soil conditions described in the following paragraphs are generalized, based on our observations of soil revealed in our exploratory borings. More detailed information can be found in the boring logs in Appendix A.

Boring B-1 was excavated from the ground surface to a depth of approximately 40 feet below ground surface (bgs) through reddish brown, moist, silty fine sand with gravel. The silty fine sand with gravel was underlain by reddish brown, saturated, well graded gravel to a depth of approximately 20 feet bgs. Completely weathered grano-diorite was encountered, which drilled as poorly graded course sand, from approximately 20 to 40 feet bgs. Boring B-1 was terminated at 40 feet bgs. Groundwater was first met at 10 feet bgs. In Boring B-1, we performed an airlift test on an open portion from 0 to 20 feet bgs which resulted in a discharge rate greater than 60 gpm.

Boring B-2 was excavated through dark brown, damp, silty fine sand from the surface to an approximate depth of 5 feet bgs. The silty fine sand graded to dark brown, wet, low plasticity clay and silt to an approximate depth of 10 feet bgs. The silty fine sand then graded to dark brown, saturated, silty fine sand to an approximate depth of 17 feet bgs. The saturated, silty fine sand was underlain by completely to slightly weathered, grey, wet grano-diorite, which drilled as poorly graded coarse to fine sand, to the bottom of the boring. Boring B-2 was terminated at 100 feet bgs. Groundwater was first encountered at 10 feet bgs. Boring B-2 was cased with Odex Steel Casing from 0 to 65 feet bgs with a Portland cement grout seal from 0 to 22 feet bgs. In Boring B-2, we performed an airlift test on the open portion from 65 to 100 feet bgs which resulted in an approximate discharge rate of 2.5 gpm. After the Odex Steel casing was perforated, we performed another airlift test from 30 to 100 feet bgs which resulted in a discharge rate less than 1 gpm. In addition, we performed a pump test which yielded a flow rate of 2½ to 60 gpm.

Sediment depths within the impoundment were estimated using a dynamic cone penetrometer (DCP) and hand level. Sediment depth measurements within the impoundment ranged from 1 to 8 feet. These measurements were used to estimate average sediment volumes within specific sections of the impoundment. The average sediment depth along the flow line of Auburn Ravine was estimated to be 1 foot, and average sediment depths for low-energy, depositional areas of the impoundment ranged from 3 to 6 feet.

3 LAB RESULTS

We performed laboratory tests on selected samples collected from our subsurface investigation to determine their engineering material properties. These engineering material properties were used to develop preliminary geotechnical engineering design recommendations for structural improvements of the project site. We performed the following laboratory tests.

- Small Scale Hydraulic Conductivity Test; Constant Head (ASTM 2434)

In general, a particle size analysis laboratory test was performed on the material excavated for environmental sediment characterization. The material that didn't pass the #4 sieve was collected to run a small scale hydraulic conductivity test. The same sample was used to run this test 3 times, and compared to permeability results from imported coarse grain material. The results show that the average permeability of the material collected during our field investigation was approximately 10 times lower than that of the imported material. Appendix B presents our laboratory results.

4 STRUCTURAL IMPROVEMENT DESIGN CRITERIA

The following section presents our structural improvement design criteria and recommendations. The recommendations are in accordance with Option 4 of K*leinschmidt's Hemphill Alternative Analysis,* dated May 2016. The recommendations address preliminary sizing of infiltration beds, conveyance pipes and erosion/scour countermeasures to implement the proposed inflow structure.

The inflow structure generally would include installing a concrete lift vault, infiltration bed, and associated piping adjacent to the ravine. The infiltration bed would consist of granular, high permeability soil with a network of collection pipes placed at the base of the bed. The infiltration bed would be designed to take in surface water from Auburn Ravine during the irrigation season, and would be augmented with inflow from fractured rock and granular subsurface channel flow during irrigation season. Water would be pumped from a pump vault into the canal using a high flow, low lift pump system to provide a flow ranging from 6 to 15 CFS (2,700 to 6,700 gpm). The overall head of pumped water is estimated to be around 15 to 20 feet. Refer to Figure 1 attached for our recommendations and preliminary design.

4.1 INFILTRATION BED SIZING

In order to determine the size of the infiltration bed, we assumed the use of import 3/8-inch to 1½-inch gravel with a permeability of 0.22 ft/sec, a hydraulic head of 0.7 ft/ft, and a cross sectional area of 300 square feet. Estimated flows were between 35 and 43 CFS.

In order to reduce the chance of stream scour, we recommend a 12-inch thick armament of 4 to 6-inch diameter, angular rock secured with grouted rock anchors and mechanical anchors overlying the infiltration bed. Small diameter backflush pipes would be installed within the infiltration bed for periodic cleaning.

4.2 CONSTRUCTION CONCERNS

Our primary concern from a constructability standpoint is the flowing sand and gravel that will be encountered during excavation and groundwater inflow. Based on the subsurface seepage at shallow depths that we observed during the pump test, water flowing into the excavation will create high seepage forces and flowing sand/gravel. The excavation may require shoring or sheet piling to reach the excavation depths.

We anticipate that groundwater will enter the excavation with relatively high volumes, even with solid shoring. Groundwater removal may cause a high gradient differential that could cause the seepage forces at the base of the excavation to exceed the effective stress of the soil. This would result in a “quick condition” and ultimately the instability of the base of the excavation. A detailed analysis of the seepage forces should be performed prior to excavation and shoring.

5 LIMITATIONS

The following limitations apply to the findings, conclusions and recommendations presented in this report:

1. Our professional services were performed consistent with the generally accepted geotechnical engineering principles and practices employed in northern California. No warranty is expressed or implied.
2. These services were performed consistent with our agreement with our client. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of our services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report. This report is solely for the use of our client unless noted otherwise. Any reliance on this report by a third party is at the party's sole risk.

3. If changes are made to the nature or design of the project as described in this report, then the conclusions and recommendations presented in this report should be considered invalid. Only our firm can determine the validity of the conclusions and recommendations presented in this report. Therefore, we should be retained to review all project changes and prepare written responses with regards to their impacts on our conclusions and recommendations. However, we may require additional fieldwork and laboratory testing to develop any modifications to our recommendations. Costs to review project changes and perform additional fieldwork and laboratory testing necessary to modify our recommendations are beyond the scope of services presented in this report. Any additional work will be performed only after receipt of an approved scope of services, budget, and written authorization to proceed.

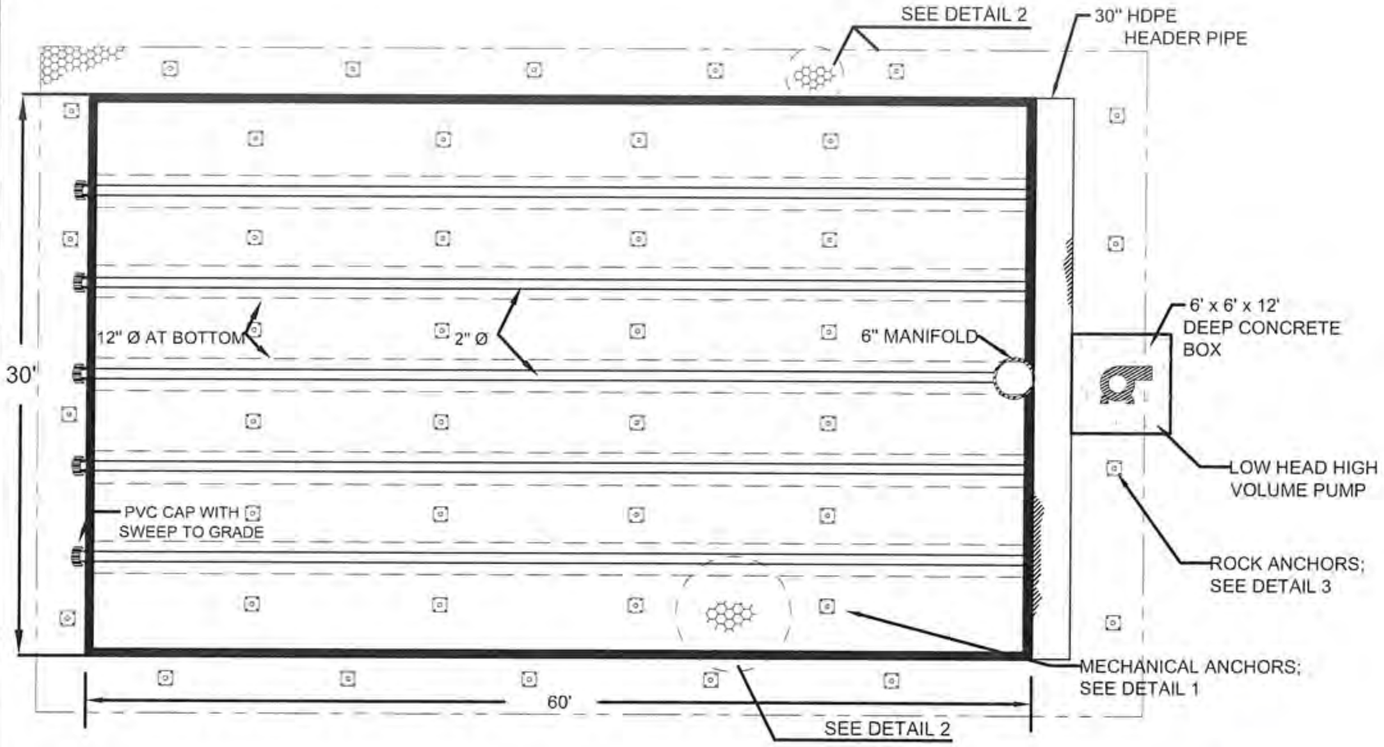
4. The analyses, conclusions and recommendations presented in this report are based on site conditions as they existed at the time we performed our surface and subsurface field investigations. Therefore, if the subsurface conditions encountered during construction are different than those described in this report, then we should be notified immediately so that we can review these differences and, if necessary, modify our recommendations.

5. Our geotechnical investigation scope of services did include evaluating the project site for the presence of hazardous materials. Based on aerial photographs, the site has been used as a diversion structure. Although we did not observe evidence of hazardous materials within the proposed project site at the time of our field investigation, all project personnel should be careful and take the necessary precautions should hazardous materials be encountered during construction.

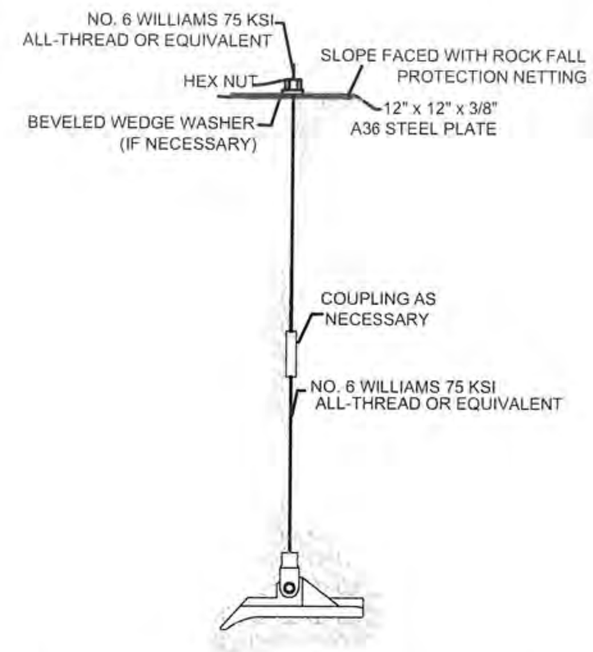
6. The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time. The changes may be due to natural processes or to the works of man, on the project site or adjacent properties. In addition, changes in applicable or appropriate standards can occur, whether they result from legislation or the broadening of knowledge. Therefore, the recommendations presented in this report should not be relied upon after a period of two years from the issue date without our review.

FIGURES

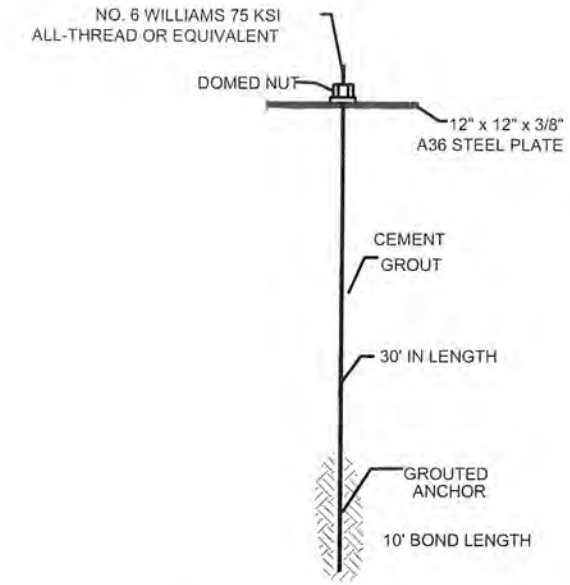
Figure 1 Conceptual Infiltration Bed Details



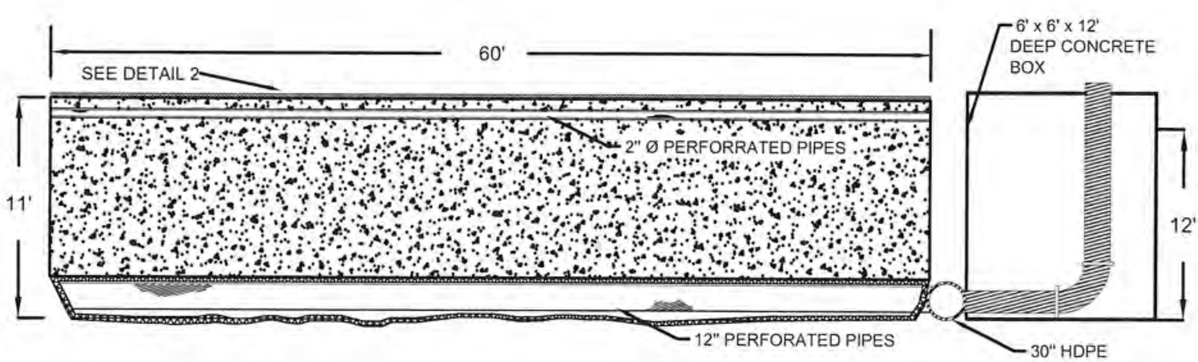
A DIVERSION STRUCTURE (PLAN VIEW)
NOT TO SCALE



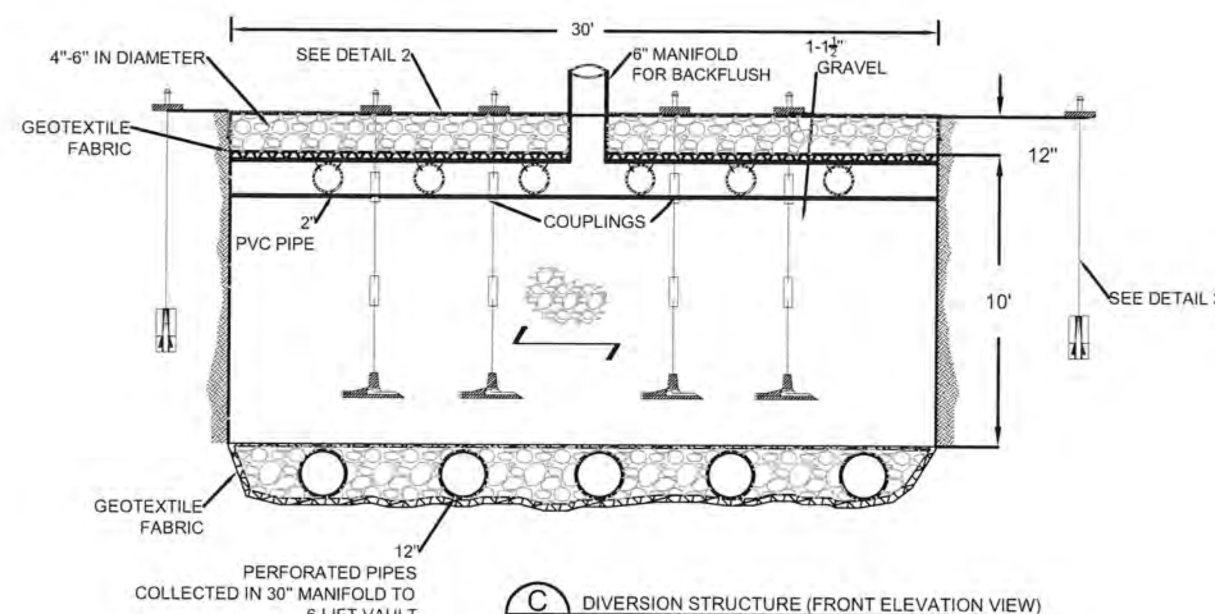
1 MECHANICAL ANCHOR OR EQUIVALENT DETAIL
NOT TO SCALE



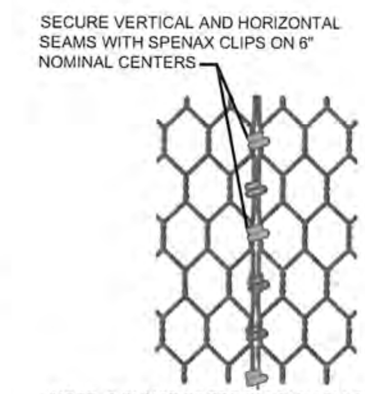
3 ROCK ANCHOR OR EQUIVALENT DETAIL
NOT TO SCALE



B DIVERSION STRUCTURE (SIDE ELEVATION VIEW)
NOT TO SCALE



C DIVERSION STRUCTURE (FRONT ELEVATION VIEW)
NOT TO SCALE



NOTE: 6 OUNCE FILTER FABRIC COULD BE USED BEHIND THE DTHM FOR SEDIMENT CONTROL

2 TYP. LACING DETAIL (VERTICAL SEAM)
NOT TO SCALE

HOLDREGE & KULL CONSULTING ENGINEERS • GEOLOGISTS 792 SEARLS AVENUE, NEVADA CITY, CALIFORNIA 95959 (530) 478-1305 phone www.HOLDREGEandKULL.com (530) 478-1019 fax NEVADA CITY • TRUCKEE • CHICO • YUBA CITY	Kleinschmidt	KLEINSCHMIDT P.O. BOX 650 PITTSFIELD, MAINE 04967	CONCEPTUAL INFILTRATION BED DETAILS HEMPHILL DIVERSION STRUCTURE PLACER COUNTY, CALIFORNIA	REV.: DATE: JUNE 2017 H&K PROJECT: 4794-01	DRAWN BY: BAUTISTA CHECKED BY: KULL H&K PROJECT: 4794-01 DATE: JUNE 2017	FIGURE 1

APPENDIX A

Boring Logs

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EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-1

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/21/17
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/21/17

Sheet: 1 of 2

Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP	**Drill Rig Type:** ATLAS T3W
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX	**Hammer Type:** QL-60
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 40	**Backfill or Well Casing:** 7" ODEX CASING TO 60' BGS

Ground Water Information

Date				
Time				
Depth (ft)				

Soil and/or Rock Descriptions
(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions
0900			AIR							(SM) SILTY FINE SAND WITH GRAVEL, 7.5YR (4/4) REDDISH BROWN, MOIST, LOOSE, 70% FINE SAND, 30% LOW PLASTICITY CLAY-SILT.
						1				
						2				
						3				
						4				STATIC WATER LEVEL AT 5' BGS
						5				
						6				
						7				
						8				
						9				
						10				(GW) WELL GRADED GRAVEL, 5YR (4/3) REDDISH BROWN, SATURATED, LOOSE, 95% FINE SAND, 5% LOW PLASTICITY CLAY-SILT. (ALLUVIUM)
						11				
						12				FIRST ENCOUNTERED GROUNDWATER AT 13' BGS
						13				
						14				
						15				
						16				
						17				
						18				
						19				
						20				

NOTES: AIR LIFT TEST ON OPEN PORTION OF BORING (0-20' BGS @ >60 GPM)

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EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/21/17	**Boring No.** B-1
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/21/17	**Sheet:** 2 of 2
Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP		**Drill Rig Type:** ATLAS T3W	
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX		**Hammer Type:** QL-60	
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 40	**Backfill or Well Casing:** 7" ODEX CASING TO 60' BGS		

Ground Water Information

Date				
Time				
Depth (ft)				

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
			AIR			21				COMPLETELY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 10YR (3/4) DARK YELLOWISH BROWN, WET, LOOSE.
						22				
						23				
						24				
						25				
						26				
						27				
						28				
						29				
						30				
						31				
						32				
						33				
						34				
						35				
						36				
						37				
						38				
						39				
						40				BORING TERMINATED AT 40' BELOW GROUND SURFACE

NOTES:

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EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/29/17	
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/29/17	**Sheet:** 1 of 5
Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP		**Drill Rig Type:** ATLAS T3W	
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX		**Hammer Type:** QL-60	
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 100	**Backfill or Well Casing:** 7" ODEX CASING TO 65' BGS		

Ground Water Information

Date				
Time				
Depth (ft)				

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
0900			AIR			0–5				(SM) SILTY FINE SAND, 7.5YR (3/3) DARK BROWN, DAMP, LOOSE, 40% FINE SAND, 60% LOW PLASTICITY CLAY-SILT.
										7" DIAMETER STEEL ODEX CASING: 0' BGS TO 65' BGS
						5				STATIC WATER LEVEL AT 5' BGS
						5–10				GRADES TO (ML) LOW PLASTICITY SILT, 7.5YR (3/3) DARK BROWN, WET, MEDIUM DENSE, 90% LOW PLASTICITY CLAY-SILT, 10% FINE SAND. ROUNDED COBBLES TO 3" IN DIAMETER (ALLUVIUM).
										PORTLAND CEMENT GROUT SEAL (0-22' BGS)
						10				FIRST ENCOUNTERED GROUNDWATER AT 10' BGS
						10–17				GRADES TO (SM) SILTY FINE SAND, 7.5YR (3/3) DARK BROWN, SATURATED, MEDIUM DENSE, 40% FINE SAND, 60% LOW PLASTICITY CLAY-SILT WITH ROUNDED COBBLES TO 3" IN DIAMETER (ALLUVIUM).
						17–20				COMPLETELY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 10YR (3/4) DARK YELLOWISH BROWN, WET, LOOSE.

NOTES: 10 5/8" DIAMETER BORING FROM 0' TO 22' BGS, 7" DIAMETER BORING FROM 22' TO 100' BGS

EXPLORATORY BORING LOG

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792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/29/17
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/29/17
Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP	**Drill Rig Type:** ATLAS T3W	**Sheet:** 2 of 5
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX	**Hammer Type:** QL-60	
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 100	**Backfill or Well Casing:** 7" ODEX CASING TO 65' BGS	

Ground Water Information

Date				
Time				
Depth (ft)				

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
			AIR			21				COMPLETELY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 10YR (3/4) DARK YELLOWISH BROWN, WET, LOOSE.
						22				PORTLAND CEMENT GROUT SEAL (0-22' BGS)
						23				
						24				
						25				7" DIAMETER STEEL ODEX CASING: 0' BGS TO 65' BGS. 5MM BY 20MM PERFORATIONS FROM 30' TO 65' BGS.
						26				
						27				
						28				
						29				
						30				
						31				
						32				
						33				
						34				
						35				
						36				
						37				GRADES TO MODERATELY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 5YR (5/1) GREY, WET, LOOSE.
						38				
						39				
						40				

NOTES:

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EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: HEMPHILL DIVERSION STRUCTURE | **Project No.:** 4794-01 | **Task:** | **Start:** 04/29/17

Location: LINCOLN, CA | **Ground Elev. (Ft. MSL):** NA | **Finish:** 04/29/17 | **Sheet:** 3 of 5

Logged By: B. BOTSFORD | **Drilling Company:** PETERS' DRILLING AND PUMP | **Drill Rig Type:** ATLAS T3W

Driller: J. HAMILTON | **Drilling Method:** AIR ROTARY, ODEX | **Hammer Type:** QL-60

Boring Dia. (In.): 10 3/4", 7" | **Total Depth (Ft.):** 100 | **Backfill or Well Casing:** 7" ODEX CASING TO 65' BGS

Ground Water Information

Date				
Time				
Depth (ft)				

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
			AIR			41				MODERATELY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 5YR (5/1) GREY, WET, LOOSE.
						42				
						43				
						44				
						45				
						46				
						47				7" DIAMETER STEEL ODEX CASING: 0' BGS TO 65' BGS. 5MM BY 20MM PERFORATIONS FROM 30' TO 65' BGS.
						48				
						49				FRACTURE AT 49'
						50				
						51				
						52				
						53				GRADES TO SLIGHTLY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED FINE GRAVEL (GP), 5YR (5/1) GREY, WET, LOOSE. ABUNDANT MUSCOVITE AND BIOTITE MINERALS.
						54				
						55				
						56				
						57				
						58				
						59				
						60				

NOTES:

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CONSULTING ENGINEERS • GEOLOGISTS

EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/29/17
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/29/17
Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP	**Drill Rig Type:** ATLAS T3W	
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX	**Hammer Type:** QL-60	
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 100	**Backfill or Well Casing:** 7" ODEX CASING TO 65' BGS	

Ground Water Information

Date				
Time				
Depth (ft)				

Soil and/or Rock Descriptions

(USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions
			AIR			61				SLIGHTLY WEATHERED GRANO-DIORITE. DRILLS AS POORLY GRADED FINE GRAVEL (GP), 5YR (5/1) GREY, WET, LOOSE. ABUNDANT MUSCOVITE AND BIOTITE MINERALS.
						62				
						63				FRACTURE AT 63'
						64				7" DIAMETER STEEL ODEX CASING: 0' BGS TO 65' BGS. 5MM BY 20MM PERFORATIONS FROM 30' TO 65' BGS.
						65				GRADES TO FRESH GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 5YR (5/1) GREY, WET, LOOSE.
						66				
						67				
						68				
						69				
						70				OPEN BOREHOLE FROM 65' TO 100' BGS.
						71				
						72				
						73				
						74				
						75				
						76				
						77				
						78				
						79				
						80				

NOTES: AIR LIFT TEST ON OPEN PORTION OF BORING (65-100' BGS @ ~2.5 GPM)

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

EXPLORATORY BORING LOG

792 Searls Avenue, Nevada City, California, 95959
PHONE: 530-478-1305, FAX: 530-478-1019

Boring No. B-2

Project Name: HEMPHILL DIVERSION STRUCTURE	**Project No.:** 4794-01	**Task:**	**Start:** 04/29/17
Location: LINCOLN, CA	**Ground Elev. (Ft. MSL):** NA		**Finish:** 04/29/17
Logged By: B. BOTSFORD	**Drilling Company:** PETERS' DRILLING AND PUMP	**Drill Rig Type:** ATLAS T3W	**Sheet:** 5 of 5
Driller: J. HAMILTON	**Drilling Method:** AIR ROTARY, ODEX	**Hammer Type:** QL-60	
Boring Dia. (In.): 10 3/4", 7"	**Total Depth (Ft.):** 100	**Backfill or Well Casing:** 7" ODEX CASING TO 65' BGS	

Ground Water Information

Date				
Time				
Depth (ft)				

Time (H:M)	PID Meter Reading (ppm)	SPT Blow Counts (Blows / 6-inch)	Drilling Method and/or Sampler Type	Sample Recovery (Ft./Ft.)	Sample No.	Depth B.G.S. (Ft.)	Sample Interval And Symbol	Well Construction Detail	Graphic Log	Soil and/or Rock Descriptions (USCS Symbol; USCS Name; Field Estimated Particle Size Gradation (%); Munsel Color; Density/Consistency; Moisture; Fill Material; Dilatancy; Plasticity Toughness; Dry Strength; Structure; Cementation; Organics; Odor; Other)
			AIR			81				FRESH GRANO-DIORITE. DRILLS AS POORLY GRADED COARSE SAND (SP), 5YR (5/1) GREY, WET, LOOSE.
						82				
						83				
						84				
						85				
						86				
						87				
						88				
						89				
						90				
						91				OPEN BOREHOLE FROM 65' TO 100' BGS.
						92				
						93				
						94				
						95				FRACTURE AT 95'
						96				
						97				
						98				
						99				
						100				BORING TERMINATED AT 100' BELOW GROUND SURFACE

NOTES: AIR LIFT TEST AFTER PERFORATIONS IN ODEX CASING (30-100' @<1GPM)

APPENDIX B

Laboratory Test Results for Hydraulic Conductivity Testing

Coarse Grain Material Permeability

ASTM D2434

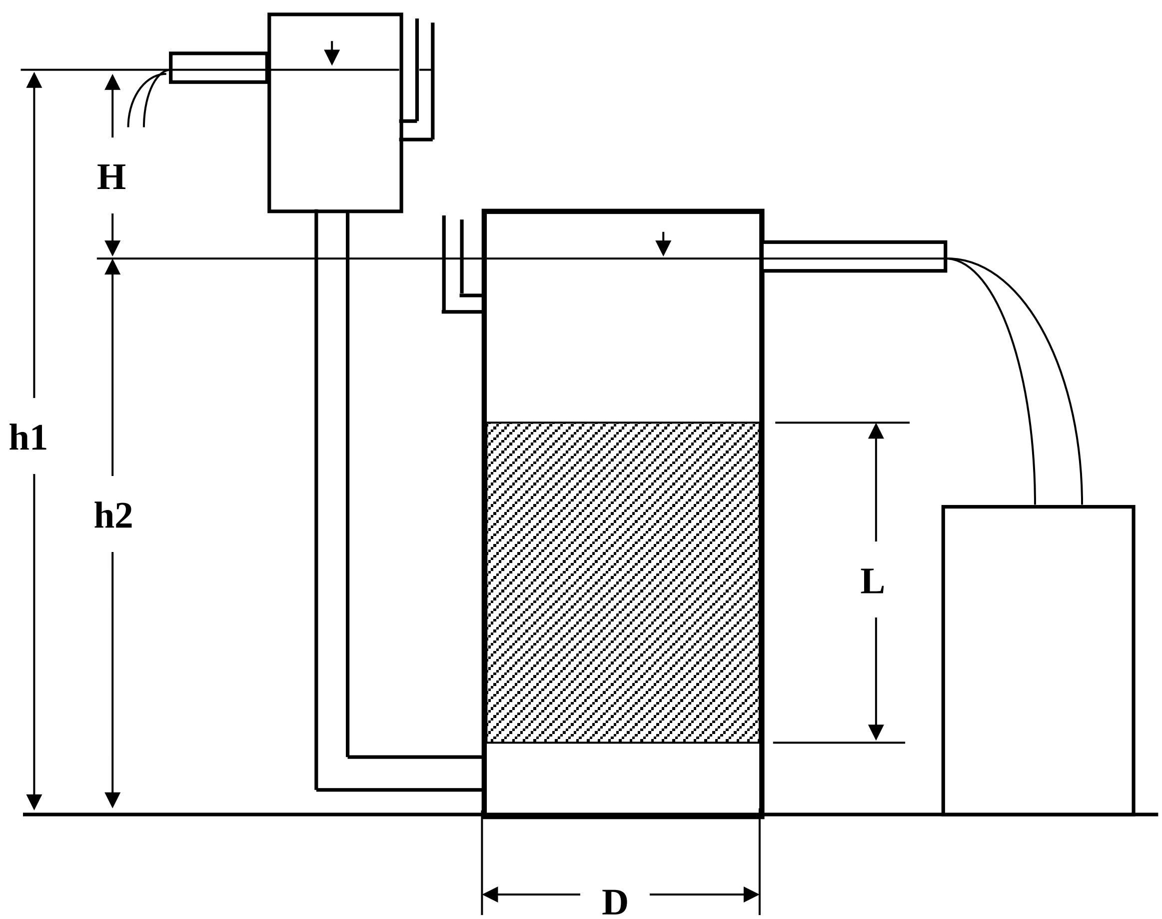
Project No.: 4794-01 Project Name: Hemphill Diversion Structure Tested By: JHA

Boring/Trench No.: NA Sample No.: 3/8" Import Smpl. Depth (ft): NA Date Tested: 6/5/2017

Sample Description (USCS; Munsel Color): Checked By: BJB

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
4	30	0.50	10.50	39749.6	21.0	1325	25.40	52.07	46.99	5.08	0.20	1.28E+01
4	30	0.50	10.40	39371.0	20.8	1312	25.40	52.07	46.99	5.08	0.20	1.27E+01
4	30	0.50	10.30	38992.4	20.6	1300	25.40	52.07	46.99	5.08	0.20	1.25E+01
4	30	0.50	10.30	38992.4	20.6	1300	25.40	52.07	46.99	5.08	0.20	1.25E+01
4	30	0.50	10.40	39371.0	20.8	1312	25.40	52.07	46.99	5.08	0.20	1.27E+01
4	30	0.50	10.20	38613.9	20.4	1287	25.40	52.07	46.99	5.08	0.20	1.24E+01
											Average =	1.26E+01



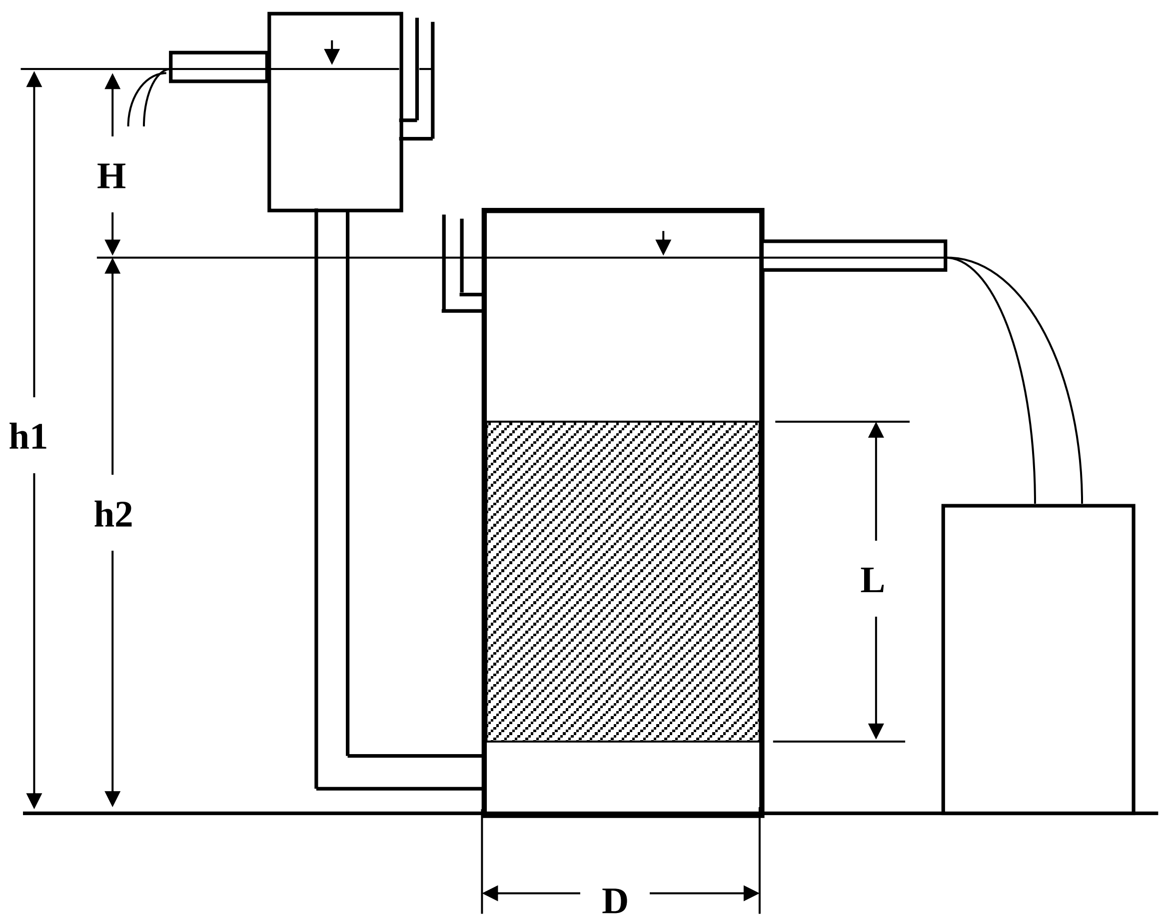
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill	Tested By:	JHA
Boring/Trench No.:		Sample No.:	Smpl. Depth (ft):	Date Tested:	5/26/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
2	30	0.50	0.40	1495.3	0.8	50	8.26	48.10	45.72	2.38	0.29	3.33E-01
2	2	0.03	0.36	1359.1	10.8	680	8.26	48.10	45.72	2.38	0.29	4.55E+00
2	29	0.48	0.36	1359.1	0.7	47	8.26	48.10	45.72	2.38	0.29	3.14E-01
2	60	1.00	0.72	2721.9	0.7	45	8.26	48.10	45.72	2.38	0.29	3.04E-01
2	141	2.35	2.46	9297.6	1.0	66	8.26	48.10	45.72	2.38	0.29	4.41E-01
											Average =	1.19E+00



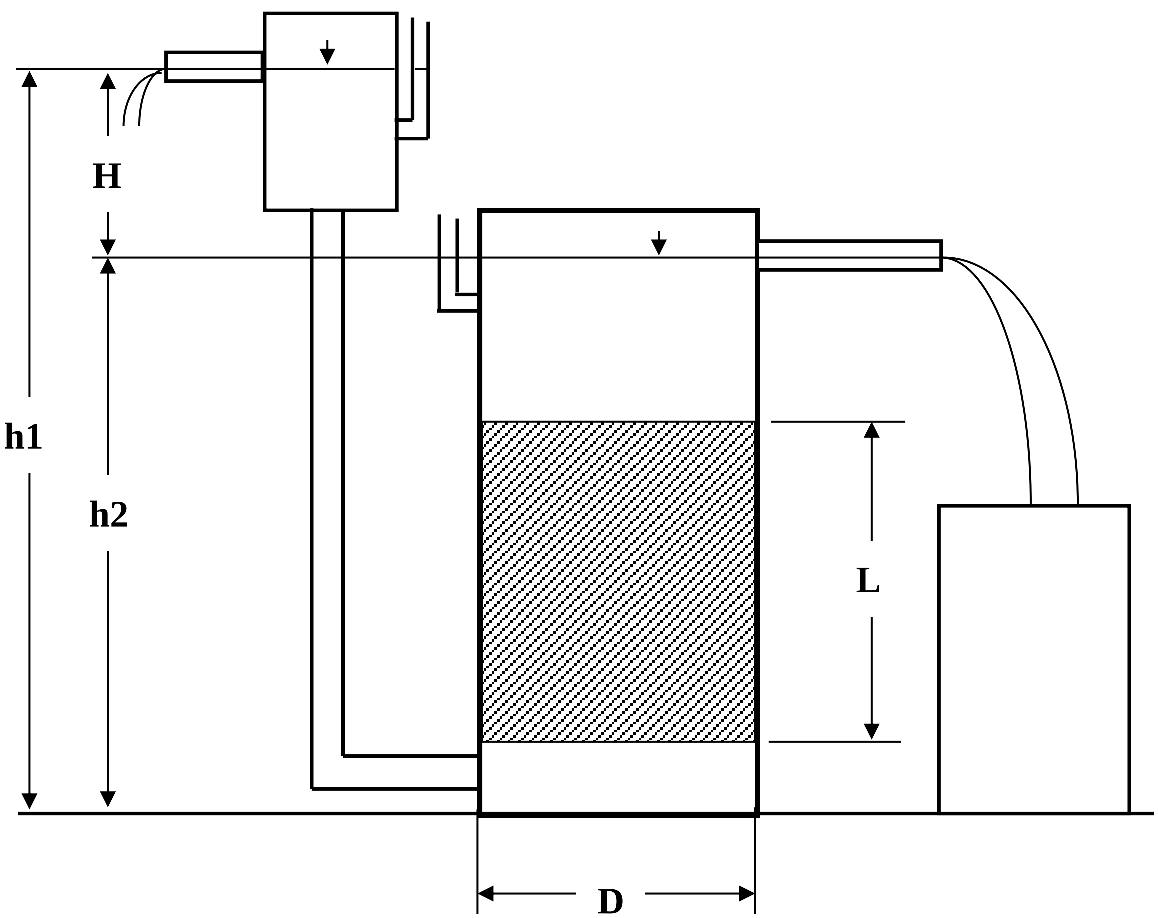
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill	Tested By:	JHA
Boring/Trench No.:		Sample No.:	Smpl. Depth (ft):	Date Tested:	5/26/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
3	51	0.85	0.64	2403.9	0.7	47	8.26	48.10	45.72	2.38	0.29	3.15E-01
3	50	0.83	0.60	2267.6	0.7	45	8.26	48.10	45.72	2.38	0.29	3.04E-01
3	49	0.82	0.60	2267.6	0.7	46	8.26	48.10	45.72	2.38	0.29	3.10E-01
3	60	1.00	0.72	2721.5	0.7	45	8.26	48.10	45.72	2.38	0.29	3.04E-01
3	429	7.15	2.70	10221.3	0.4	24	8.26	48.10	45.72	2.38	0.29	1.59E-01
											Average =	2.78E-01



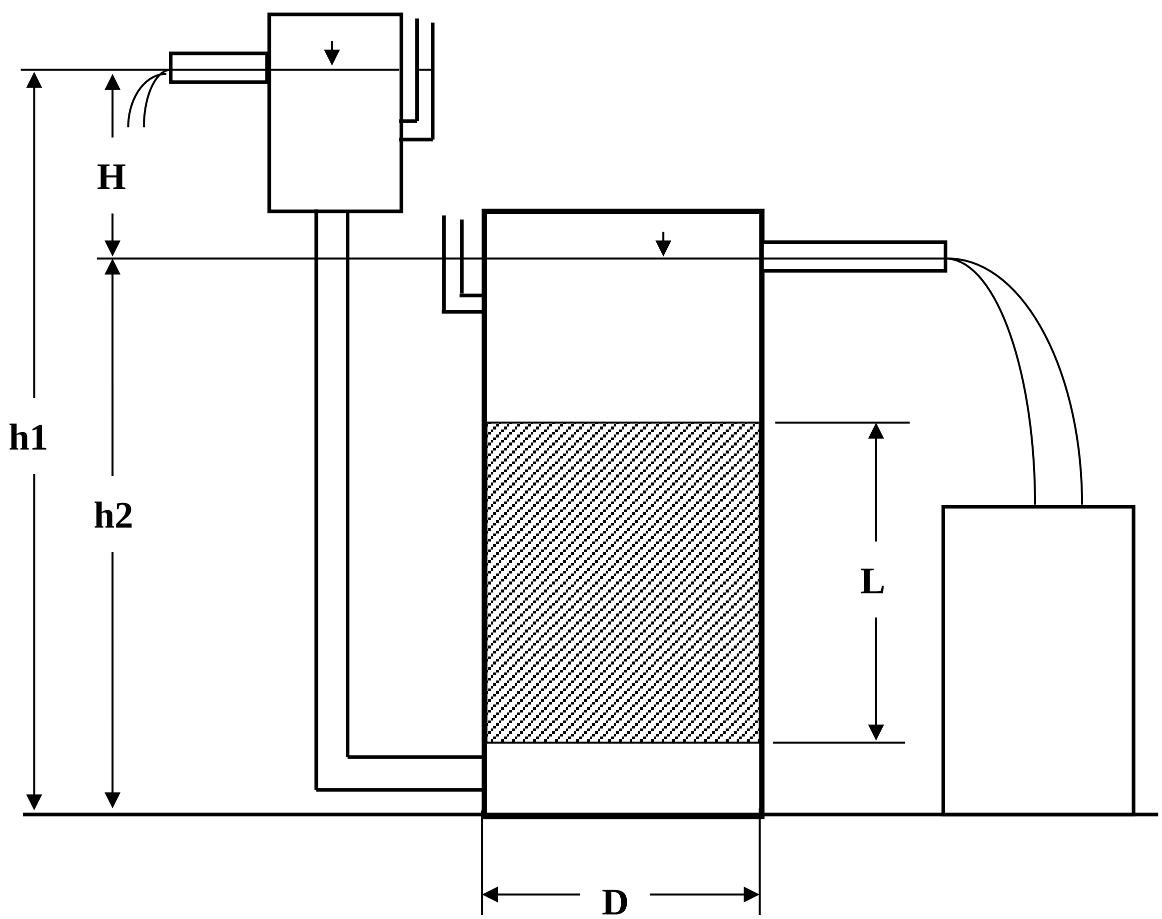
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill Diversion Structure	Tested By:	JHA
Boring/Trench No.:	NA	Sample No.:	3/8" Import	Smpl. Depth (ft): NA	Date Tested: 6/5/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
5	30	0.50	26.70	101077.5	53.4	3369	25.40	83.19	46.99	36.20	1.43	4.56E+00
5	30	0.50	26.80	101456.1	53.6	3382	25.40	83.19	46.99	36.20	1.43	4.58E+00
5	30	0.50	27.00	102213.2	54.0	3407	25.40	83.19	46.99	36.20	1.43	4.61E+00
5	30	0.50	27.00	102213.2	54.0	3407	25.40	83.19	46.99	36.20	1.43	4.61E+00
5	30	0.50	26.90	101834.6	53.8	3394	25.40	83.19	46.99	36.20	1.43	4.59E+00
5	30	0.50	27.00	102213.2	54.0	3407	25.40	83.19	46.99	36.20	1.43	4.61E+00
											Average =	4.59E+00



Coarse Grain Material Permeability

ASTM D2434

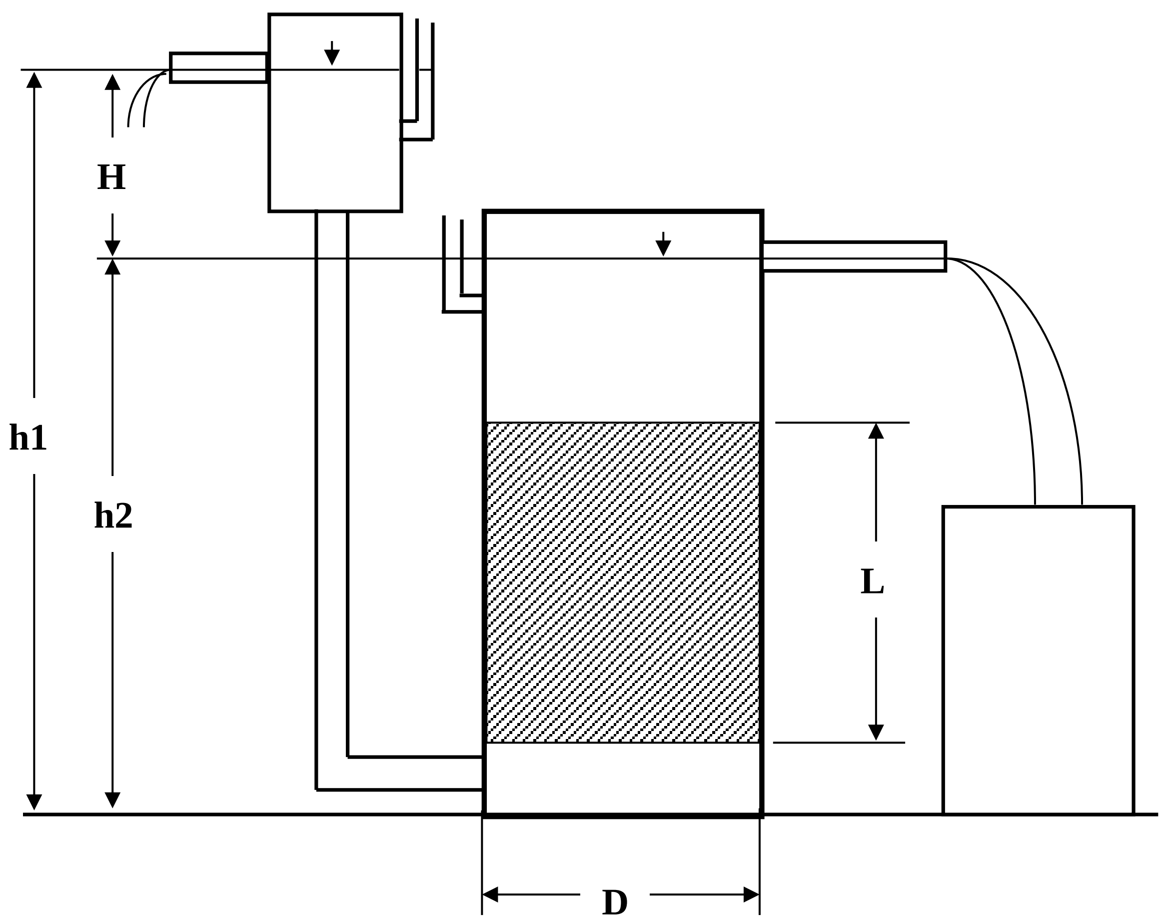
Project No.: 4794-01 Project Name: Hemphill Diversion Structure Tested By: JHA

Boring/Trench No.: NA Sample No.: 3/8" Import Smpl. Depth (ft): NA Date Tested: 6/5/2017

Sample Description (USCS; Munsel Color): Checked By:

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
6	60	1.00	25.10	95020.4	25.1	1584	25.40	61.60	46.99	14.61	0.58	5.31E+00
6	60	1.00	25.20	95399.0	25.2	1590	25.40	61.60	46.99	14.61	0.58	5.33E+00
6	60	1.00	24.70	93506.2	24.7	1558	25.40	61.60	46.99	14.61	0.58	5.23E+00
6	60	1.00	23.70	89720.5	23.7	1495	25.40	61.60	46.99	14.61	0.58	5.02E+00
6	60	1.00	23.20	87827.7	23.2	1464	25.40	61.60	46.99	14.61	0.58	4.91E+00
6	60	1.00	24.00	90856.2	24.0	1514	25.40	61.60	46.99	14.61	0.58	5.08E+00
											Average =	5.15E+00



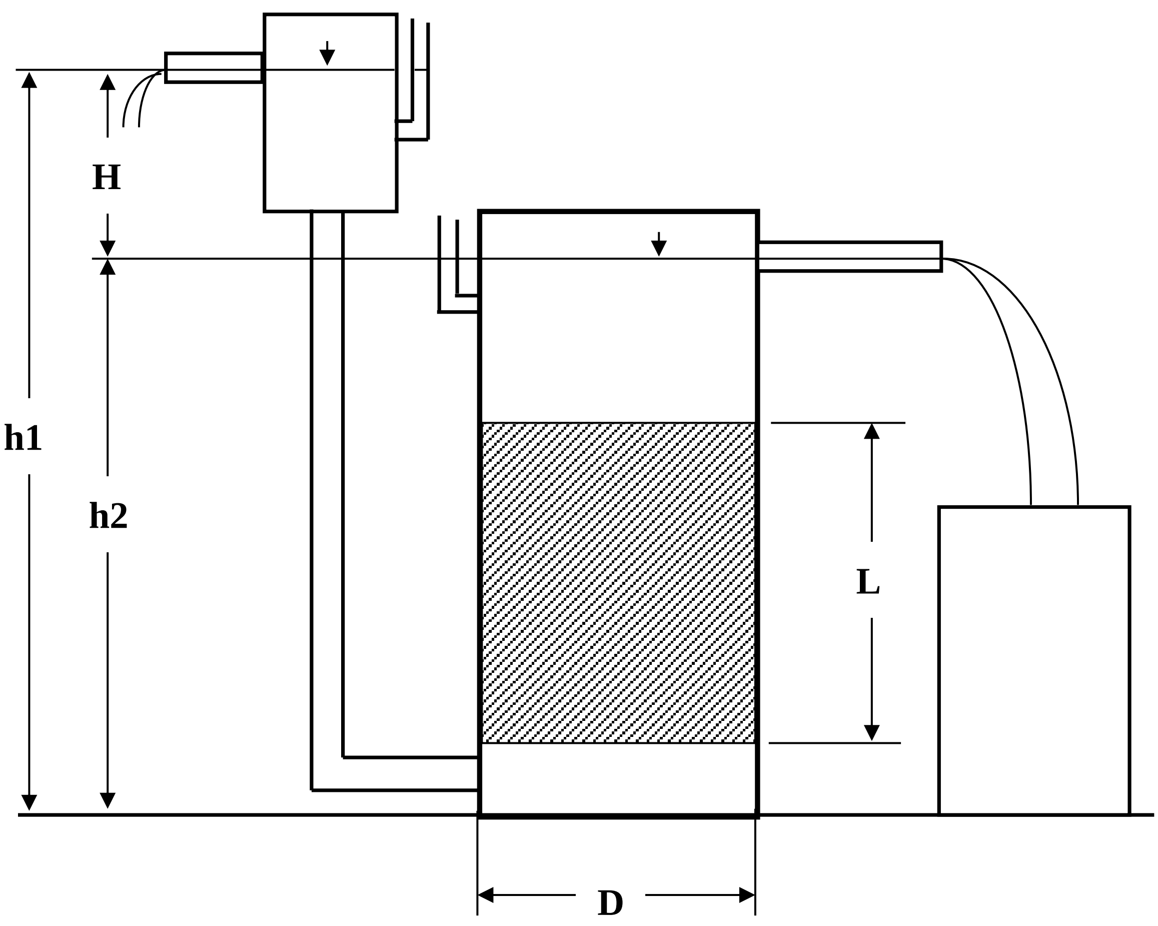
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill Diversion Structure			Tested By:	JHA
Boring/Trench No.:	NA	Sample No.:	3/8" Import	Smpl. Depth (ft):	NA	Date Tested:	6/5/2017
Sample Description (USCS; Munsel Color):						Checked By:	BJB

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
4	30	0.50	10.50	39749.6	21.0	1325	25.40	52.07	46.99	5.08	0.20	1.28E+01
4	30	0.50	10.40	39371.0	20.8	1312	25.40	52.07	46.99	5.08	0.20	1.27E+01
4	30	0.50	10.30	38992.4	20.6	1300	25.40	52.07	46.99	5.08	0.20	1.25E+01
4	30	0.50	10.30	38992.4	20.6	1300	25.40	52.07	46.99	5.08	0.20	1.25E+01
4	30	0.50	10.40	39371.0	20.8	1312	25.40	52.07	46.99	5.08	0.20	1.27E+01
4	30	0.50	10.20	38613.9	20.4	1287	25.40	52.07	46.99	5.08	0.20	1.24E+01
											Average =	1.26E+01



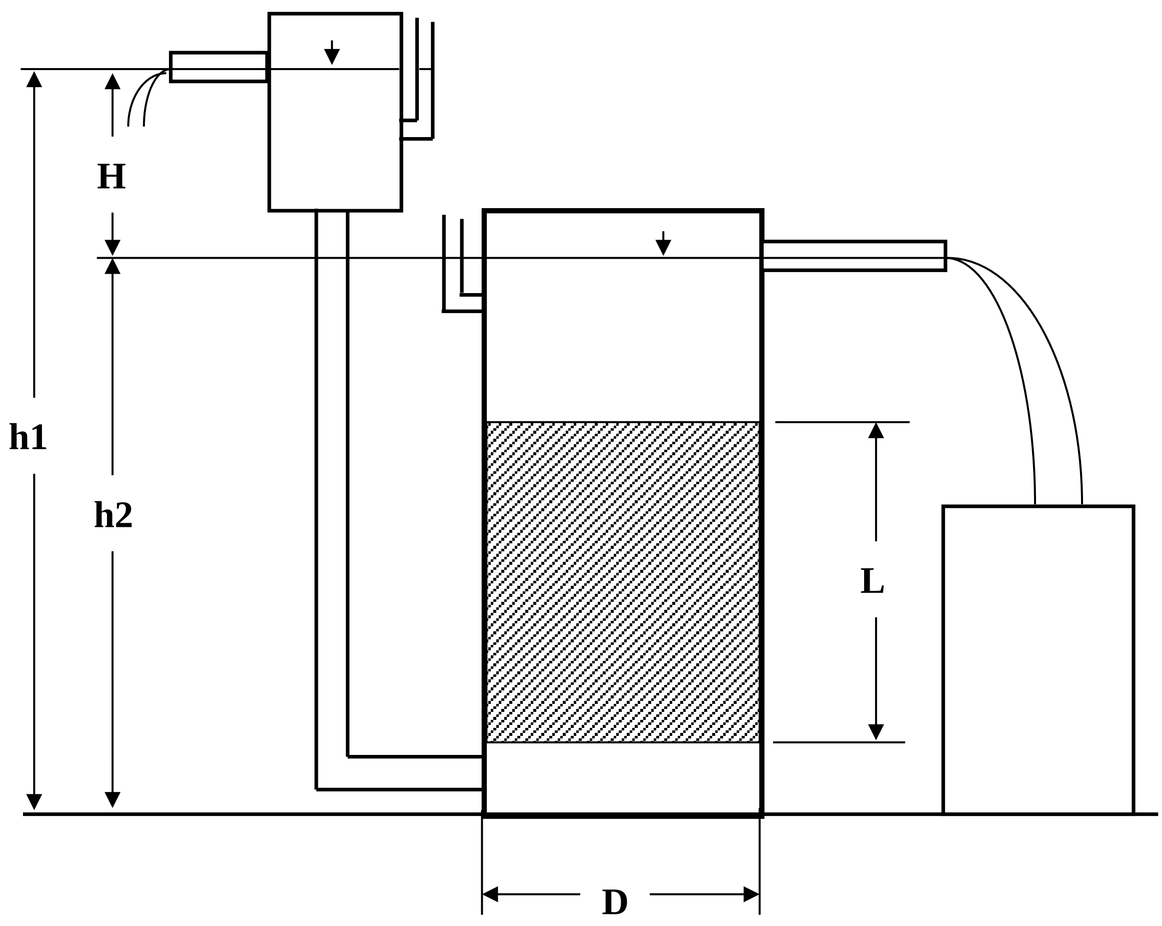
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill Diversion Structure	Tested By:	JHA
Boring/Trench No.:	NA	Sample No.:	1.5" Import	Smpl. Depth (ft): NA	Date Tested: 6/5/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
8	30	0.50	25.50	96534.7	51.0	3218	25.40	80.01	46.99	33.02	1.30	4.77E+00
8	30	0.50	25.90	98049.0	51.8	3268	25.40	80.01	46.99	33.02	1.30	4.85E+00
8	30	0.50	25.80	97670.4	51.6	3256	25.40	80.01	46.99	33.02	1.30	4.83E+00
8	30	0.50	26.00	98427.5	52.0	3281	25.40	80.01	46.99	33.02	1.30	4.87E+00
8	30	0.50	26.00	98427.5	52.0	3281	25.40	80.01	46.99	33.02	1.30	4.87E+00
											Average =	4.84E+00



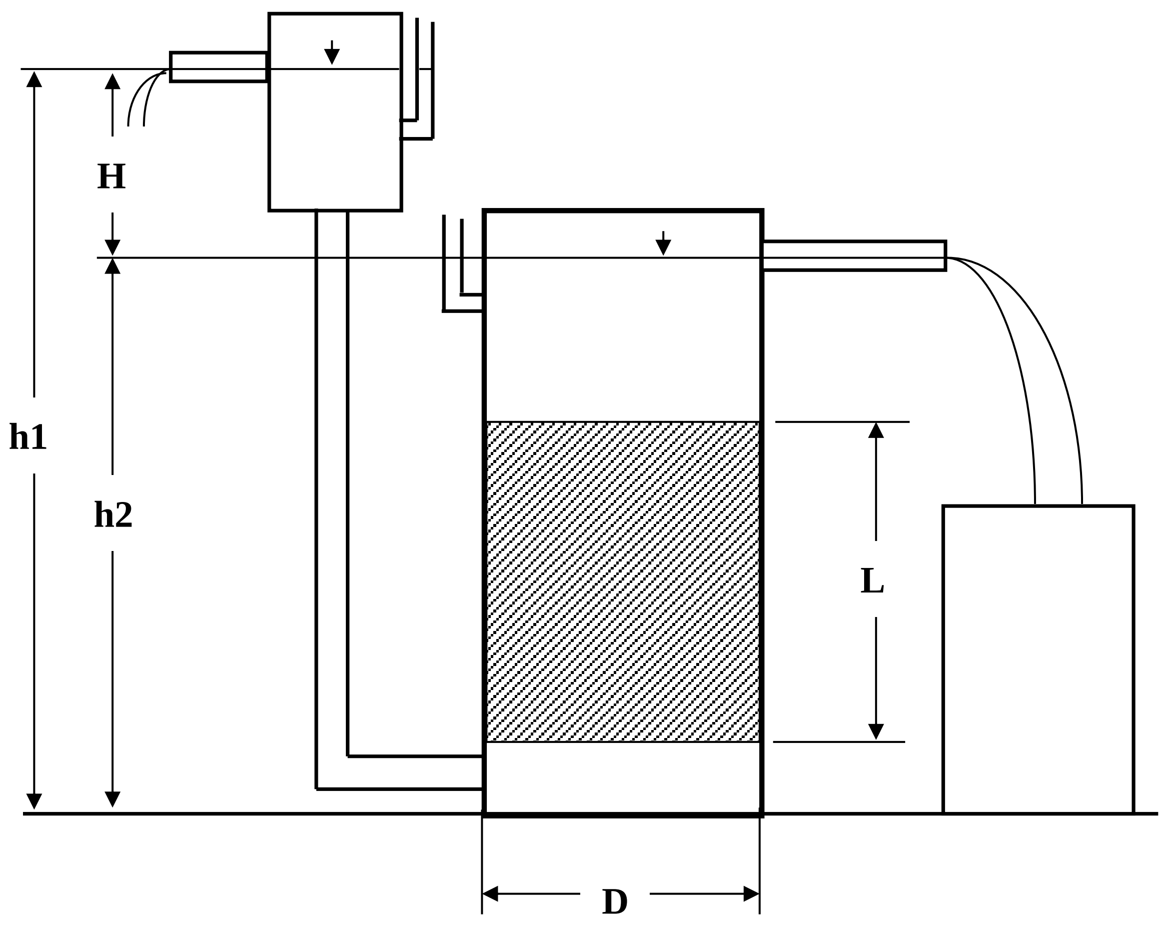
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill Diversion Structure	Tested By:	JHA
Boring/Trench No.:	NA	Sample No.:	1.5" Import · Smpl. Depth (ft): NA	Date Tested:	6/5/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time		Volume		Discharge		L	h1	h2	H	I	P
	(sec)	(min)	(gal)	(ml)	(gpm)	(ml/s)	(cm)	(cm)	(cm)	(cm)	(cm/cm)	(cm/s)
9	60	1.00	34.20	129470.1	34.2	2158	25.40	63.50	46.99	16.51	0.65	6.40E+00
9	60	1.00	34.50	130605.8	34.5	2177	25.40	63.50	46.99	16.51	0.65	6.46E+00
9	60	1.00	34.50	130605.8	34.5	2177	25.40	63.50	46.99	16.51	0.65	6.46E+00
9	60	1.00	35.00	132498.6	35.0	2208	25.40	63.50	46.99	16.51	0.65	6.55E+00
9	60	1.00	35.30	133634.3	35.3	2227	25.40	63.50	46.99	16.51	0.65	6.61E+00
											Average =	6.50E+00



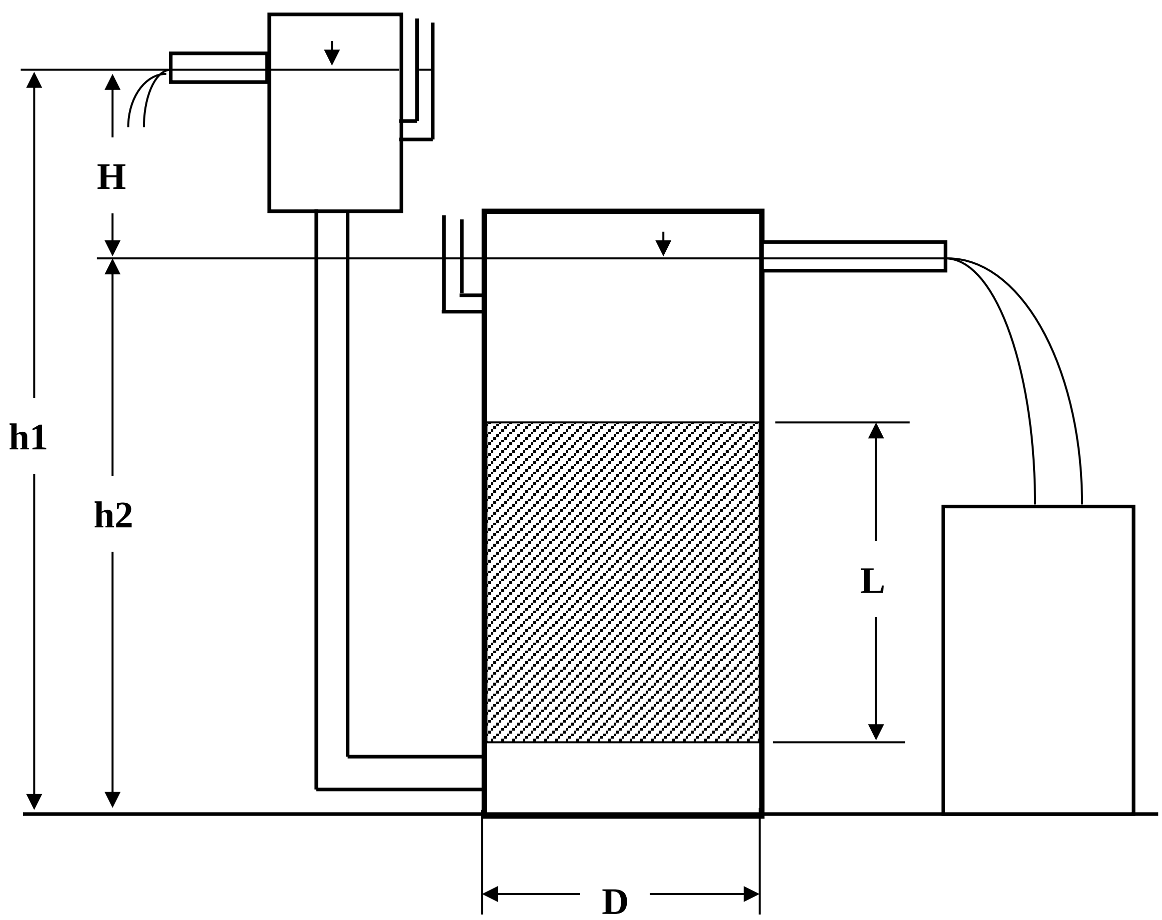
Coarse Grain Material Permeability

ASTM D2434

Project No.:	4794-01	Project Name:	Hemphill Diversion Structure	Tested By:	JHA
Boring/Trench No.:	NA	Sample No.:	1.5" Import — Smpl. Depth (ft): NA	Date Tested:	6/5/2017
Sample Description (USCS; Munsel Color):				Checked By:	

Permeameter Dim.: Diameter= 0.843 ft Area = 518.5 cm^2

Run No.	Time (sec)	Time (min)	Volume (gal)	Volume (ml)	Discharge (gpm)	Discharge (ml/s)	L (cm)	h1 (cm)	h2 (cm)	H (cm)	I (cm/cm)	P (cm/s)
7	60	1.00	22.20	84042.0	22.2	1401	25.40	54.61	46.99	7.62	0.30	9.00E+00
7	60	1.00	22.10	83663.4	22.1	1394	25.40	54.61	46.99	7.62	0.30	8.96E+00
7	60	1.00	23.70	89720.5	23.7	1495	25.40	54.61	46.99	7.62	0.30	9.61E+00
7	60	1.00	23.80	90099.1	23.8	1502	25.40	54.61	46.99	7.62	0.30	9.65E+00
7	60	1.00	22.90	86692.0	22.9	1445	25.40	54.61	46.99	7.62	0.30	9.29E+00
7	60	1.00	22.40	84799.1	22.4	1413	25.40	54.61	46.99	7.62	0.30	9.09E+00
											Average =	9.27E+00



Particle Size Distribution

ASTM D422

Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-1**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Strong Brown (7.5YR 4/6) Poorly Graded Sand**			Checked By:	**MLH**
Sample Location:		**0**		Lab. No.:	**15-17-082**

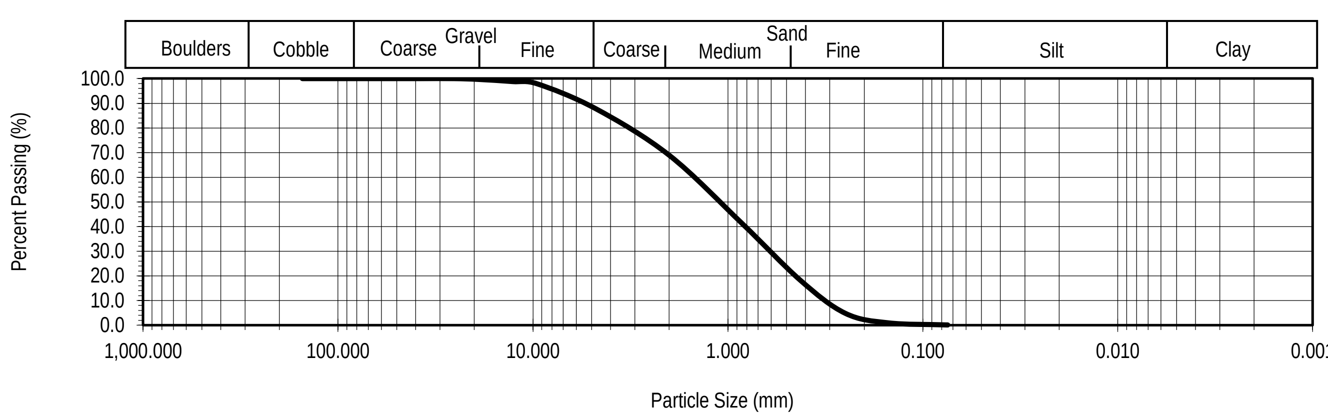
Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	4,024.3	100.0
3 Inch	3.0000	76.2	0.00	0.0	4,024.3	100.0
2 Inch	2.0000	50.8	0.00	0.0	4,024.3	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	4,024.3	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	4,024.3	100.0
3/4 Inch	0.7500	19.1	12.80	12.8	4,011.5	99.7
1/2 Inch	0.5000	12.7	35.50	48.3	3,976.0	98.8
3/8 Inch	0.3750	9.5	36.00	84.3	3,940.0	97.9
#4	0.1870	4.7500	408.90	493.2	3,531.1	87.7
#10	0.0787	2.0000	757.68	1,250.9	2,773.4	68.9
#20	0.0335	0.8500	1,106.74	2,357.6	1,666.7	41.4
#40	0.0167	0.4250	933.61	3,291.2	733.1	18.2
#60	0.0098	0.2500	538.94	3,830.2	194.1	4.8
#100	0.0059	0.1500	156.38	3,986.5	37.7	0.9
#200	0.0030	0.0750	33.51	4,020.1	4.2	0.1

Cc = 0.76

Cu = 4.62

Hydrometer

Particle Size Gradation



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Particle Size Distribution

ASTM D422

Project No.: **4794-01** Project Name: **Hemphill** Date: **4/7/2017**
Sample No.: **HD-SS-2** Boring/Trench: **-** Depth, (ft.): **-** Tested By: **MLH**
Description: **Dark Brown (10YR 3/3) Poorly Graded Sand** Checked By: **MLH**
Sample Location: **0** Lab. No.: **15-17-082**

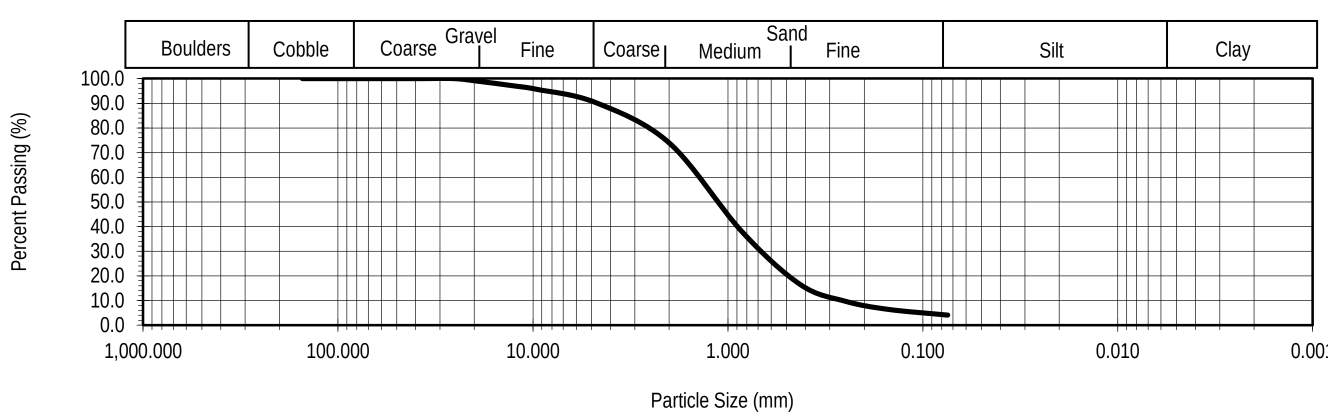
Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	6,205.8	100.0
3 Inch	3.0000	76.2	0.00	0.0	6,205.8	100.0
2 Inch	2.0000	50.8	0.00	0.0	6,205.8	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	6,205.8	100.0
1.0 Inch	1.0000	25.4	0.00	0.0	6,205.8	100.0
3/4 Inch	0.7500	19.1	66.80	66.8	6,139.0	98.9
1/2 Inch	0.5000	12.7	112.50	179.3	6,026.5	97.1
3/8 Inch	0.3750	9.5	91.60	270.9	5,934.9	95.6
#4	0.1870	4.7500	335.20	606.1	5,599.7	90.2
#10	0.0787	2.0000	1,012.80	1,618.9	4,586.9	73.9
#20	0.0335	0.8500	2,225.00	3,843.9	2,361.9	38.1
#40	0.0167	0.4250	1,339.86	5,183.8	1,022.0	16.5
#60	0.0098	0.2500	419.47	5,603.2	602.6	9.7
#100	0.0059	0.1500	205.48	5,808.7	397.1	6.4
#200	0.0030	0.0750	142.25	5,951.0	254.8	4.1

Cc = 1.19

Cu = 5.77

Hydrometer

Particle Size Gradation



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Particle Size Distribution

ASTM D422

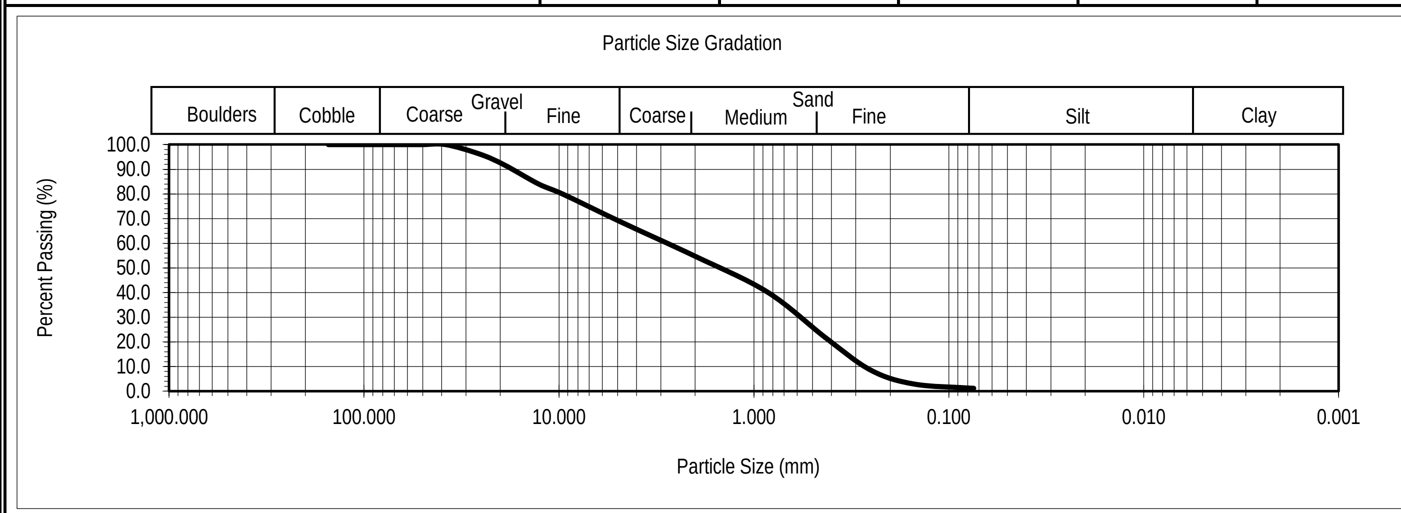
Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-3**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Brown (7.5YR 4/3) Poorly Graded Sand with Gravel**			Checked By:	**MLH**
Sample Location:	**0**			Lab. No.:	**15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Dry Weight on Sieve Accumulated On Sieve (gm)	Dry Weight on Sieve Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	8,646.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	8,646.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	8,646.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	8,646.1	100.0
1.0 Inch	1.0000	25.4	336.40	336.4	8,309.7	96.1
3/4 Inch	0.7500	19.1	377.20	713.6	7,932.5	91.7
1/2 Inch	0.5000	12.7	670.20	1,383.8	7,262.3	84.0
3/8 Inch	0.3750	9.5	355.80	1,739.6	6,906.5	79.9
#4	0.1870	4.7500	990.90	2,730.5	5,915.6	68.4
#10	0.0787	2.0000	1,185.44	3,915.9	4,730.2	54.7
#20	0.0335	0.8500	1,260.22	5,176.2	3,470.0	40.1
#40	0.0167	0.4250	1,616.59	6,792.8	1,853.4	21.4
#60	0.0098	0.2500	1,125.43	7,918.2	727.9	8.4
#100	0.0059	0.1500	480.08	8,398.3	247.9	2.9
#200	0.0030	0.0750	146.80	8,545.1	101.1	1.2

Cc = 0.47

Cu = 10.58

Hydrometer



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Particle Size Distribution

ASTM D422

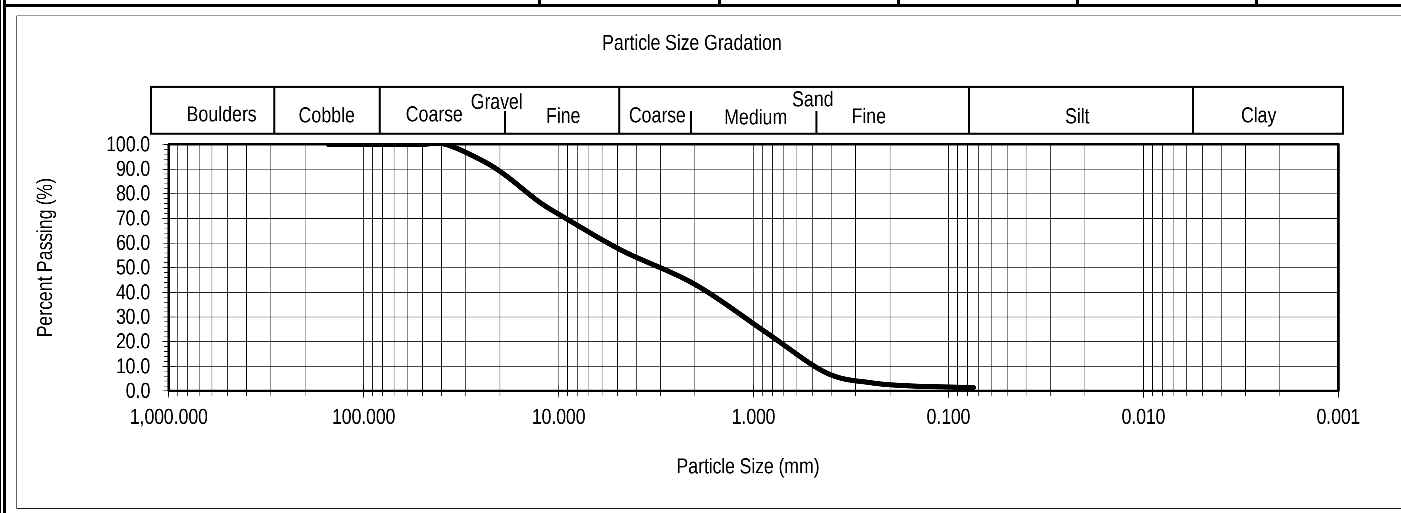
Project No.:	**4794-01**	Project Name:	**Hemphill**	Date:	**4/7/2017**
Sample No.:	**HD-SS-6**	Boring/Trench:	**-** Depth, (ft.): **-**	Tested By:	**MLH**
Description:	**Brown (7.5YR 4/4) Poorly Graded Sand with Gravel**			Checked By:	**MLH**
Sample Location:	**0**			Lab. No.:	**15-17-082**

Sieve Size	Particle Diameter		Dry Weight on Sieve			Percent
	Inches	Millimeter	Retained On Sieve	Accumulated On Sieve	Passing Sieve	Passing
(U.S. Standard)	(in.)	(mm)	(gm)	(gm)	(gm)	(%)
6 Inch	6.0000	152.4	0.00	0.0	9,035.1	100.0
3 Inch	3.0000	76.2	0.00	0.0	9,035.1	100.0
2 Inch	2.0000	50.8	0.00	0.0	9,035.1	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	9,035.1	100.0
1.0 Inch	1.0000	25.4	548.30	548.3	8,486.8	93.9
3/4 Inch	0.7500	19.1	548.80	1,097.1	7,938.0	87.9
1/2 Inch	0.5000	12.7	993.40	2,090.5	6,944.6	76.9
3/8 Inch	0.3750	9.5	557.10	2,647.6	6,387.5	70.7
#4	0.1870	4.7500	1,238.80	3,886.4	5,148.7	57.0
#10	0.0787	2.0000	1,245.37	5,131.8	3,903.4	43.2
#20	0.0335	0.8500	1,794.47	6,926.2	2,108.9	23.3
#40	0.0167	0.4250	1,441.59	8,367.8	667.3	7.4
#60	0.0098	0.2500	367.12	8,735.0	300.2	3.3
#100	0.0059	0.1500	121.85	8,856.8	178.3	2.0
#200	0.0030	0.0750	53.80	8,910.6	124.5	1.4

Cc = 0.52

Cu = 11.98

Hydrometer



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Particle Size Distribution

ASTM D422

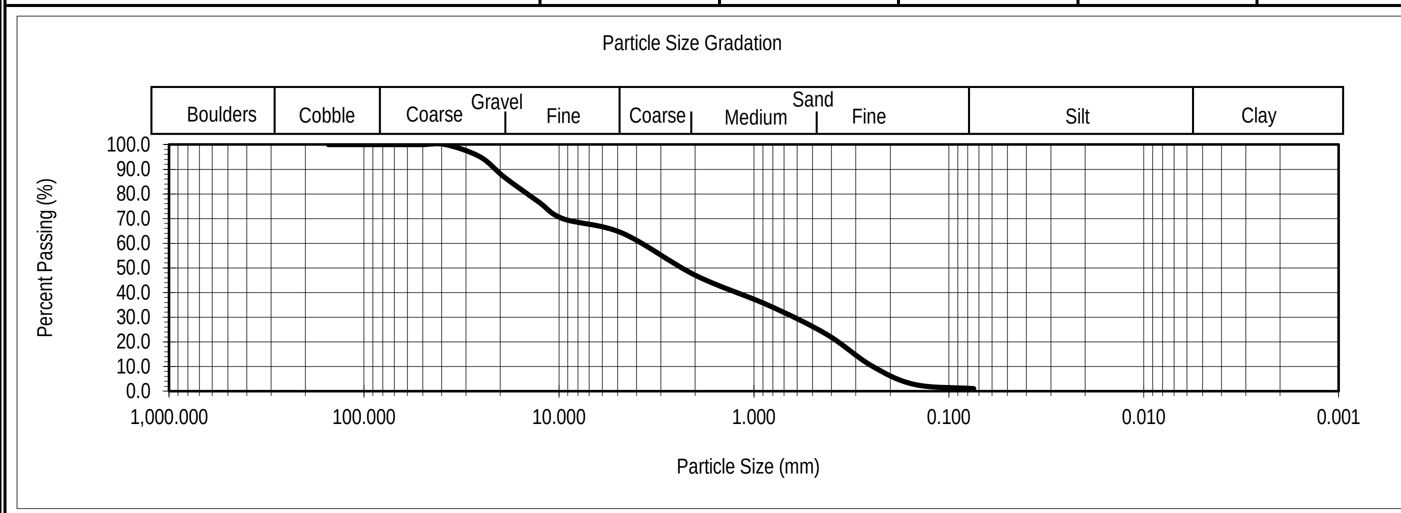
Project No.:	**4794-01**	Project Name: **Hemphill**	Date: **4/7/2017**
Sample No.:	**HD-SS-7**	Boring/Trench: **-** Depth, (ft.): **-**	Tested By: **MLH**
Description:	**Dark Brown (10YR 3/3) Poorly Graded Sand with Gravel**		Checked By: **MLH**
Sample Location:	**0**		Lab. No.: **15-17-082**

Sieve Size (U.S. Standard)	Particle Diameter Inches (in.)	Particle Diameter Millimeter (mm)	Dry Weight on Sieve Retained On Sieve (gm)	Accumulated On Sieve (gm)	Passing Sieve (gm)	Percent Passing (%)
6 Inch	6.0000	152.4	0.00	0.0	5,902.5	100.0
3 Inch	3.0000	76.2	0.00	0.0	5,902.5	100.0
2 Inch	2.0000	50.8	0.00	0.0	5,902.5	100.0
1.5 Inch	1.5000	38.1	0.00	0.0	5,902.5	100.0
1.0 Inch	1.0000	25.4	292.60	292.6	5,609.9	95.0
3/4 Inch	0.7500	19.1	487.30	779.9	5,122.6	86.8
1/2 Inch	0.5000	12.7	593.40	1,373.3	4,529.2	76.7
3/8 Inch	0.3750	9.5	400.80	1,774.1	4,128.4	69.9
#4	0.1870	4.7500	341.30	2,115.4	3,787.1	64.2
#10	0.0787	2.0000	1,010.91	3,126.3	2,776.1	47.0
#20	0.0335	0.8500	712.38	3,838.7	2,063.8	35.0
#40	0.0167	0.4250	698.66	4,537.4	1,365.1	23.1
#60	0.0098	0.2500	752.89	5,290.2	612.2	10.4
#100	0.0059	0.1500	451.23	5,741.5	161.0	2.7
#200	0.0030	0.0750	99.10	5,840.6	61.9	1.0

Cc = 0.44

Cu = 15.83

Hydrometer



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APPENDIX C

Proposal

HOLDREGE & KULL
CONSULTING ENGINEERS • GEOLOGISTS

Proposal No. PN16167
November 14, 2016

Kleinschmidt
P.O. Box 650
Pittsfield, ME 04967

Attention: Mike Schimpff

Reference: ***Hemphill Diversion Structure***
Placer County, California

Subject: ***Proposal for Environmental and Geotechnical Investigation***

Dear Mr. Schimpff:

Holdrege & Kull (H&K) proposes to perform environmental and geotechnical engineering investigation at an impoundment associated with the Hemphill Diversion Structure on Auburn Ravine, located near Virginiatown Road and Mini Ranch Road, in Placer County, California.

This proposal includes the scope of environmental services presented in our previous "Proposal for Soil Sampling and Analysis" dated September 27, 2016, and a proposed scope of geotechnical subsurface investigation as discussed with representatives of Kleinschmidt and Nevada Irrigation District (NID) on September 23, 2016, and pursuant to our conference call with you on November 2, 2016.

SCOPE OF SERVICES

Environmental Characterization

H&K will perform sediment sampling, analytical laboratory testing and particle size analysis to inform future permitting and sediment removal activities associated with the project. Our proposed scope of services is not intended to satisfy all permitting requirements associated with the project; rather, the findings are intended to help scope management alternatives for dam and sediment removal. Our scope of services does not address other permitting requirements or fees.

Sediment samples will be obtained within 500 feet upstream of the 8-foot-high dam. Assuming that the sediment depth ranges from two to six feet deep along the flow line and reduces linearly to zero at the edges of the 100-foot-wide channel, the sediment volume within 500 feet upstream of the dam may be approximately 3,700 cubic yards. We will update this estimate based on the results of our field investigation.

H&K understands that permitting requirements are not yet known. Therefore, sediment samples will be analyzed for the heavy metals listed in the California Regional Water Quality Control Board (Regional Board) the General Order for Maintenance Dredging

(R5-2009-0085), and also for industrial organic compounds including semivolatile organic compounds (SVOCs), petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs).

We understand that methylmercury (MeHg) sampling and analysis is also required. We have budgeted for additional field sampling personnel to assist with the specific handling procedures required to sample MeHg. The laboratory reporting limit (RL) for MeHg (EPA 1630) is 0.1 micrograms per kilogram (ug/kg), and the MDL is 0.03 ug/kg.

If requested, we would be able to consult with the Regional Water Quality Control Board regarding the specific type and frequency of analysis required. Specific tasks for environmental characterization are described below.

Sample Collection

We will collect sediment samples using hand tools at up to eight locations within the impoundment. Samples will be obtained at areas with up to 3 feet of water. We will use sediment sampling equipment to obtain representative samples from sediment up to six feet deep. We assume that the sampling effort will not be hindered by oversize materials. If a boat is required or mechanical sampling methods are necessary, we will be able to revise our scope of services and fee to include different sampling procedures.

Laboratory Analysis

We will prepare two composite samples and contract for chemical analysis of the following constituents by a California-certified laboratory.

- Total Title 22 Metals (EPA Method 6010B);
- Total mercury (EPA Method 7471A, reporting limit <0.025 mg/kg);
- Total aluminum (EPA Method 6010B);
- Total hexavalent chromium (EPA Method 7199A);
- Soluble Title 22 Metals (Title 22 Waste Extraction Test [WET] and USEPA Method 6010B/7471);
- Soluble Title 22 Metals (Toxicity Characteristic Leaching Potential [TCLP] and USEPA Method 6010B/7471A);
- Moisture content (ASTM D2216);
- SVOCs (EPA Method 8270C);
- Carbon Chain (EPA Method 8015);
- PCBs (EPA method 8082);

- PAHs (EPA Method 8310); and
- Methylmercury (EPA Method 1630).

Full sieve particle size analysis with long hydrometer (ASTM D422C) will be performed at H&K's Nevada City laboratory for two composite samples. Specific gravity (ASTM D854) testing will be performed for one sample.

Reporting

H&K will prepare a report summarizing the sampling methodology, presenting the laboratory results and comparing the results to common regulatory benchmarks. The report will include:

- A description of sampling methodology;
- A map of sample locations;
- A tabular summary of laboratory results;
- Laboratory reports and chain of custody documentation;
- Evaluation of the laboratory results based on comparison to common regulatory benchmarks and regional background concentrations;
- An estimate of the sediment volume; and
- Conclusions and recommendations regarding the sediment characterization.

Geotechnical Investigation

Site Investigation and Sample Collection

Concurrently with our environmental investigation, we will conduct a geotechnical investigation which will include hand augering, sediment sample collection, and dynamic cone penetrometer testing (DCPT) to determine depth to native stream channel. We will collect sediment samples using waders and hand tools at several locations within the impoundment. Samples will be obtained at areas with up to 3 feet of water. We will use sediment sampling equipment to obtain representative samples from sediment up to six feet deep. We assume that the sampling effort will not be hindered by oversized materials.

Drilling and Well Construction

H&K will drill one 8-inch diameter boring with an air hammer to depths of 100 feet. The cuttings will be logged by an engineer or geologist from our firm during drilling. We will contract with the driller to perform an air lift test to provide a preliminary estimate of the groundwater yield.

At NID's request, the boring will be converted to a well with 6-inch diameter PVC sanitary seal extending approximately 20 feet below the ground surface.

H&K will obtain a permit for the drilling and well construction, and will pay the associated permitting fees. We will rely on NID to choose a location for the well, and we will work with the drillers to determine whether the location is accessible to the drill rig.

We will contact Underground Service Alert (USA) prior to drilling, so that USA can notify utility companies to mark underground utilities in the vicinity of the proposed drilling. Although we will use reasonable caution during drilling, we cannot be responsible for damage to underground utilities that were not marked or that were improperly marked as a result of USA notification. To reduce the chance of damage to underground utilities, we can revise our scope and fee to include subcontracting with a private utility locator to identify underground utilities prior to drilling.

Laboratory Analysis

We will perform particle size determination as discussed above in the environmental scope. After our field investigation, we propose to perform small scale hydraulic conductivity testing in order to determine the size of a filter bed that would be required to deliver flows of 10 to 15 cubic feet per second. These would be performed in our laboratory with large diameter slotted pipe and recirculating pumps.

Reporting

We will prepare a report for the project that will present our methodology, findings, conclusions, and recommendations. The report will include:

- A description of drilling and sediment sampling methodology;
- A map of the exploratory boring locations and sample locations;
- Logs of the well drilling and yield based on an air lift test;
- A tabular summary of laboratory results;
- A discussion of the small scale hydraulic conductivity testing and results; and
- Conclusions and recommendations.

ASSUMPTIONS AND CLIENT RESPONSIBILITIES

By authorizing H&K's services, the client attests to the fact that the property owner is aware of H&K's proposed investigation and that the owner authorizes H&K to access the site for investigation purposes. We understand that the proposed sediment sampling is not subject to permit requirements or regulatory fees.

FEE

H&K's fee is summarized below:

Task	Fee
Environmental Characterization	$
Geotechnical Investigation	$
Total	$

If we encounter field conditions or regulatory directives that require a chance in scope, we will discuss the conditions with you prior to proceeding.

SCHEDULE

We can perform the investigation within four weeks of your authorization to proceed, weather and drill rig availability permitting. Laboratory analysis and report preparation will require four weeks after we perform the field work.

AUTHORIZATION TO PROCEED

If this proposal meets with your approval, please review and sign the attached agreement for environmental consulting services and return the signed agreement to our office.

We appreciate the opportunity to provide this proposal and we look forward to working with you. Please contact us if you have any questions.

Sincerely,

HOLDREGE & KULL

Jason W. Muir, P.E., G.E.
Principal Engineer

Charles R. Kull, P.E., G.E., C.E.G.
Founding Principal

attached: Agreement for Environmental Consulting Services

copies: Mike Schimpff, Mike.Schimpff@KleinschmidtGroup.com
Kelly Schaeffer, Kelly.Schaeffer@KleinschmidtGroup.com

F:\2 Proposals\PN16167 Hemphill Diversion Structure\Chemical Characterization\Proposal\PN16167 H&K Proposal for Environmental and Geotechnical Investigation, Hemphill Diversion Structure.docx

APPENDIX 3.3 E

Hemphill Diversion Structure and Fish Passage Assessment –
Final Report
(NHC 2021)

HEMPHILL DIVERSION STRUCTURE AND FISH PASSAGE ASSESSMENT

FINAL REPORT

Prepared for:

Nevada Irrigation District
Grass Valley, California

Prepared by:

Northwest Hydraulic Consultants Inc.
Sacramento, California

26 March 2021

NHC Ref. No. 5005721

nhc

HEMPHILL DIVERSION STRUCTURE AND FISH PASSAGE ASSESSMENT

FINAL REPORT

Prepared by:

Amiana McEwen, Project Engineer

Reviewed by:

Brian Wardman, PE

DISCLAIMER

This document has been prepared by Northwest Hydraulic Consultants Inc. in accordance with generally accepted engineering practices and is intended for the exclusive use and benefit of Nevada Irrigation District and their authorized representatives for specific application to the Hemphill Diversion Structure on Auburn Ravine in Auburn, California. The contents of this document are not to be relied upon or used, in whole or in part, by or for the benefit of others without specific written authorization from Northwest Hydraulic Consultants Inc. No other warranty, expressed or implied, is made.

Northwest Hydraulic Consultants Inc. and its officers, directors, employees, and agents assume no responsibility for the reliance upon this document or any of its contents by any parties other than Nevada Irrigation District.

EXECUTIVE SUMMARY

The Hemphill Diversion structure is located in the Auburn Ravine in Lincoln, CA. The diversion consists of a 64-foot channel-spanning flashboard dam that diverts up to 15 cfs into the diversion canal. The dam does not provide fish passage[1] and the diversion canal is unscreened. Nevada Irrigation District (NID), ECORP, and other key stakeholders have been working on a solution to provide fish passage for aquatic species at the dam. Specific species of interest include adult and juvenile fall-run Chinook salmon, steelhead, and Pacific Lamprey. The goal of this report is to offer solutions for providing fish passage past the existing Hemphill diversion dam. Northwest Hydraulic Consultants (NHC) is providing technical and engineering support to analyze the existing diversion structure and assess fish passage alternatives. This report summarizes NHC's analysis of previous reports and photographs, documents the findings from a site visit, presents fish passage and screening concepts that would be compatible with the existing dam.

Five alternatives for providing fish passage at the existing structure are presented. The existing Hemphill Dam would likely require significant structural improvements to support a structural fish ladder. Two alternatives entail removing the dam, replacing it with a new grade control structure, and installing channel-spanning nature-like fishways; two alternatives leave the existing dam in place without any structural modifications, and include bypass fishways; and the last alternative leaves the dam in place with some structural modifications with a concrete pool and chute fish ladder.

The report also includes a brief discussion on fish screen alternatives at the Hemphill Diversion Canal. Fish screens would reduce entrainment of juvenile fish in the diversion, and could be considered as an alternative to other diversion modifications such as infiltration galleries. Order of magnitude costs and considerations for these alternatives are provided.

[1] It is possible that the dam allows fish passage at higher flows; however, high velocities may be a barrier to migrating fish during high flows.

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1 INTRODUCTION

1.1 Purpose

Northwest Hydraulic Consultants (NHC) is assisting ECORP and Nevada Irrigation District (NID) with the development of fish passage alternatives at Hemphill Diversion Structure. According to NID, the Hemphill Diversion Structure is identified as a fish barrier to anadromous fish on the Auburn Ravine, east of the City of Lincoln in Placer County, California. The primary anadromous species of concern are fall-run Chinook salmon and Steelhead. Pacific Lamprey are present in Auburn Ravine and may also be a species of concern; however, that determination has to yet to be made. The purpose of this project is to improve fish passage in Auburn Ravine near the Hemphill Diversion Structure, minimize the potential environmental impacts of operating and maintaining the future project, and continuing to provide raw water service.

NHC originally assessed fish passage options that would not require removing the dam. However, after review of the existing dam structural design, history of maintenance, and downstream channel conditions, NHC noted the long-term viability of the existing structure may be limited and NID directed NHC to also evaluate passage alternatives which would replace the structure. NHC reviewed existing documents and as-built plans in addition to conducting a site visit. This report summarizes the finding of the analysis and provides an opinion on whether the Hemphill diversion dam structure will require replacement to implement the proposed fish passage structures, in addition to the benefits and costs of identified alternatives. Should NID select one of the alternatives presented below, this report serves as a precursor to an Environmental Impact Report of the eventual preferred fish passage alternative.

1.2 Background

1.2.1 Hemphill Diversion

The Hemphill diversion dam, constructed in 1981, is a 64-foot-wide channel-spanning concrete structure in Auburn Ravine. The dam's concrete crest has an elevation of 197.4 ft (NAVD88). Seasonal wooden flashboards raise the dam's crest three feet up to an elevation of 200.4 ft during the summer diversion season from about April 15th through October 15th. Given the depth of the original dam foundation (Figure 1-1), we presume the dam crest was constructed at the original channel bed elevation, prior to significant downstream incision. According to the 1981 as-built drawings, the dam was constructed with 6-foot-tall wing walls on both banks, and did not include any bank fortification upstream or downstream of the dam. Bank fortification was added later after three large flood events in 1997, 2006, and 2017 (see section 1.2.2) severely eroded the banks and dam foundation. Due to ongoing channel incision downstream, the concrete crest of the existing dam is approximately ten feet above the scoured channel bed immediately downstream of the dam, according to a topographic and bathymetric survey completed by NID in March 2020. In general, the wooden flashboards are in place from April 15th through October 15th during diversion season.

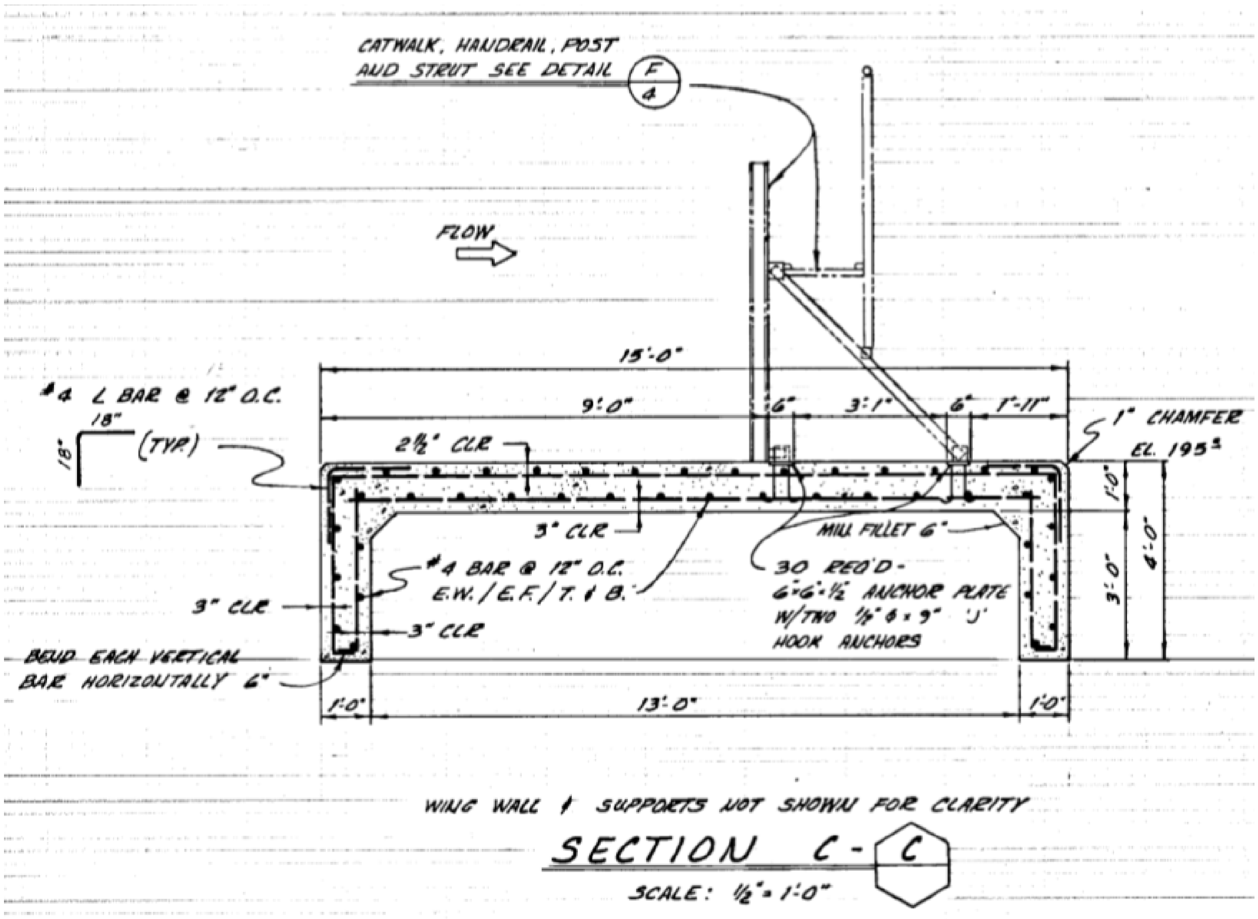

Figure 1-1. 1981 as-built cross section of existing dam. Figure source: NID's 1981 as-builts.

1.2.2 Hemphill Dam Repairs

Large floods in 1997, 2006, and 2017 caused significant erosion and scouring around and under the dam. In 1997, the flow flanked the dam and eroded the north and south banks. As such, both banks and the dam's apron are heavily armored with grouted riprap. Photos of the damage, provided by NID, confirmed that the erosion was extensive (Figure 1-2). NID rectified the issue by fortifying the northern bank and dam apron with grouted riprap (Figure 1-3). An aerial view of the Hemphill Dam shows that the dam is located on a mild meander bend in the Auburn Ravine, with the northern side of the dam on the outside of the bend. Because of this, NHC recognizes that the north side of the dam remains more susceptible to flanking and erosion than the south bank of the dam.

Another large flood in 2006 caused significant scouring underneath the dam. According to discussions with NID, the 2006 flood also flanked the dam on both sides, but not nearly as extensively as the 1997 flood; instead, the erosive force was directed downward under the dam. After the 2006 flood, NID placed a concrete slurry under the dam to fill the scour hole. During our field visit on September 22, 2020, Doug Andrews, with NID maintenance, mentioned that working conditions were less than ideal when placing the concrete slurry under the dam. Doug recalled that there was a gap between the top of the concrete plug and the bottom of the original dam foundation, indicating that the dam's foundation is compromised. Finally, NID had to complete an emergency repair due to water going around and under the dam near the right bank, likely following high winter flows. The 2017 repair consisted of placing erosion resistant fabric and rip rap upstream of the dam (Figure 1-4).

Figure 1-2. Extensive erosion on the north bank caused by high flows in 1997. Photo provided by NID.

Figure 1-3. Fortifying the banks and dam apron with grouted riprap following the 1997 flood. Photo provided by NID.

Figure 1-4. Placing riprap in scour hole upstream of dam following winter 2017 floods. Photo provided by NID

1.2.3 Previous Alternative Analyses

NID and ECORP are considering the following options to improve fish passage at Hemphill Dam. Several alternatives have been previously proposed to aid fish passage while leaving the existing dam in place. In 2009, Michael Love & Associates, in partnership with and Winzler & Kelly, proposed four fish passage alternatives for the Hemphill Diversion Structure, each of which would keep the existing dam in place. Two of their alternatives included a bypass fishway around the dam, and the other two entailed notching into the existing dam and installing a pool and chute fish ladder past the dam. Of the four alternatives proposed, NID identified a two stage fish ladder, installed in the main stem of the river, as the most desirable alternative. However, based on internal conversations, NID expressed concern that the structural integrity of the existing diversion would become compromised and would not support the pool-and-chute ladder, eventually requiring the entire dam to be replaced. We expand upon the feasible fish passage alternatives, including new alternatives that leave the existing dam in place, as well as new alternatives that replace the existing dam with a new grade control structure in section 3.

2 FIELD INVESTIGATION

On September 22, 2020 Amiana McEwen (Project Engineer with NHC) and Mitch Swanson (Senior Geomorphologist with NHC) met with Tonia Tabucchi Herrera (Senior Engineer with NID) and Doug Andrews (NID maintenance manager) at the Hemphill Dam Diversion. They reviewed the existing dam, banks, first few hundred feet of the irrigation canal, and geomorphic conditions upstream and downstream of the diversion structure.

2.1 Existing conditions

Existing Dam

During the September 22, 2020 site visit, we observed that the downstream edge of the dam's concrete apron constructed as part of the 1997 repair (Figure 1-3) was perched approximately 1.5 feet above the downstream channel, and the scour hole extended approximately 11 feet under the concrete apron(Figure 2-1 and Figure 2-2). Some of the wire mesh had become exposed within the shotcrete on top of the apron. It was also evident that there was seepage flow under the dam. Based on field observations, and Doug's recounting of the attempts to plug the dam with concrete, it is likely that another large flood event may further compromise the dam or cause it to fail entirely, given that its foundation is already compromised. Large woody debris had also accumulated on the dam's apron (Figure 2-3). NID noted that woody debris was common at this site, which may limit the feasibility of some in-channel fish passage designs.[2]

[2] For example, a traditional fish ladder (e.g. pool and chute or vertical slot) installed within the main stem of the river may become clogged and impassible with wood jams. On the other hand, a series of channel-spanning concrete weirs within the main stem of the river may be better suited for passing woody debris. Similarly, a bypass fishway, inset within the bank and around the existing dam, would be less susceptible to woody debris entrainment.

Figure 2-1. Erosion under the dam apron as of September 22, 2020. The apron was constructed after the 1997 flood, as shown in Figure 1-3. The photo on the left shows the apron perched approximately 1.5 feet above the downstream channel bed. The photo on the right shows that the scour hole extends approximately 11 feet under the dam; the wire mesh, that was originally encased in the shotcrete is becoming exposed on the apron's surface.

Figure 2-2. Looking under the dam apron – the foundation has eroded under the concrete encased boulders.

Figure 2-3. Large woody debris accumulated on the banks and the dam's apron

Existing Diversion

The existing Hemphill diversion canal is an open-channel, earthen-lined canal located on the south (left) bank approximately 40 feet upstream of the existing dam. The maximum diversion rate is 15 cfs; however, typical diversions are 8 cfs or less (NID, 2020). The canal's existing intake elevation is at 197.0', nearly a half foot below the existing dam's crest. According to NID, the canal is approximately 3,600 ft long before reaching the first point of use (i.e. service box) at an elevation of 189.0 ft. Over this 3,600 feet, the canal drops eight feet and has an average slope of 0.22%. Flow in the canal is provided during irrigation season when NID installs wooden flashboards along the crest of the dam, providing three feet of head to drive the diversion flow. Flow within the canal is then regulated with a slide gate at its intake; however, the canal is unscreened and does not exclude fish from entering the canal. There are several structures within the canal such as a culvert at the canal's entrance, a gaging station (Figure 2-4), several culverts that flow underneath the Turkey Creek Golf Club, and at least one check station before the first point of use. During a brief field visit in September 2020, we noticed that there was a significant hydraulic drop downstream of the Parshall flume gaging station, which can be seen in Figure 2-4, indicating that there is room to improve the canal's hydraulic efficiency, such as regrading a portion of the canal, lining the canal with smooth concrete, or piping a portion of the canal (discussed in Alternative 2).

Figure 2-4. Gaging station and Parshall flume within the Hemphill Diversion. Photo source: NHC

2.2 Geomorphic Conditions

NHC conducted a reconnaissance level analysis of geomorphic conditions at Hemphill Diversion Dam site and the immediate areas upstream and downstream. NHC reviewed current and historical information and reports directly related to Hemphill Diversion Dam and Auburn Ravine Creek. Current and historical aerials and maps were also examined. A field inspection was conducted with NID personnel knowledgeable in the history of the Hemphill Diversion Dam and watershed area. The following key findings were made to assist and support this fish passage engineering study.

1) The Hemphill Diversion Dam is acting as a channel bed grade control structure holding the channel bed artificially high for perhaps hundreds of feet of channel upstream. Completely removing the dam without countermeasures would likely cause head cutting erosion up to several feet deep at Hemphill Diversion Dam then dissipating upstream until channel longitudinal profile is smoothed. This incision would propagate upstream and lower the channel bed at least several feet over hundreds of feet upstream, unless there are shallow bedrock exposures or other grade controls; however these too could be undermined and have dramatic erosional effects. Downcutting the channel bed would increase already unstable bank heights and accelerate ongoing lateral bank erosion and channel expansion. It is also possible that lowered bed could cause undercutting of root zones in stable vegetated banks and cause new instabilities and erosion. Bank erosion is already very active in upstream areas. Up to 100 feet of lateral erosion has occurred between 2011 and 2019 on the north (right bank) upstream of Hemphill Diversion Dam. Similar and independent conclusions were reported by Balance Hydrologic's 2020 sediment transport report (discussed further in section 3.1).
2) Completely removing the Hemphill Diversion Dam and lowering of the channel bed upstream would also lower the water surface in the channel during the irrigation season, possibly affecting pumps and shallow groundwater wells. Lowering the channel bed and shallow groundwater table could also negatively affect natural bank vegetation by abruptly lowering groundwater levels below established root zones and reducing soil moisture during hot summer seasons.
3) The bed and bank materials at Hemphill Diversion Dam and upstream and downstream consist of highly erodible materials, mostly silty sand mining spoils from historic placer gold dredger mining from the mid 1800s to early 1900s. Mining was reportedly carried out by dredger from upstream to downstream. This dredger could reach through the depths of gold placer deposits and as a result the original natural valley fill sediments, which were likely a wide variety of sediments and sizes from boulders and cobbles to gravels, sand silt and clay were completely replaced with fine grained spoils left over from sluicing out gold. These spoils are highly erodible, fine grained materials with little to no clay content to bind soil particles. These spoils erode rapidly as evidenced by the eroding banks in the Hemphill Diversion Dam impoundment area and other areas upstream and downstream. The erosion around and under the Hemphill Diversion Dam in 1997, 2006, and 2017, as well as the extensive and repeated repair and installation of rip rap and cement armoring is further evidence of the high erodibility of materials and the low level of resistance to hydraulic forces in floods that can occur once every ten years (or less) on average.
4) The channel at and upstream of Hemphill Diversion Dam is unstable as a result of an ongoing, decadal response of the stream channel to historical modifications near the Hemphill Diversion Dam site and in the Auburn Ravine watershed. These cumulative direct and indirect changes are associated with mining, land reclamation / agricultural practices and urbanization. Auburn Ravine was likely placed in a straight ditch after placer mining in order to accommodate property lines, irrigation, and drainage works for agricultural uses. The straight channel became somewhat naturalized with dense bank vegetation and fairly abundant water during the growing season. Auburn Ravine just upstream of Hemphill Diversion Dam was reportedly a narrow, straight, well vegetated and stable channel until upset by the record 1997 flood and its

overwhelming hydraulic force and sediment load. Now the channel is still seeking a stable morphology along many reaches as evidenced by actively growing bars, bank erosion and the beginning of channel meandering at many locations upstream and downstream of Hemphill Diversion Dam.

5) The hydraulic and sediment transport discontinuity caused by the hard Hemphill Diversion Dam structure adds additional factors of systemwide instability. Of local importance to and the result of the Hemphill Diversion Dam, a large bar of flood deposited sediments formed in the January 1997 flood in the backwater /impoundment area just upstream of Hemphill Diversion Dam. The bar consists of sediments that could not be transported downstream likely due to reduced sediment transport capacity in the backwater and impoundment of Hemphill Diversion Dam. The bar has continued to grow laterally and vertically and is a significant obstruction to flood flows. With the middle of the channel blocked by the bar, the channel boundaries must be expanded to accommodate flood flows. The paths of least resistance are the eroding channel banks on north and south sides. As the bar is stabilized by vegetation, it continues to attract more sediment deposition and stability. The process of bar growth and channel widening through bank erosion continues as a self reinforcing process. As discussed above, completely removing Hemphill Diversion Dam would involve additional risks without countermeasures; however, partially lowering the dam (i.e. a new grade control structure) could improve sediment continuity and reduce the lateral forces on the banks upstream (see Alternative 2 in section 3.4.2).
6) In any scenario of removal, modification or replacement of Hemphill Diversion Dam, consideration of geomorphic and channel stability factors is essential to address the imbalances of bank resistance and the force of flood flows and sediment transport. Any protective measures must work with natural forces imposed on Hemphill Diversion Dam and the local channel reaches upstream and downstream.

3 NHC ANALYSIS AND RECOMMENDATIONS

3.1 Dam and Geomorphic Stability

Based on our review of existing documents, photographs, bathymetric survey data, and from the site visit on September 22, 2020, it is evident that the existing dam's foundation has become significantly compromised due to three major flood events, and through ongoing erosion processes. Only the concrete sill (Figure 1-1) is composed of structural concrete, and this structural concrete is relatively thin and sitting on a foundation of unreinforced concrete grout with likely voids (Section 2.1). Much of the downstream apron is composed of grouted riprap which has been undercut by downstream erosion and the 2006 and 2017 damage. Due to the previous performance, lack of structural concrete, and changes in site conditions since implementation of the original design, it is assumed cutting into any of the dam structure may have adverse impacts to its overall structural stability.

Downstream channel incision has gradually increased the height of the Hemphill Dam as the downstream channel deepened. As the height of the dam increases, the depth of local scour downstream caused by flow plunging over the dam also increases. Under existing conditions, the dam crest is 10.1 feet above the channel invert immediately downstream of the dam. The channel invert rises about 4.2 feet from the low point of the scour hole to the downstream channel (Figure 3-1). They hydraulic drop over the dam appears to be about 6 feet. Incorporating the hydraulic control point into a nature-like fishway (discussed in Alternatives 1 and 2) can significantly decrease the amount of elevation fish will have to overcome to navigate past Hemphill diversion.

As noted in Section 2.2, the dam also acts as a grade control structure, preventing incision upstream of the dam. A sediment transport report prepared by Balance Hydrologics in 2020 (Balance Hydrologics, 2020) evaluated several dam removal scenarios including partial removal and full removal at 2-year, 10-year, and 25-year flow events. Their findings indicate that completely removing the dam may induce one to seven feet of erosion up to about 1,300 feet upstream.

Balance Hydrologics (2020) showed lowering the dam crest by only two feet will promote sediment continuity over the dam limiting upstream deposition. The model results suggested about 1 foot of incision could occur along the left bank up to 500 feet upstream in select locations, while sediment deposition may occur up to approximately 1,000 feet downstream of the existing Hemphill dam. Improving sediment continuity over the dam would limit ongoing bar deposition and the resultant bank erosion upstream of the dam. The potential for limited incision upstream is unlikely to inhibit bank stability, while the deposition downstream may offset recent channel incision effects and possibly provide additional spawning habitat. As such, we recognize that lowering the dam crest by two feet may be an ideal solution for upstream channel stability if retrofitting the Hemphill diversion site.

3.2 Hydrology and Hydraulics

For the purpose of this report, NHC has not conducted an independent hydrologic or hydraulic analysis of the Auburn Ravine Watershed or the Hemphill site. An alternatives analysis by Michael Love and Associates & Winzler and Kelly completed in 2009 (MLA, 2009) included a preliminary hydrologic assessment of Auburn Ravine. The MLA (2009) study primarily relied on three reference reaches to build a flow duration curve of the Hemphill site since there was limited flow data on Auburn Ravine during non-diversion seasons. A high level review of the methods suggest the hydrologic flows are reasonable, although an additional 12 years of data is now available to improve estimates. For the purpose of this report, we have used the MLA (2009) data and have assumed that their hydrologic analysis is still reasonably accurate; however, it would be important to revisit and update the hydrologic analysis with more recent data before moving forward with more nuanced design calcuations. Updated flow data will be important for developing hydraulic models of the selected alternative; it will better inform the range of low and high fish passage flow rates; and it will ensure that the selected alternative is designed to withstand large flood events.

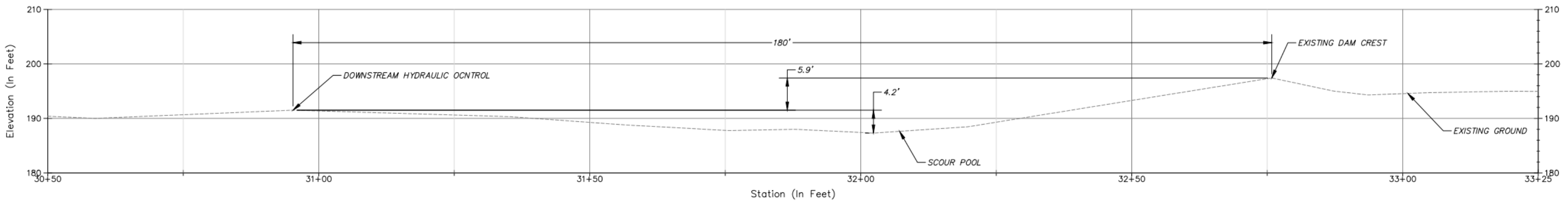

Figure 3-1. Channel profile downstream of the Hemphill Dam showing a scour pool and a hydraulic control point. There is a 5.9 ft elevation difference between the existing dam crest and the hydraulic control 180 ft downstream. There is a 10.1 ft elevation difference between the dam crest and the scour pool immediately downstream of the dam.

3.3 Design Species

In order to design an appropriate fish passage structure, it is imperative to identify the species and life stages for which the structure will be designed. Previous reports have identified adult and juvenile fall-run Chinook salmon and steelhead as the two primary species migrating at the Hemphill site. However, other species may also rely on passage past the dam, that should be considered in the design process. The dam has been identified as a total upstream passage barrier for adult resident trout, and a downstream passage barrier for kelts (adult steelhead that have spawned in the river and are returning to the ocean). NID mentioned that at a public meeting on September 21, 2020, members of the public raised concern about Pacific Lamprey passage at the dam. Friends of Auburn Ravine have confirmed that Pacific Lamprey are present in Auburn Ravine based on their monitoring camera at the Lincoln gaging station. Pacific Lamprey are migratory fish, and while they have similar habitat preferences to salmon, they are much weaker swimmers and have a difficult time navigating traditional fish ladders that are designed for salmon and steelhead (Foulds & Lucas, 2013). Lamprey are generally unable to overcome swift velocities (greater than 1-3 ft/sec), and cannot navigate the sharp angles and corners found in traditional fish ladders (Pacific Lamprey Technical Workgroup, 2017). Since lamprey are channel-bottom-oriented and attach to channel bed substrate using their oral discs, they need continuous, smooth, and rounded surfaces when navigating through a fishway. If Pacific Lamprey are identified as one of the design species, the fishway design will need to account for their weaker swimming abilities and preference for rounded surfaces (e.g. any concrete corners within the fishway must be rounded with a radius greater than or equal to 3-4 inches). In general, nature-like fishways such as chutes and pools (Alternative 1) and roughened rock ramps (Alternative 2) are better suited for a wider range of fish species and life stages.

3.4 Fish Passage Recommendations

In the following section, we present five fish passage alternatives. The fish passage options in alternatives 1 and 2 assume the existing dam is replaced with a new grade control structure. NID has indicated that replacing the dam with a new grade control structure may be prudent given the dam's continued issues with erosion, scour, and costly repair. Alternatives 3 through 5 assume the existing dam is left in place, thus the fish passage options in these alternatives are compatible with the existing dam. We do not recommend fully removing the dam unless NID is prepared to address significant upstream erosion and bank instability. As such, all of our fish passage alternatives assume some level of grade control structure is present at Hemphill site. Additionally, all of the following fish passage recommendations are working under the assumption that the fishway will be operational year-round.

3.4.1 Alternative 1: Nature-like Chutes and Pools

Alternative 1 consists of a nature-like roughened channel with chutes and pools, similar to the passage structure at the Lincoln Gaging Station farther downstream. This alternative entails removing the existing Hemphill Dam and replacing it with the nature-like chute and pool structure. The chute and pool structure would provide adequate fish passage while also maintaining the existing grade of Auburn

Ravine upstream of the dam. The crest of the chute and pool structure would be at the same elevation as the existing dam crest (without flashboards). This alternative is designed primarily to maintain the grade upstream of the dam, which is showing evidence of bank instability. However, it is important to note that a 2020 sediment transport report by Balance Hydrologics indicates that lowering the dam crest by two feet likely will not adversely affect the bank stability upstream (lowering the grade control structure crest will be presented in Alternative 2).

During our September 22, 2020 field visit with NID, Tonia Tabucchi Herrera mentioned that members of the public were interested in pursuing a fish passage structure similar to the Lincoln gaging station, located downstream from the Hemphill Diversion. The fish passage structure at the Lincoln gaging station is a nature-like fishway where fish passage provided by a series of channel-spanning concrete weirs and rock chutes constructed at a 4% slope.

Figure 3-2 shows a similar chute and pool structure as the Lincoln gaging station laid out at the Hemphill site. The widths and extents shown in the concept will require refinement at further levels of design. The chute and pool structure for the Hemphill diversion would have an overall slope of 4% over approximately 180 feet, providing 5.9 feet of elevation gain past the structure. The downstream end of the chute and pool structure would tie into a naturally-occurring hydraulic control approximately 180 feet downstream of the existing dam[3]. The chutes would have a slope of 8%, with drops ranging from 1 to 2 feet, while the drops across the pools will be 0 feet. Chute and pool structures are recommended when the passage structure needs to overcome elevation differences greater than five feet. Each pool dissipates energy and slows the velocity from the chute immediately upstream of it, while also providing resting zones for migrating fish. The bed of the chutes and pools will be comprised of engineered streambed material with a similar composition as the native streambed material. Due to its nature-like design, the chute and pool would meet the longitudinal connectivity needs of the target species and likely the seasonal distribution needs of other endemic fishes.

To maintain a stable grade throughout the structure, several channel-spanning sheetpile or concrete weirs, fortified with large boulders, are recommended. The weirs will keep the structure stable during high flow events to minimize detrimental erosion and scour within the structure. In order to determine the depth of weir embeddedness, we recommend conducting a geotechnical investigation beneath the surface of the proposed structure to determine the depth to bedrock and/or sediment composition of subsurface layers. The structure will be sized to remain stable up to the 100-year flood event.

To provide year-round fish passage, the crest of chute and pool structure will not require flashboards during irrigation season. Because of this, the entrance of the Hemphill diversion canal will need to be lowered by up to three feet. As such, a portion of the diversion canal will need to be regraded, starting at the entrance, which may affect certain structures within the canal (i.e. gaging station and culverts). Lowering the canal intake by three feet will still allow for an average diversion canal slope of 0.14%

[3] The elevation difference between the downstream hydraulic control and the crest of the existing dam is approximately 6.5 feet.

between the entrance and point of first use, which is reasonable and typical for an irrigation canal of this size. As shown in Figure 2-4, taking advantage of hydraulic inefficiencies, such as the drop downstream of the Parshall Flume, can partially make up for the effects of reprofiling a portion of the canal. Additionally, a portion of the canal can be piped with smooth-walled HDPE pipe or lined with smooth concrete to further improve hydraulic efficiency. We recommend completing a detailed topographic survey of the canal and performing a subsequent hydraulic analysis of its flow characteristics in order to determine the extents and parameters for regrading the canal.

To be compliant with CDFW fish passage and screening guidelines, we also recommend installing a fish screening structure at or near the entrance of the irrigation canal. Fish screening options are discussed in more detail in section 3.5.

There are a few shortfalls of this alternative that are worth considering. First, it is important to recognize that a meander has been steadily forming immediately upstream of the dam for the past several years (discussed in section 2.2, and independently verified by Balance Hydrologics' 2020 sediment transport report). Should the meander continue its current course, it is likely that the Hemphill Diversion may eventually be flanked if the meander is left untreated[4]. Matching the new grade control structure's elevation to the existing dam crest will likely cause this meander to continue forming due to sediment discontinuity. Lowering the structure's crest (as will be presented in Alternative 2), may promote better sediment continuity and relieve some of the upstream forces that are promoting the upstream meander, and dam erosion. A second shortfall is that lowering the elevation of the irrigation canal may cause additional sediment accumulation in the canal entrance. This could increase the operation and maintenance activity for the canal.

3.4.2 Alternative 2: Lower Grade Control Structure with Roughened Rock Ramp

Alternative 2 entails removing the existing Hemphill Dam and replacing it with a nature-like roughened rock ramp with the upstream crest elevation two feet lower than the existing dam crest. Figure 3-3 provides a conceptual planview and profile of this alternative. The extents of the concept are approximate, and will require refinement in further levels of design. The rock ramp structure would provide fish passage while also improving sediment continuity over the dam and likely improving bank stability upstream of the dam. Due to its nature-like characteristics, the rock ramp would aesthetically "blend in" with the natural riverine environment and resemble a typical riffle.

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[4] Similarly, if the existing dam is left in place, the meander may eventually flank the Hemphill Diversion if left untreated.

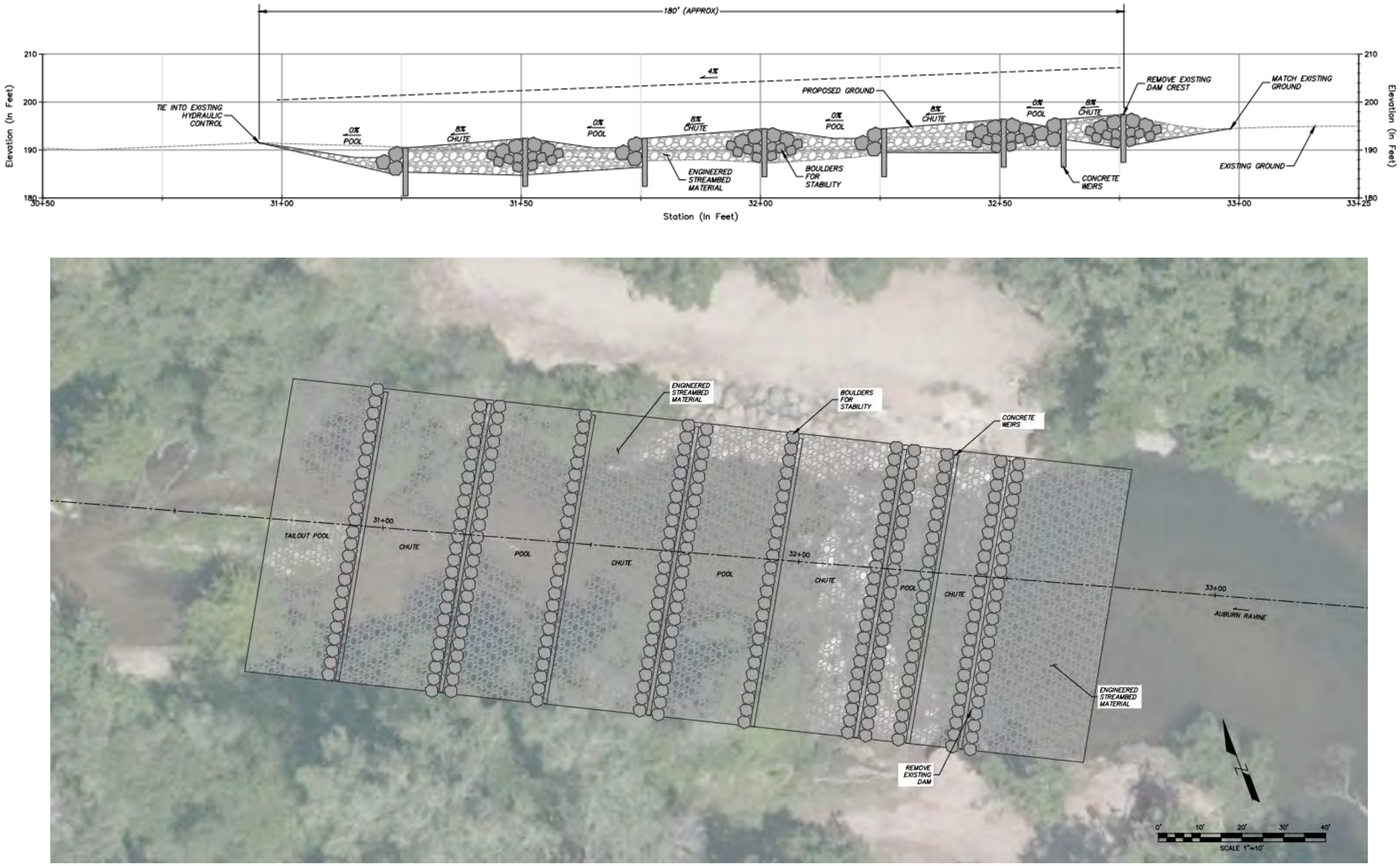

Figure 3-2. Profile and plan view of proposed chute and pool nature-like fishway (Alternative 1)

The roughened rock ramp would have an overall slope of 2.2% over approximately 180 feet, providing 3.9 feet of elevation gain past the structure. The downstream end of the ramp would tie into a naturally-occurring hydraulic control approximately 180 feet downstream of the existing dam[5]. The ramp would have a continuous slope, with no major pools, chutes, or jumps constructed within the ramp. Rock ramps are often limited to slopes less than 4% and are best for overcoming elevation differences of five feet or less. They rely on the swimming abilities of the fish, rather than the leaping abilities, making them better suited for passing a wider range of fish species and life stages, including those that have poor or no leaping abilities (e.g. Pacific Lamprey), and other non-anadromous, endemic fishes.

To maintain a stable grade throughout the structure, several channel-spanning boulder weirs are recommended. The weirs will keep the structure stable during high flow events to minimize detrimental erosion and scour within the structure. The boulders will be sized to remain stable up to the 100-year flood event. The bed material of the ramp would be comprised of engineered streambed material, such as gravels, sands, and cobbles, with similar sediment sizes characteristically found in Auburn Ravine. Roughness elements, such as large boulders protruding above the bed, could be constructed to provide slower wake zones downstream of the boulders. Commonly called “emergent boulders,” they provide low-velocity resting zones for fish migrating up the ramp.

To provide year-round fish passage, the crest of rock ramp will not require flashboards during irrigation season. Because of this, the entrance of the Hemphill diversion canal will need to be lowered by up to five feet. As such, a portion of the diversion canal will need to be regraded, starting at the entrance, which may affect certain structures within the canal (i.e. gaging station and culverts). Lowering the canal intake by five feet will still allow for an average diversion canal slope of 0.08% between the entrance and point of first use, which is at the low end for a typical gravity diversion, but not unreasonable for an irrigation canal of this size. As shown in Figure 2-4, taking advantage of hydraulic inefficiencies, such as the drop downstream of the Parshall Flume, can partially make up for the effects of reprofiling a portion of the canal. Additionally, a portion of the canal can be piped with smooth-walled HDPE pipe or lined with smooth concrete to further improve hydraulic efficiency. We recommend completing a detailed topographic survey of the canal and performing a subsequent hydraulic analysis of its flow characteristics in order to determine the extents and parameters for regrading the canal.

To be compliant with CDFW fish passage and screening guidelines, we also recommend installing a fish screening structure at or near the entrance of the irrigation canal. Fish screening options are discussed in more detail in section 3.5.

[5] The elevation difference between the downstream hydraulic control and the crest of the existing dam is approximately 5.9 feet. If the new grade control structure’s crest is lowered by two feet, the elevation difference will be 3.9 feet.

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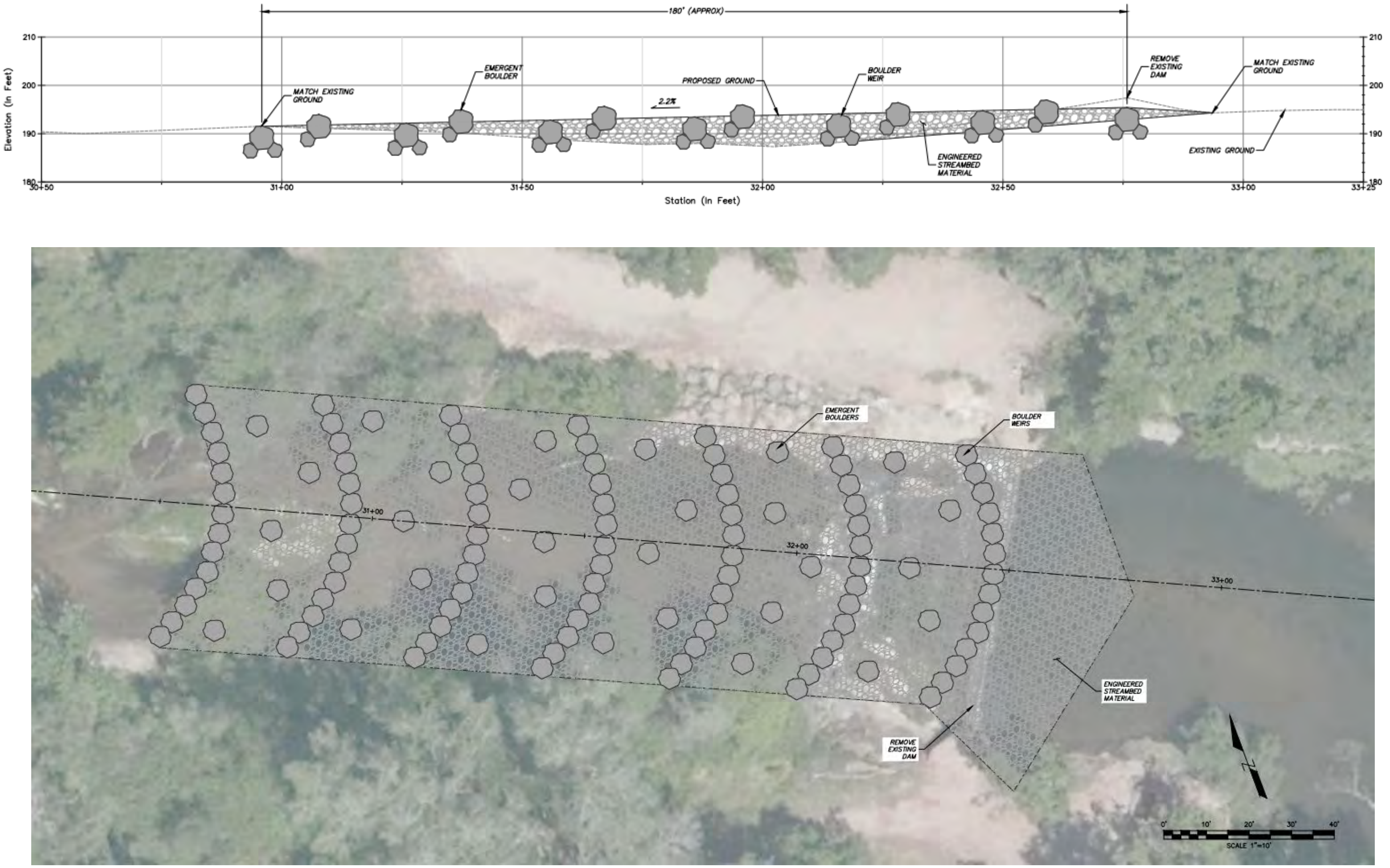

Figure 3-3. Profile and plan view of proposed roughened rock ramp (Alternative 2)

Based on the fish passage alternatives presented in this report, and other previous reports, we believe this alternative best meets all of the current needs at the Hemphill site. Alternative 2 would replace the existing dam with a more stable grade control structure. Lowering its crest by two feet would provide better sediment continuity, allowing impounded sediments upstream to deposit downstream, thus reversing some of the effects of channel incision and possibly providing suitable instream fish spawning habitat. Lowering the crest height by two feet would also have minimal erosion effects upstream while also relieving the lateral stress that is promoting the meander bend upstream. An elevation gain of 3.9 feet would be the least exhausting option for migrating fish compared to all of the other alternatives presented in this report.

3.4.3 Alternative 3: Vertical Slot Bypass Fishway

A vertical slot fishway is a traditional, technical fishway (Figure 3-4). It is constructed in a rectangular concrete channel with a downstream sloping floor, and is divided into a number of pools. Each pool is separated by concrete partition with a vertical slot extending to the floor. As water passes downstream through the fishway, fish are able to migrate upstream through the vertical slots. In vertical slot fishways, the water level is self-adjusting based on the flow rate through the structure allowing it to function both with and without flashboards installed on top of the existing dam.

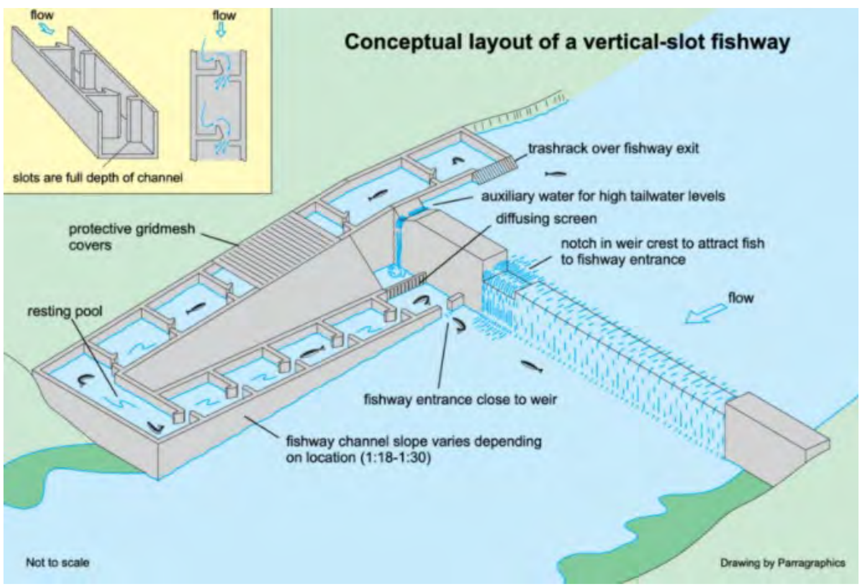

Figure 3-4. Schematic diagram of a vertical slot fishway bypassing a dam. Note that the fishway entrance is as far upstream as possible, which is preferable for migrating salmonids. Figure credit: Thorncraft & Harris, 2000

This alternative assumes the existing dam is left in place. The vertical slot fishway could be installed to bypass around the existing dam, and would be inset within the bank. This type of structure would not alter the existing dam structure, which would avoid further compromising it. Off-channel bypass fishways are generally less-susceptible to becoming clogged with debris since they are not in the main course of the river. This option could work on either the north or the south bank; however, NID expressed preference for the north bank for ease of access and maintenance. The vertical slot fishway would be constructed close to the dam within the scour pool immediately downstream, which is approximately 13 feet lower than the top of the flashboards during diversion season. This structure would not be able to tie into the existing hydraulic control approximately 170 feet downstream. For a slot width of one-foot (typical for salmonids), and an elevation gain of 13 feet, the overall migration pathway length would be approximately 130 feet long (Rajaratnam, Katopodis, & Solanki, 1992); however, as Figure 3-4 shows, a turning/resting pool would allow for the fishway footprint to be much shorter, instead of having a continuous linear 130-foot long structure. Vertical slot fishways are typically suitable for fish species with strong swimming abilities, such as salmonids. Weaker fish, such as lamprey, often have a harder time overcoming the fast through each of the vertical slots. However, some modifications, such as rounded corners, can be made to make the vertical slots more suitable for Pacific Lamprey to provide a continuous attachment point (Figure 3-5).

Figure 3-5. An example of a vertical slot fishway with rounded corners for Pacific Lamprey passage. Lamprey passage is improved in fishways when concrete corners are rounded with a 3-4 inch radius. Photo credit: Eugene Water and Electric Board

This alternative also assumes that flashboards will be installed across the dam crest during diversion season, thereby raising the upstream water surface elevation by three feet for portions of the year. Because the bypass fishway would be inset within the bank, maintenance would be less frequent compared to if it was installed within the main channel. However, with the narrow slots, debris entrainment will likely still occur which will reduce the fishway's functionality until the debris is removed. To minimize this, we recommend installing a trash rack on the upstream end (exit) of the fishway and frequently checking the fishway for blockages and sediment accumulation.

Since the existing structure will be left in place in this alternative, the addition of the vertical slot fishway should not put additional pressure on the dam. The dam will be operated as it currently is, flashboards and all. The dam and the fishway will act as two separate structures, not structurally tied to one another. Since the fishway would cut into the bank, the bank may be more susceptible to erosion (particularly, given the flood/erosion history of the dam site). This would be addressed using suitable bank armoring around the fishway. If the existing dam were to fail, it would likely be independent of whether or not an off-channel fishway is installed. Aside from adding a fish screen on the diversion, the diversion will mostly be left untouched; it will not have to be regraded like Alternatives 1 and 2.

A limitation of this alternative is the amount of elevation the fish will have to overcome when swimming past the dam. Even in a well-designed fish ladder, overcoming 13 feet of elevation can be physically taxing on a fish, which may lead to premature exhaustion. Additionally, this alternative does not address the failing structural stability of the existing dam, nor does it address the meander bend upstream that may eventually flank the Hemphill Diversion.

3.4.4 Alternative 4: Larinier Fishway

Alternative 4 entails installing a Larinier fishway. Larinier fishways are modified Denil fishways (Larinier, Travade, & Porcher, 2002; Armstrong, et al., 2010), and are typically designed for passing salmonids and sea trout in the United Kingdom. They are constructed with vertical walls – generally from concrete – and have steel herringbone baffles on the bottom. They also tend to have strong attraction flows. Given similar species characteristics with Chinook salmon and steelhead, this structure may be compatible with NID’s project objectives while also meeting fish passage requirements for salmonids. Larinier fishways can be constructed at a steep slope, up to approximately 15%, which reduces its overall footprint. We propose two Larinier fishway alternatives: 1) installing a Larinier fishway as a bypass around the dam, and 2) installing a seasonal, modular Larinier fishway over the existing dam.

Figure 3-6. Larinier fishway looking downstream. Note the vertical, smooth side walls, and the wide, baffled base. Photo credit: Aquatic Control Engineering

For the bypass Larinier fishway, we recommend a two-stage Larinier designed to bypass around the dam. Like the vertical slot fishway alternative, this alternative also assumes that flashboards will be installed across the dam crest during diversion season, thereby raising the upstream water surface elevation by three feet for portions of the year. As such, we recommend designed a two-stage fishway. A two-stage fishway allows the structure to be operational year-round. During non-diversion season (when flashboards are not installed along the dam crest), the lower stage of the fishway exit would be open. During diversion season (when flashboards are installed), the upper stage of the fishway exit would be open. A bypass Larinier fishway would be approximately 90 feet long at a 15% slope to account for 13 feet head drop during irrigation season (assuming three feet of flashboards are installed across the dam crest). The fishway could be installed on the north or south bank; however, based on comments from NID, the north (right) bank would be easier to access for maintenance. Because Larinier fishways can be designed as rather wide channels (their overall width can be highly variable), they are also generally less susceptible to debris entrainment, which would lower maintenance frequency. Additionally, insetting the Larinier structure within the bank would increase the susceptibility of flanking the dam during large flood events. To minimize flanking, we recommend heavily fortifying the banks surrounding the structure with grouted boulders or gabion baskets.

A removable, modular, in-stream Larinier fishway could potentially be installed on the existing dam. This would be a relatively low-cost option (compared to other alternatives in this report); however, not without possible complications. Given that the existing dam's foundation is highly compromised, we recommend a thorough structural analysis of the dam before pursuing this option. We do not recommend this option if the added weight of the Larinier structure will further compromise the dam. This temporary Larinier structure would be approximately 75-90 feet long at a variable 11-15% slope. The structure would be modular (to install and remove in pieces, rather than as an entire structure). During non-irrigation season, the Larinier structure would be flush with the existing dam crest. During irrigation season, the upstream side of the structure would be raised to account for the addition of flashboards across the dam. The downstream pivot point would remain the same. This option could provide year-round fish passage provided that the upstream portion of the fishway is raised and lowered depending on whether the flashboards are installed. Figure 3-7 shows an example of a temporary, removable fishway, installed during diversion season.

Figure 3-7. Example of a removable fishway structure on a diversion dam installed during diversion season (while flashboards are currently installed). Photo credit: NHC

While Larinier fishways are suitable for strong swimmers, such as adult salmon and steelhead, they are not as compatible for weaker swimmers such as lamprey. If Pacific Lamprey are identified as a target species, we recommend installing a studded tile fishway adjacent to the Larnier fishway (Figure 3-8). Similar to Larinier fishways, studded tile fishways have smooth, vertical walls; however, instead of metal herringbone plates, they have studded plastic plates along the bottom of the fishway. The studded plates are designed to be compatible with lamprey morphology by providing the lamprey with a continuous smooth attachment surface, while the studs provide energy dissipation (Lothian, Tummers, A, O'Brien, & Lucas, 2020; Tummers, et al., 2016).

Similar to Alternative 3, a limitation of this alternative is the amount of elevation the fish will have to overcome when swimming past the dam. Overcoming 13 feet of elevation can be physically taxing on a fish, which may lead to premature exhaustion. Additionally, this alternative does not address the failing structural stability of the existing dam, nor does it address the meander bend upstream that may eventually flank the Hemphill Diversion.

Figure 3-8. An example of studded tiles designed for lamprey passage. Photo credit: University of Southampton

3.4.5 Alternative 5: Pool and Chute

NID previously identified a possible fish passage solution presented by Michael Love and Associates (2009). This alternative entailed installing a concrete pool and chute ladder notched into the existing dam. We do not recommend installing a pool and chute fish ladder as they presented. The pool and chute ladder would require notching into the existing dam, which would further compromise its structural integrity, or rebuilding a channel wide structure. Additionally, given that the pool and chute ladder alternative is within the main course of the river, it would more susceptible to sediment and woody debris entrainment, increasing the frequency of maintenance relative to Alternatives 1 and 2.

3.4.6 Summary of Alternatives

Table 3-1 presents a summary of the proposed alternatives listed above. This table it intended to briefly summarize what each alternative entails as a broad overview. The opinion of probable cost is a rough order-of-magnitude approximation and is variable depending on inflation, current construction and supply rates, and final design. The cost does not include fish screening options; fish screening options are proposed in section 3.5.

Table 3-1. Summary of alternatives

Alternative	Maintenance Requirements	Require Dam Removal/Replacement	Require Regrading Irrigation Canal?	Instream Impacts	Permanent/ Seasonal	Opinion of Probable Cost*
Alt 1: Nature-like chute and pool	Inspect for scour and repair streambed material and boulders as necessary. Accessible from north bank.	Remove dam and construct a new grade control structure	Yes	Place chute and pool structure within main channel. Minimal upstream or downstream impacts	Permanent	$3.2 million
Alt 2: Roughened rock ramp	Inspect for scour and repair streambed material and boulders as necessary. Accessible from north bank.	Remove dam and construct a new grade control structure	Yes	Place rock ramp within main channel. Improved sediment transport conditions upstream of the dam, some local deposition in the channel downstream of rock ramp	Permanent	$2.9 million
Alt 3: Vertical slot ladder (bypass)	Clearing debris from ladder and trash rack. Accessible from north bank	Will **not** require dam removal or replacement	No	Minimal instream impacts	Permanent	$1.5 million[1] to $4.2 million[2]
Alt 4A: Larinier (bypass)	Occasional clearing debris from Larinier structure. Accessible from north bank	Will **not** require dam removal or replacement	No	Minimal instream impacts	Permanent	$1.5 million[1] to $4.2 million[2]
Alt 4B: Larinier (in-stream)	Adjust height of structure during irrigation and non-irrigation season. Accessible from north bank	Will **not** require dam removal or replacement	No	Minimal instream impacts	Permanent but seasonally adjusted	$750,000[1] to $3.5 million[2]
Alt 5: Concrete Pool and Chute Fish Ladder (in-stream)	Frequently clear pools of sediment and woody debris	Will require removing and replacing the dam with another concrete structure	No	Minimal instream impacts	Permanent	$5 million

*Opinion of Probable Cost are order of magnitude construction costs for a relative comparison of alternatives. Future stages of the design process will hone the Opinion of Probable Costs.

[1]Cost estimate assuming existing structure remains in place without repair or replacement.

[2]Cost estimate assuming the existing structure is removed and replaced as part of the project.

3.5 Fish Screening

While not part of this current scope, NHC and NID engineers briefly discussed the feasibility of incorporating a fish screen on the Hemphill Diversion entrance to exclude migratory salmonids and other native fish from entering the canal. NID expressed interest in adding a fish screen to the entrance of the existing diversion canal to exclude fish from entering the canal. Installing fish screens on the Hemphill diversion could be an alternative to existing alternatives of piping diversion flow from upstream or installing an infiltration basin and diversion pump along the bank (Kleinschmidt, 2016). Although the infiltration basin alternative would inherently provide fish screening; potential clogging of the basin by fine sediment could require costly maintenance relative to fish screens. Two fish screen options that would work with Alternatives 1 through 5 (elevations would have to be adjusted depending on alternative designed at the am) would be a flat plate screen (Figure 3-9) and a cone screen (Figure 3-10).

A flat plate screen could be installed on-channel (along the riverbank, parallel to the river's direction of flow) or in-canal (offset from the river located some distance down the diversion canal). Assuming a maximum diversion of 15 cfs, and 3 feet of submergence, the flat plate screen would be approximately 20 feet long. NHC opinion of probable cost for the materials and installation of a flat plate screen is approximately $400,000. A benefit of an in-canal flat plate screen is that should any major flood events flank the dam again, an in-canal screen would largely be protected from the flood, with relatively minor repairs to the diversion intake itself; however, it would require a bypass pipe to return any fish back to the river downstream of the dam. An in-canal screen also has the added benefit of being partially shielded from sediment accumulation. The screen could be designed to allow sediment to sweep past it and down the bypass pipe. The screen could also be perched on a concrete "mud sill" that would prevent sediment for directly impacting the screen itself.

An on-channel screen would not require a bypass pipe for fish, but it would be more susceptible to damage during a high flow event; it may also be inundated by sediment, especially if the diversion intake was lowered (Alternatives 1 and 2). Additionally, the flat plate screens may be overtopped during a high flow event allowing fish to pass over the top of the screens and into the canal. A cone screen, on the other hand, is fully submergible without allowing fish to enter the canal. An on-channel cone screen could be installed along the bank at the current diversion entrance; however, it is possible that fine sediment would inundate the screen. Assuming a maximum diversion of 15 cfs, and a fully-submerged screen, the base of the cone screen would be approximately 8 ft in diameter. NHC's opinion of probable cost for the materials and installation of a cone screen is approximately $300,000. Regardless of the final fish screen design, we recommend conducting a hydraulic analysis of the preferred alternative to understand the hydraulics and sediment transport in and around the screen.

Both screen options could likely be designed to either have a water-powered or electric (assuming on-site power) brush system. Figure 3-9 shows a water-driven paddle wheel that turns as water flows into the diversion, thus driving the screen brushes shown in the left-hand photo. The brushes on the cone screen in Figure 3-10 are driven by an internal water-powered impeller. If on-site power is available, the brush cleaning systems could be fully electric reducing headloss through the facility.

Figure 3-9. Example of a flat plate screen. NHC designed and installed this screen for Deer Creek Irrigation District in Tehama County, CA in 2019.

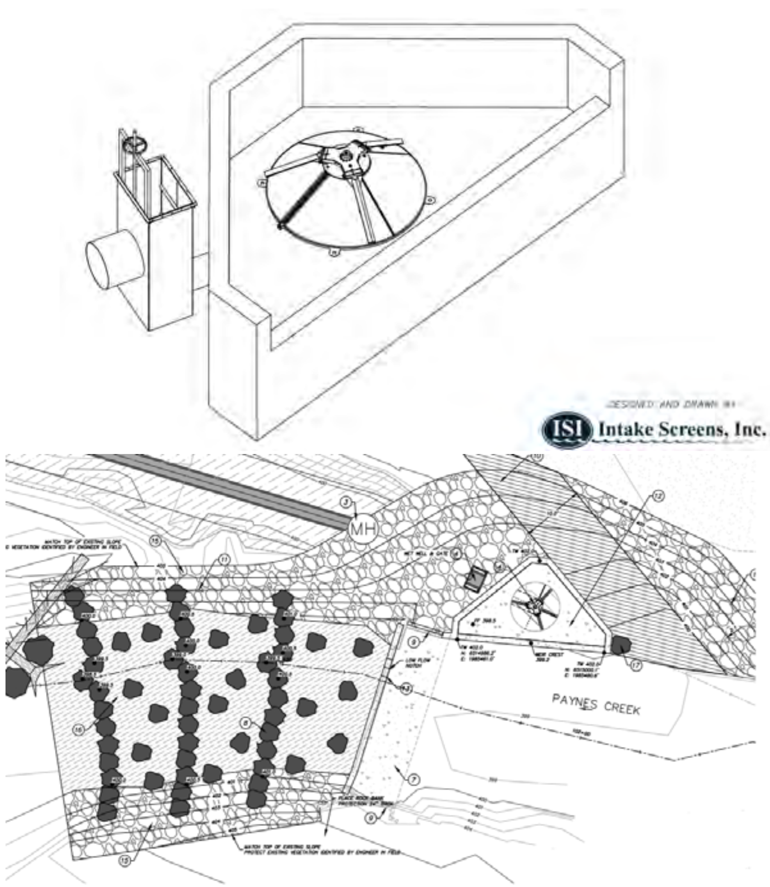

Figure 3-10. Example of a cone screen. NHC is currently designing this cone screen for Bend Water Users in Tehama County, CA

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APPENDIX 3.9

FHWA Roadway Noise Construction Model Data Outputs
(Federal Highway Administration, 2006)

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/2/2021
Case Description: Hempill Diversion - Alternative 1 Structure Removal

Description	**Affected Land Use**
Rural Residential	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Impact Pile Driver	Yes	20		101.3	200	0
Front End Loader	No	40		79.1	200	0
Front End Loader	No	40		79.1	200	0
Dump Truck	No	40		76.5	200	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Excavator		68.7	64.7
Excavator		68.7	64.7
Pumps		68.9	65.9
Pumps		68.9	65.9
Pumps		68.9	65.9
Impact Pile Driver		89.2	82.2
Front End Loader		67.1	63.1
Front End Loader		67.1	63.1
Dump Truck		64.4	60.4
	Total	89.2	**82.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date:	3/15/2021
Case Description:	Hempill Diversion - Alternative 1 Structure Removal

Description	**Affected Land Use**
Construction	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	430	0
Excavator	No	40		80.7	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Impact Pile Driver	Yes	20		101.3	430	0
Front End Loader	No	40		79.1	430	0
Front End Loader	No	40		79.1	430	0
Dump Truck	No	40		76.5	430	0

		Calculated (dBA)	
Equipment		***Lmax**	**Leq**
Excavator		62	58
Excavator		62	58
Pumps		62.3	59.2
Pumps		62.3	59.2
Pumps		62.3	59.2
Impact Pile Driver		82.6	75.6
Front End Loader		60.4	56.4
Front End Loader		60.4	56.4
Dump Truck		57.8	53.8
	Total	82.6	**76.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/2/2021
Case Description: Hempill Diversion - Alternative 1 Infiltration Gallery

Description	**Affected Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Front End Loader	No	40		79.1	200	0
Front End Loader	No	40		79.1	200	0
Dump Truck	No	40		76.5	200	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Excavator		68.7	64.7
Excavator		68.7	64.7
Pumps		68.9	65.9
Pumps		68.9	65.9
Pumps		68.9	65.9
Front End Loader		67.1	63.1
Front End Loader		67.1	63.1
Dump Truck		64.4	60.4
	Total	68.9	**73.6**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hempill Diversion - Alternative 1 Infiltration Gallery

Description	**Affected Land Use**
Construction	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	430	0
Excavator	No	40		80.7	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Front End Loader	No	40		79.1	430	0
Front End Loader	No	40		79.1	430	0
Dump Truck	No	40		76.5	430	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Excavator		62	58
Excavator		62	58
Pumps		62.3	59.2
Pumps		62.3	59.2
Pumps		62.3	59.2
Front End Loader		60.4	56.4
Front End Loader		60.4	56.4
Dump Truck		57.8	53.8
	Total	62.3	**66.9**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/3/2021
Case Description: Hemphill Diversion - Alternative 2 Site Preparation

Description	**Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Chain Saw	No	20		83.7	100	0
Chain Saw	No	20		83.7	100	0
Chain Saw	No	20		83.7	100	0
Chain Saw	No	20		83.7	100	0
Man Lift	No	20		74.7	100	0
Dump Truck	No	40		76.5	100	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Chain Saw		77.7	70.7
Chain Saw		77.7	70.7
Chain Saw		77.7	70.7
Chain Saw		77.7	70.7
Man Lift		68.7	61.7
Dump Truck		70.4	66.5
	Total	77.7	**77.2**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hemphill Diversion - Alternative 2 Site Preparation

Description	**Affected Land Use**
Construction	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Chain Saw	No	20		83.7	530	0
Chain Saw	No	20		83.7	530	0
Chain Saw	No	20		83.7	530	0
Chain Saw	No	20		83.7	530	0
Man Lift	No	20		74.7	530	0
Dump Truck	No	40		76.5	530	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Chain Saw		63.2	56.2
Chain Saw		63.2	56.2
Chain Saw		63.2	56.2
Chain Saw		63.2	56.2
Man Lift		54.2	47.2
Dump Truck		55.9	52
	Total	63.2	**62.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/2/2021
Case Description: Hemphill Diversion - Alternative 2 Phase 2 - Structure Removal and Fish Passage Installation

Description	**Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Crane	No	16		80.6	200	0
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Impact Pile Driver	Yes	20		101.3	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Front End Loader	No	40		79.1	200	0
Front End Loader	No	40		79.1	200	0
Dump Truck	No	40		76.5	200	0
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Dump Truck	No	40		76.5	200	0

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Crane	68.5	60.6
Excavator	68.7	64.7
Excavator	68.7	64.7

Impact Pile Driver		89.2	82.2
Pumps		68.9	65.9
Pumps		68.9	65.9
Pumps		68.9	65.9
Front End Loader		67.1	63.1
Front End Loader		67.1	63.1
Dump Truck		64.4	60.4
Excavator		68.7	64.7
Excavator		68.7	64.7
Dump Truck		64.4	60.4
	Total	89.2	**83**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hemphill Diversion - Alternative 2 Phase 2 - Structure Removal and Fish Passage Installation

Description	Affected Land Use
Construction	Residential

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	430	0
Excavator	No	40		80.7	430	0
Excavator	No	40		80.7	430	0
Impact Pile Driver	Yes	20		101.3	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Front End Loader	No	40		79.1	430	0
Front End Loader	No	40		79.1	430	0
Dump Truck	No	40		76.5	430	0
Excavator	No	40		80.7	430	0
Excavator	No	40		80.7	430	0
Dump Truck	No	40		76.5	430	0

Calculated (dBA)

Equipment	*Lmax	Leq
Crane	61.9	53.9
Excavator	62	58
Excavator	62	58
Impact Pile Driver	82.6	75.6
Pumps	62.3	59.2
Pumps	62.3	59.2

Pumps	62.3	59.2
Front End Loader	60.4	56.4
Front End Loader	60.4	56.4
Dump Truck	57.8	53.8
Excavator	62	58
Excavator	62	58
Dump Truck	57.8	53.8
Total	82.6	**76.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/3/2021
Case Description: Hemphill Diversion - Alternative 2 - Phase 3 Diversion Ditch Preparation

Description	**Affected Land Use**
Costruction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Crane	No	16		80.6	200	0
Excavator	No	40		80.7	200	0
Concrete Mixer Truck	No	40		78.8	200	0
Concrete Mixer Truck	No	40		78.8	200	0

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Crane	68.5	60.6
Excavator	68.7	64.7
Concrete Mixer Truck	66.8	62.8
Concrete Mixer Truck	66.8	62.8
Total	68.7	**69**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hemphill Diversion - Alternative 2 - Phase 3 Diversion Ditch Preparation

Description	Affected Land Use
Construction	Golf Course

Description	Impact Device	Usage(%)	Equipment Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Crane	No	16		80.6	430	0
Excavator	No	40		80.7	430	0
Concrete Mixer Truck	No	40		78.8	430	0
Concrete Mixer Truck	No	40		78.8	430	0

Calculated (dBA)

Equipment		*Lmax	Leq
Crane		61.9	53.9
Excavator		62	58
Concrete Mixer Truck		60.1	56.1
Concrete Mixer Truck		60.1	56.1
	Total	62	**62.3**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/30/2021
Case Description: Hemphill Diversion - Alternative 2 - Culvert Replacement

Description	**Land Use**
Culvert Replacement	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Crane	No	16		80.6	50	0
Excavator	No	40		80.7	50	0
Concrete Mixer Truck	No	40		78.8	50	0

		Calculated (dBA)	
Equipment		***Lmax**	**Leq**
Crane		80.6	72.6
Excavator		80.7	76.7
Concrete Mixer Truck		78.8	74.8
	Total	80.7	**79.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/3/2021
Case Description: Hempill Diversion - Alternative 3 Structure Removal

Description	**Affected Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	200	0
Excavator	No	40		80.7	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Pumps	No	50		80.9	200	0
Impact Pile Driver	Yes	20		101.3	200	0
Front End Loader	No	40		79.1	200	0
Front End Loader	No	40		79.1	200	0
Dump Truck	No	40		76.5	200	0

		Calculated (dBA)	
Equipment		***Lmax**	**Leq**
Excavator		68.7	64.7
Excavator		68.7	64.7
Pumps		68.9	65.9
Pumps		68.9	65.9
Pumps		68.9	65.9
Impact Pile Driver		89.2	82.2
Front End Loader		67.1	63.1
Front End Loader		67.1	63.1
Dump Truck		64.4	60.4
	Total	89.2	**82.8**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hempill Diversion - Alternative 3 Structure Removal

Description	**Affected Land Use**
Construction	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Excavator	No	40		80.7	430	0
Excavator	No	40		80.7	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Pumps	No	50		80.9	430	0
Impact Pile Driver	Yes	20		101.3	430	0
Front End Loader	No	40		79.1	430	0
Front End Loader	No	40		79.1	430	0
Dump Truck	No	40		76.5	430	0

Calculated (dBA)

Equipment	***Lmax**	**Leq**
Excavator	62	58
Excavator	62	58
Pumps	62.3	59.2
Pumps	62.3	59.2
Pumps	62.3	59.2
Impact Pile Driver	82.6	75.6
Front End Loader	60.4	56.4
Front End Loader	60.4	56.4
Dump Truck	57.8	53.8
Total	82.6	**76.1**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/3/2021
Case Description: Hemphill Diversion - Alternative 3 Pipeline Installation

Description	**Affected Land Use**
Construction	Residential

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Concrete Mixer Truck	No	40		78.8	50	0
Concrete Pump Truck	No	20		81.4	50	0
Excavator	No	40		80.7	50	0
Front End Loader	No	40		79.1	50	0
Excavator	No	40		80.7	50	0
Front End Loader	No	40		79.1	50	0
Roller	No	20		80	50	0
Flat Bed Truck	No	40		74.3	50	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Concrete Mixer Truck		78.8	74.8
Concrete Pump Truck		81.4	74.4
Excavator		80.7	76.7
Front End Loader		79.1	75.1
Excavator		80.7	76.7
Front End Loader		79.1	75.1
Roller		80	73
Flat Bed Truck		74.3	70.3
	Total	81.4	**83.9**

*Calculated Lmax is the Loudest value.

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 3/15/2021
Case Description: Hemphill Diversion - Alternative 3 Pipeline Installation

Description	**Affected Land Use**
Construction	Golf Course

Description	**Impact Device**	**Usage(%)**	**Equipment Spec Lmax (dBA)**	**Actual Lmax (dBA)**	**Receptor Distance (feet)**	**Estimated Shielding (dBA)**
Concrete Mixer Truck	No	40		78.8	530	0
Concrete Pump Truck	No	20		81.4	530	0
Excavator	No	40		80.7	530	0
Front End Loader	No	40		79.1	530	0
Excavator	No	40		80.7	530	0
Front End Loader	No	40		79.1	530	0
Roller	No	20		80	530	0
Flat Bed Truck	No	40		74.3	530	0

Calculated (dBA)

Equipment		***Lmax**	**Leq**
Concrete Mixer Truck		58.3	54.3
Concrete Pump Truck		60.9	53.9
Excavator		60.2	56.2
Front End Loader		58.6	54.6
Excavator		60.2	56.2
Front End Loader		58.6	54.6
Roller		59.5	52.5
Flat Bed Truck		53.7	49.8
	Total	60.9	**63.4**

*Calculated Lmax is the Loudest value.

TRAFFIC NOISE LEVELS

Project Number: 2020-104
Project Name: Hemphill Diversion Structure

Background Information

Model Description: FHWA Highway Noise Prediction Model (FHWA-RD-77-108) with California Vehicle Noise (CALVENO) Emission Levels.
Analysis Scenario(s): X
Source of Traffic Volumes: X
Community Noise Descriptor: L_{dn}: ______ CNEL: X

Traffic Noise Levels

Analysis Condition / Roadway Segment	Affected Land Use	Lanes	Median Width	Peak Hour Volume	ADT Volume	Design Speed (mph)	Dist. from Center to Receptor[1]	Alpha Factor	Barrier Attn. dB(A)	Peak Hour dB(A) L_{eq}	24-Hour dB(A) CNEL	Traffic Volumes 24-Hour Day	Eve	Night	Peak Hour MTp	HTp	24-Hour MTd	HTd	MTe	HTe	MTn	HTn	Ref. Energy Level A	MT	HT	Dist Adj
Alternative 1 - Structure Removal & Infiltration Gallery Installation																										
Virginatown Rd & Fowler Rd	Residential	2	0	6	42	35	25	0	0	**60.1**	57.8	33	5	4	0	0	1	0	0	0	0	0	80.0	74.8	80.0	3.1
SR 193	Residential	2	0	5	42	60	25	0	0	**57.0**	55.5	33	5	4	0	0	1	0	0	0	0	0	80.0	80.8	84.5	3.1
Alternative 2 - Phase 1																										
Virginatown Rd & Fowler Rd	Residential	2	0	3	20	35	25	0	0	**57.0**	54.6	16	3	2	0	0	0	0	0	0	0	0	80.0	74.8	80.0	3.1
SR 193	Residential	2	0	3	20	60	25	0	0	**54.8**	52.3	16	3	2	0	0	0	0	0	0	0	0	80.0	80.8	84.5	3.1
Alternative 2 - Phase 2																										
Virginatown Rd & Fowler Rd	Residential	2	0	2	17	35	25	0	0	**55.3**	53.8	13	2	2	0	0	0	0	0	0	0	0	80.0	74.8	80.0	3.1
SR 193	Residential	2	0	2	17	60	25	0	0	**53.1**	51.6	13	2	2	0	0	0	0	0	0	0	0	80.0	80.8	84.5	3.1
Alternative 2 - Phase 3																										
Virginatown Rd & Fowler Rd	Residential	2	0	4	28	35	25	0	0	**58.3**	56.0	22	4	3	0	0	0	0	0	0	0	0	80.0	74.8	80.0	3.1
SR 193	Residential	2	0	4	28	60	25	0	0	**56.1**	53.8	22	4	3	0	0	0	0	0	0	0	0	80.0	80.8	84.5	3.1
Alternative 3 - Structure Removal & Pipe Installation																										
Virginatown Rd & Fowler Rd	Residential	2	0	2	26	35	25	0	0	**55.3**	55.7	20	3	2	0	0	0	0	0	0	0	0	80.0	74.8	80.0	3.1
Fruitvale Road	Residential	2	0	1	7	35	25	0	0	**52.3**	50.0	5	1	1	0	0	0	0	0	0	0	0	80.0	74.8	80.0	3.1
SR 193	Residential	2	0	2	26	60	25	0	0	**53.1**	53.5	20	3	2	0	0	0	0	0	0	0	0	80.0	80.8	84.5	3.1

The Reference Sound Energy Level has been adjusted to account for 100% truck trips
Average Daily Trip volumes are based on calculated Total Trips divided by the anticipated amount of days in each scenario
Peak Hour Trip volumes are calculated by dividing the Average Daily Trips over eight hours of construction