ATTACHMENT G

JURISDICTIONAL DELINEATION REPORT

BonTerra PSOMAS

Jurisdictional Delineation Report

Arroyo Seco Canyon Project
City of Pasadena
Los Angeles County, California

Prepared for

Carollo Engineers, Inc
199 South Los Robles Avenue, Suite 530
Pasadena, California 91101
Contact: Inge Wiersema, P.E.

Prepared by

BonTerra Psomas
225 South Lake Avenue, Suite 1000
Pasadena, California 91101
Contact: David Hughes, Senior Project Manager
Regulatory Services
T: (626) 351-2000 F: (626) 351-2030

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EXECUTIVE SUMMARY

The purpose of this report is to document baseline conditions of existing jurisdictional resources in the upper Arroyo Seco within four discrete areas for the Arroyo Seco Canyon Proposed Project. The Arroyo Seco Canyon Proposed Project consists of (1) restoring and improving water intake facilities; (2) modifying the existing sediment-removal mechanism; (3) naturalizing a portion of the Arroyo Seco streambed; (4) expanding recharge operations by creating additional spreading basins; (5) constructing new recreational and educational amenities; and (6) constructing a new reduced size parking lot at the existing Jet Propulsion Laboratory (JPL) parking site for those using the Arroyo Seco Canyon and Hahamongna Watershed Park areas. Jurisdictional resources considered for this report include wetlands and non-wetland "waters of the U.S." regulated by the U.S. Army Corps of Engineers (USACE) and the Los Angeles Regional Water Quality Control Board (RWQCB), as well as the bed, bank, and channel of all rivers and streams (and associated riparian trees), as regulated by the California Department of Fish and Wildlife (CDFW).

The jurisdictional delineation work was performed by BonTerra Consulting Regulatory Specialist David Hughes and BonTerra Consulting Biologist Dani Henning on May 10 and September 26, 2013.[1] The Arroyo Seco Canyon Project is located within the County of Los Angeles on the U.S. Geological Service's Pasadena 7.5-minute quadrangle maps.

Wetland features were identified based on the USACE's three-parameter approach in which wetlands are defined by the presence of hydrophytic vegetation, hydric soils, and presence of wetland hydrology indicators. The limits of non-wetland "waters of the U.S." were identified by the presence of an ordinary high water mark. The limits of CDFW jurisdictional waters were identified as the top of bank or the outer drip line of riparian vegetation.

Based on the results of the jurisdictional delineation field work, the total acreage of jurisdictional resources within the survey areas are summarized below along with the proposed permanent and temporary impacts to these resources:

- **USACE Jurisdiction.** 6.35 total acres of non-wetland "waters of the U.S." (0.48 acre of permanent impacts and 3.67 acres of temporary impacts).
- **RWQCB Jurisdiction.** 10.22 total acres of "waters of the State" (0.48 acres of permanent impacts and 7.54 acres of temporary impacts).
- **CDFW Jurisdiction.** 8.48 total acres of CDFW jurisdictional waters (0.60 acre of permanent impacts and 7.88 acres of temporary impacts).

[1] Although BonTerra Consulting merged with Psomas and became "BonTerra Psomas" as of January 1, 2014, "BonTerra Consulting" is still used throughout this document for all work completed and documents produced before January 1, 2014.

SECTION 1.0 INTRODUCTION

This Jurisdictional Delineation Report (report) has been prepared for the City of Pasadena to provide baseline data concerning the type and extent of resources under the jurisdiction of the U.S. Army Corps of Engineers (USACE), the California Department of Fish and Wildlife (CDFW), and the Regional Water Quality Control Board (RWQCB) for the Arroyo Seco Canyon Project (hereinafter referred to as "the proposed Project"). This Jurisdictional Delineation Report is based on the jurisdictional delineation surveys performed on May 10 and September 26, 2013.

1.1 PROJECT LOCATION

The proposed Project site is located along the upper Arroyo Seco in the City of Pasadena (City), within Hahamongna Watershed Park, extending from approximately 0.5 mile north to 0.25 mile east of the Jet Propulsion Laboratory (JPL) (Exhibit 1). It is located on the U.S. Geological Survey's (USGS') Pasadena 7.5-minute quadrangle of the San Bernardino Meridian at Township 2 North, Range 12 West, Section 31 and Township 1 North, Range 2 West, Sections 5 and 6 (Exhibit 2). The study area for this jurisdictional delineation consists of three discrete areas that include (from north to south): Area 1, the Arroyo Seco Headworks; Area 2, the Arroyo Seco Intake; and Area 3, the JPL East Parking Lot (Exhibit 3). The topography surrounding the Arroyo Seco generally consists of steep canyon walls in Areas 1 and 2, while Area 3 is located near the top end of Devil's Gate Reservoir where the topography becomes noticeably more flat. The temporary staging site is located in an area of steep slopes. Elevations in the study area range from 1,100 to 1,250 feet above mean sea level (msl).

The proposed Project area can be accessed via Interstate 210, exiting Windsor Avenue and traveling northward for approximately 0.8 mile. The entrance to the JPL East Parking Lot is located at the intersection of Windsor Avenue and Ventura Street. The parking lot (Area 3) is reached by continuing down the entrance road for approximately 0.25 mile. Areas 1 and 2 are located approximately 0.7 and 0.4 mile, respectively, north of Area 3 and can be reached by walking or driving on Arroyo Seco Road (Gabrielino Trail), which extends from the northern end of the JPL East Parking Lot. The temporary staging site is approximately 0.1 mile north of Area 3.

1.2 EXISTING CONDITIONS

The Arroyo Seco is an important source of drinking water supply for the City. The City of Pasadena Department of Water and Power (PWP) owns the right to divert up to 25 cubic feet per second (cfs) of surface water from the Arroyo Seco into the City's spreading basins located along the east side of the Arroyo Seco, upstream of Devil's Gate Dam. An additional 7 cfs of surface water rights from Millard Creek, which is a tributary to the Arroyo Seco, are held by the Lincoln Avenue Water Company (LAWC). Through the spreading basins, the PWP and LAWC use the surface water to recharge the underlying Raymond Groundwater Basin for future extraction.

PWP currently operates several structures in Arroyo Seco Canyon that capture and convey stream water to a series of groundwater recharge basins that are located in the vicinity of the proposed Project. These facilities include the Arroyo Seco Headworks structure and adjacent sedimentation basins; the Arroyo Seco Intake Dam; and the associated pipelines that convey water to the existing spreading basins. A large number of these facilities were entirely or severely damaged due to debris flows following the Station Fire in 2009.

1.3 PROJECT DESCRIPTION

The proposed Project will increase the utilization of surface water rights held by the PWP by restoring and improving the intake facilities; modifying the existing sediment removal mechanism; naturalizing the Arroyo Seco streambed; and expanding recharge operations by

Local Vicinity

Exhibit 1

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

2,000 1,000 0 2,000 Feet

BonTerra CONSULTING

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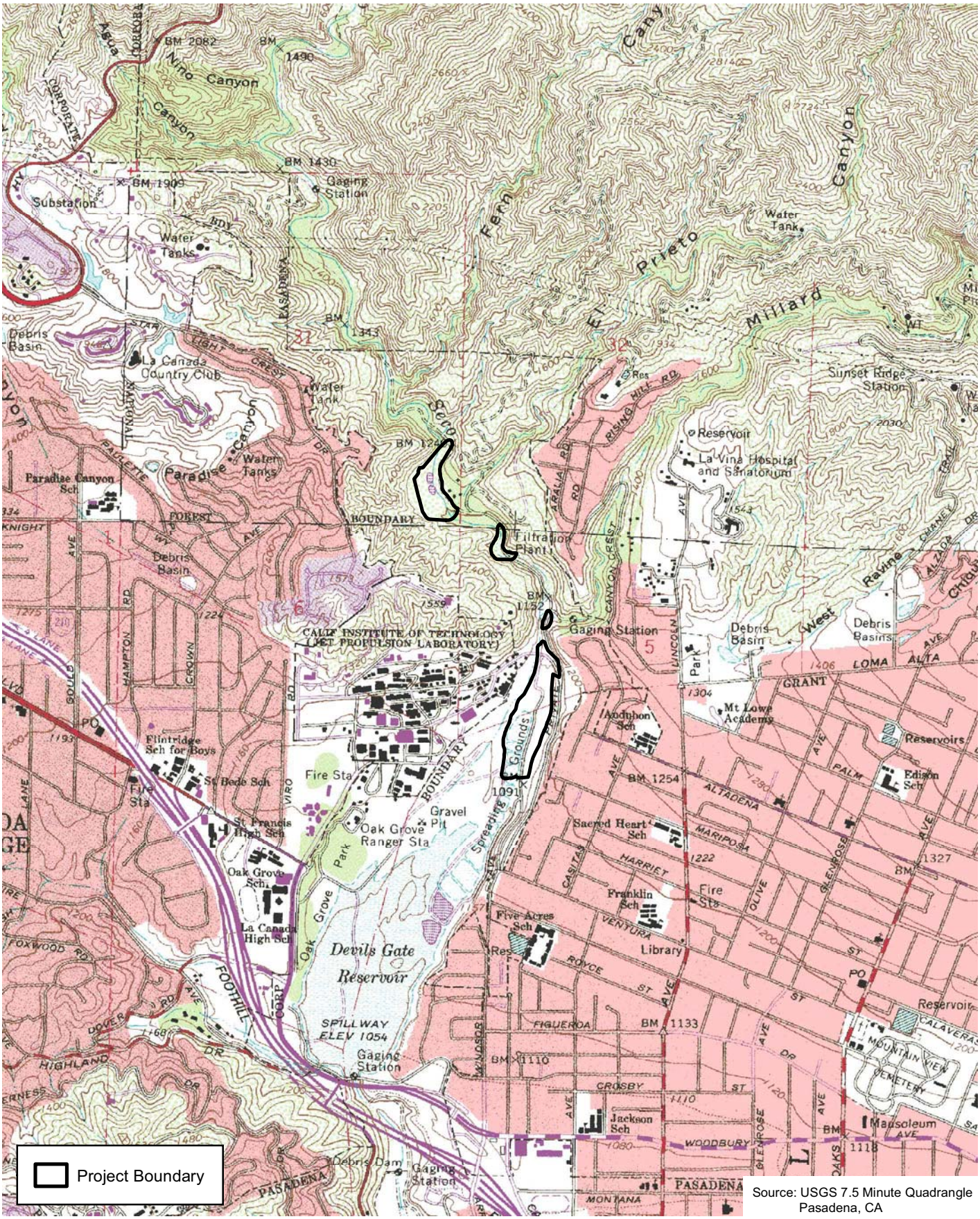

Source: USGS 7.5 Minute Quadrangle
Pasadena, CA

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USGS Quadrangle

Exhibit 2

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

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Feet

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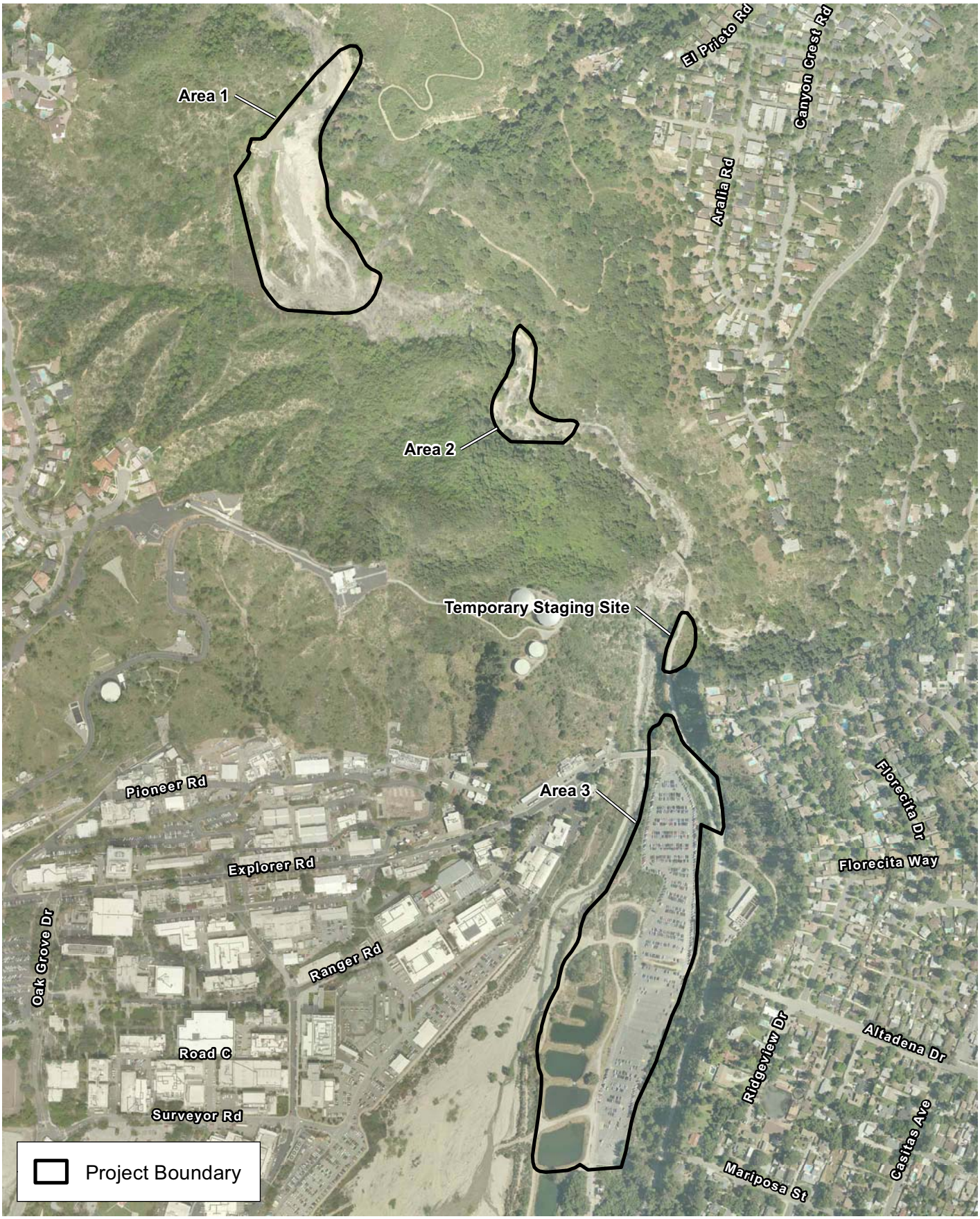

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Survey Areas

Exhibit 3

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

600 300 0 600 Feet

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creating additional spreading basins. In addition, the proposed Project is planned to include new recreational and educational amenities near the headworks structure, as well as a new reduced-sized parking lot at the existing JPL parking site for those using the Arroyo Seco Canyon and Hahamongna Watershed Park areas. A detailed description of current conditions and proposed activities at each of the three Project areas described above is provided below.

Area 1 – Arroyo Seco Headworks

Area 1 is the northernmost and furthest upstream area, primarily located in the low- to mid-level floodplain of the Arroyo Seco. This area includes the existing headworks structure across the stream that was designed to divert flows into adjacent sedimentation basins to reduce the amount of suspended solids in the stream flow. The headworks and sedimentation basins were substantially damaged due to the debris flows following the 2009 Station Fire and are essentially non-functional facilities. The United States Forest Service (USFS) Ranger Station, which includes three dwelling units providing housing for USFS Rangers, is located just east of the trail. Dominant vegetation in this area consists of white alder (*Alnus rhombifolia*), coast live oak (*Quercus agrifolia*), western sycamore (*Platanus racemosa*), black cottonwood (*Populus trichocarpa*), black willow (*Salix gooddingii*), and arroyo willow (*Salix lasiolepis*).

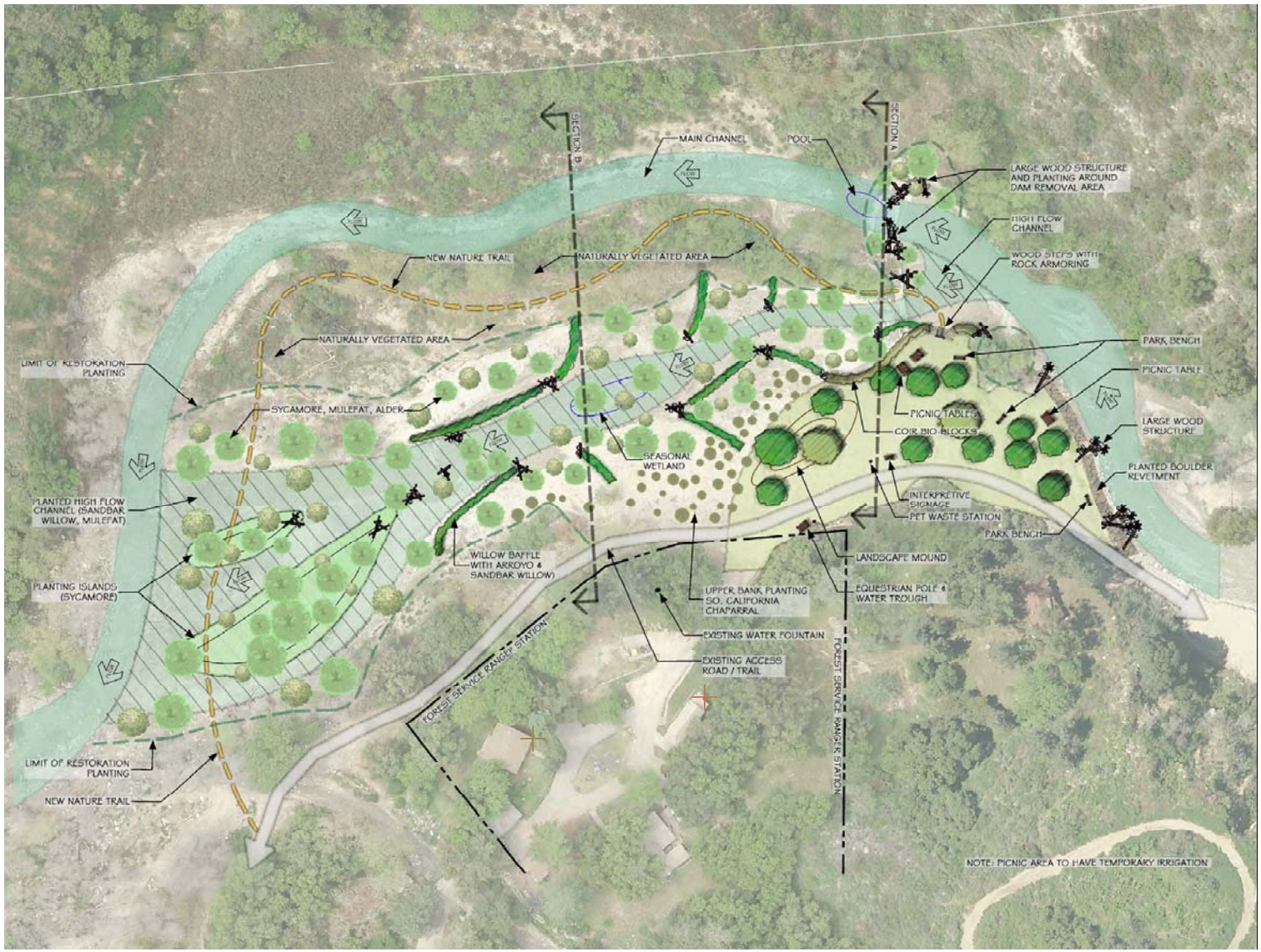
The proposed Project intends to remove the existing headworks structure; to perform minor grading to establish a defined channel; to create a meandering, at-grade pedestrian trail; to install picnic tables; and to establish native landscaping to enhance approximately six acres of the Arroyo Seco floodplain where the sedimentation basins described above were located. The conceptual design and cross-sections for Area 1 are provided in Exhibits 4 and 5. Stream restoration would involve native plant revegetation and invasive species removal on approximately 1,000 linear feet of streambed. In addition, the proposed Project includes the reconstruction of the existing rock bank revetment; bank stabilization using coir (coconut fiber) blocks; creation of planting islands; and installation of woody debris clusters.

The large wood structures would be made of raw logs available from nearby lumber mills or down trees that are not rotten, and would be anchored and bolted together into woody debris clusters. These clusters would be positioned to collect debris at the edge of the stream below the two-year water surface elevation. At points of high velocities and shear forces, these clusters would be kept in place with boulders.

This new trail is proposed to begin in the lower portion of Area 1, meandering between the Arroyo Seco main channel and the recreated riparian zone, across the stream at the northern section, with steps leading to the rest area/picnic area. The trail would be approximately three feet wide and would be constructed on the existing ground through the clearing of brush and debris.

Area 2 – Arroyo Seco Intake

Area 2 is located approximately 0.3 mile downstream from the Arroyo Seco Headworks and contains a diversion weir and intake structure; an equipment building; the Gabrielino Trail (access road); and a historic A-frame bridge over the Arroyo Seco. The PWP operates the diversion weir and intake diversion structure, which can withdraw up to 32 cfs of water. Upon entering the intake, the water is piped downstream, traveling approximately 3,000 feet where it is delivered to PWP's spreading basins in Area 3. The diversion structure consists of a retaining wall on the east bank of the stream, which is approximately nine feet tall and constructed of reinforced concrete. Near the downstream end of the retaining wall is a reinforced concrete diversion weir, placed perpendicular to the direction of the stream flow to allow water to flow into the intake structure when the weir is raised. The intake is located immediately upstream of the diversion weir and extends through the left bank retaining wall, protected by a steel trash rack. Dominant vegetation in this area consists of mature white alders, coast live oaks, and western sycamores.



Source: Carollo 2013

Proposed Improvements – Area 1

Exhibit 4

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

0 50 100 Feet

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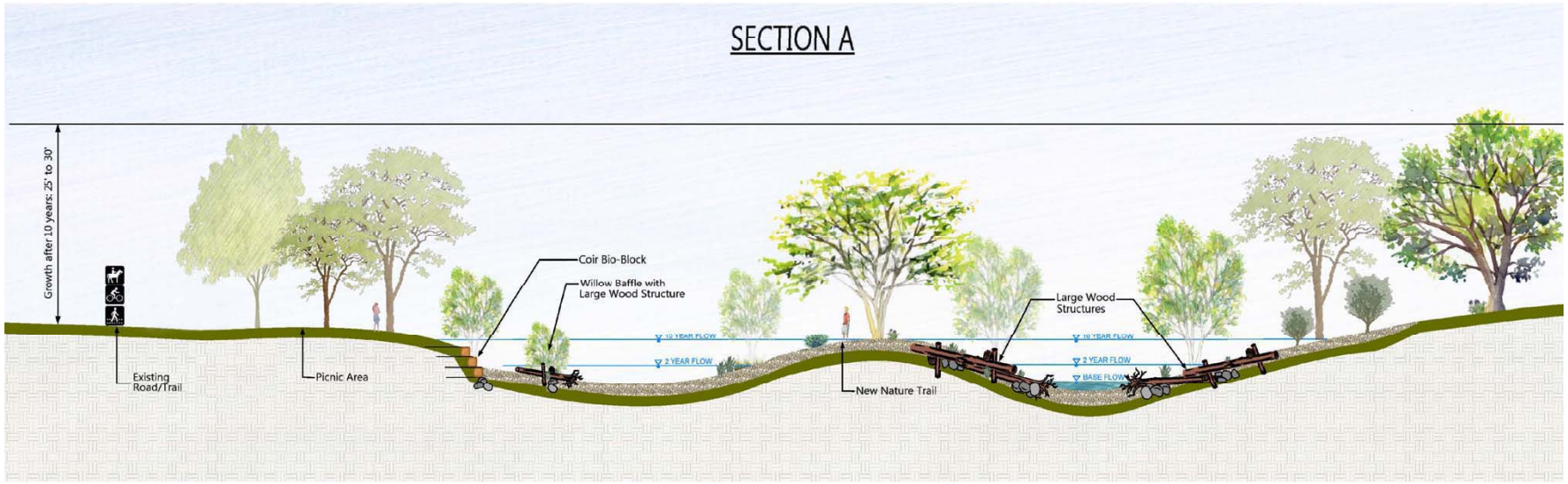

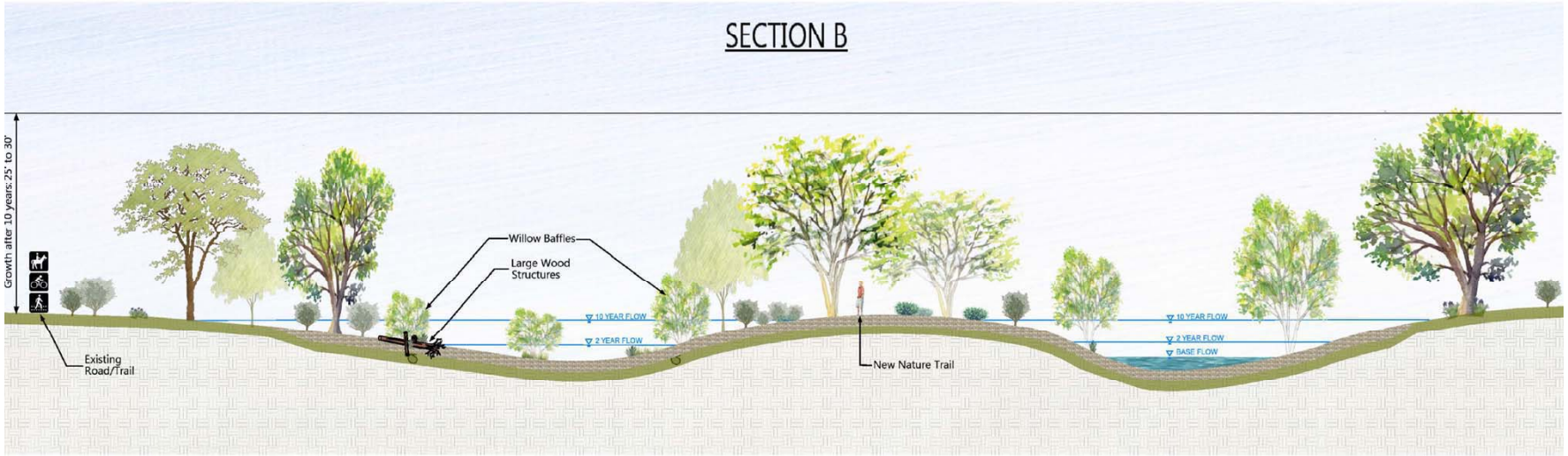

Source: Carollo 2013

Proposed Final Condition – Area 1 Cross Section

Exhibit 5

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

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Proposed improvements in Area 2 include the replacement of the diversion weir and intake structures and reconstruction of the adjacent access road. The access road south of the intake structure in Area 2 would be stabilized through the reconstruction of the slope and the provision of protective riprap. The road would be repaved with asphalt, and the existing river rock wall would be extended from the A-frame bridge at the downstream end of this site to the diversion structure.

The existing diversion structure would be replaced with either a pneumatically operated spillway gate or a crest gated spillway (Exhibit 6). Either option would allow an increase in the amount of water that could be diverted to the spreading basins in Area 3 to better manage sediment build up behind the diversion structure. The gate/weir would have a sluice or slide gate (with an electric or a hydraulic actuator), a 35-foot wide and 10-foot long diversion sill, a trash rack, and a fine screen. The new gate/weir could be effectively removed from the flow path during large storm events to minimize the amount of sediment that builds up at the diversion structure. At other times, the weir/gate would be raised to allow stream flow to be diverted through the intake structure into the spreading basins.

Area 3 – Jet Propulsion Labotatory East Parking Lot

Area 3 includes the JPL East Parking Lot, adjacent City-owned spreading basins, and the access bridge that connects the Parking Lot to the JPL Campus to the west. The parking lot is approximately 9.6 acres and contains 1,132 parking spaces that JPL has leased from the City since 1960; the parking lot is restricted for use by NASA JPL employees and visitors.

Two sludge basins and a series of 13 spreading basins are located east of the Arroyo Seco; west of the JPL East Parking Lot; approximately 650 feet south of Bridge No. 1; and approximately 2,200 feet north of Devil's Gate Dam. Area 3 includes only the four upper spreading basins that are located west of the JPL East Parking Lot. A 12-inch water line serving JPL, and a 30-inch Hume line (connecting the Intake to the spreading basins) run the length of the parking lot; 24-inch diameter influent and effluent lines and a 6-inch diameter sludge line run from the treatment plant across the parking lot to the sludge basins. Currently, the parking lot has one coast live oak tree in the middle of the parking lot and several other trees along the edges of the survey area. The spreading grounds contain several mature coast live oaks and western sycamores along the edges of these facilities.

Proposed improvements in Area 3 include reducing the size of the current parking lot to 75 stalls (paved with decomposed granite or other pervious materials and available for use by the public), creation/expansion of additional spreading basins, and construction of 2 sedimentation basins (Exhibit 7). Additional features to be constructed in this area include a new access road; a pedestrian stairway; a trail/equestrian pathway; interpretative signage; a pet waste station; a drinking fountain; a guard station in front of the access point to JPL; and a public restroom that is compliant with the Americans with Disabilities Act (ADA).

Two pre-sedimentation basins would be constructed at approximately 160 feet by 20 feet, with a maximum water depth of 9 feet. These two pre-sedimentation basins would be followed by 8 spreading basins with a total area of approximately 7.2 acres and a storage volume of approximately 9.4 acre-feet. The proposed spreading basins would generally have an operating water depth of 1 foot; freeboard of 2 feet; a basin wall slope ratio of 3:1. A 15-foot-wide access road would be provided around each basin. With the area's sloping terrain, maximum depths of the basins would range from 5.5 to 6.5 feet. To maximize the effective recharge area for the spreading basins, three existing basins would be combined with the new basins proposed immediately to the east of the existing basins, except for Basin J. Spillways, pipelines, culverts, and valves would be provided to connect the basins to each other.

Existing diversion weir and intake structure within Area 2.

Example of proposed Obermeyer weir for Area 2. The Obermeyer weir is raised with inflatable rubber bladders (note: proposed side levee construction will not resemble this photo). Another option for a diversion structure would be a similar crest gate that is raised mechanically. Source: Carollo 2013.

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Proposed Improvements – Area 2

Exhibit 6

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

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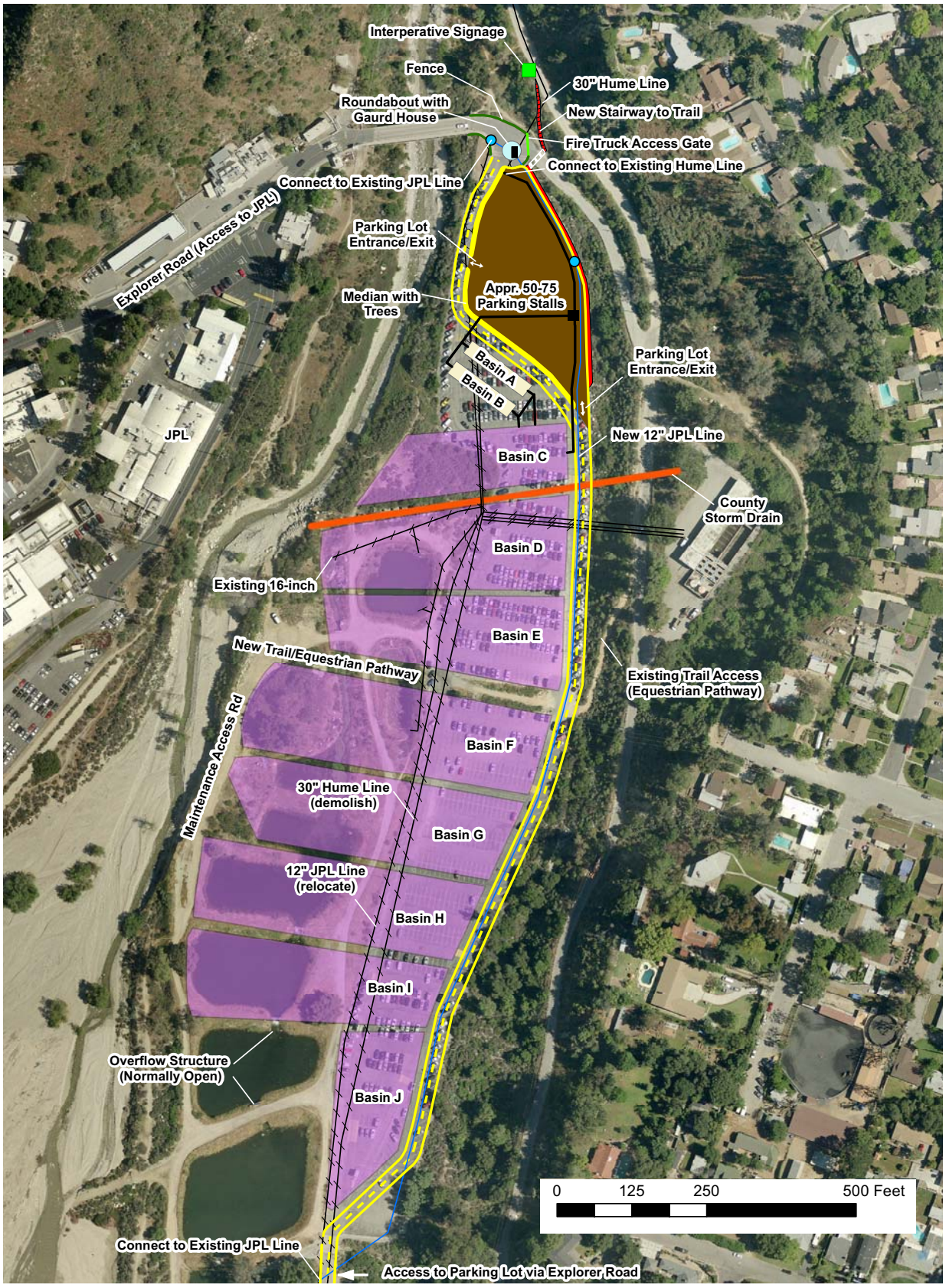

Source: Carollo 2013

Proposed Improvements – Area 3

Exhibit 7

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

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Temporary Staging Site

The temporary staging site is an area just south of Millard Canyon that currently is vegetated with a mix of California sagebrush scrub, California buckwheat scrub, and laurel sumac scrub. This area may be used as a temporary staging site for construction activities. Construction materials, equipment, and vehicles may be temporarily located in this area during construction activities associated with Areas 1 and 2. No jurisdictional waters are located within the temporary staging site.

1.4 REGULATORY AUTHORITY

1.4.1 SUMMARY OF REGULATIONS

U.S. Army Corps of Engineers

The USACE Regulatory Branch regulates activities that discharge, dredged or fill materials into "waters of the U.S." under Section 404 of the Federal Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act. This permitting authority applies to all "waters of the U.S." where the material (1) replaces any portion of a "waters of the U.S." with dry land or (2) changes the bottom elevation of any portion of any "waters of the U.S.". These fill materials would include sand, rock, clay, construction debris, wood chips, and materials used to create any structure or infrastructure in these Waters. The selection of disposal sites for dredged or fill material is done in accordance with Section 404(b)(1) guidelines, which were developed by the U.S. Environmental Protection Agency (USEPA).

Waters of the United States

"Waters of the U.S." can be divided into three categories: territorial seas, tidal waters, or non-tidal waters. The term "waters of the U.S." is defined by the *Code of Federal Regulations* (CFR, Title 33, Navigation and Navigable Waters; Part 328, Definition of waters of the United States; §328.3, Definitions) and includes:

1. All waters that have, are, or may be used in interstate or foreign commerce (including sightseeing or hunting), including all waters subject to the ebb and flow of the tide.
2. All interstate waters including interstate wetlands.
3. All other waters such as intrastate lakes, rivers, or streams (including intermittent streams); mudflats; sand flats; wetlands; sloughs; prairie potholes; wet meadows; playa lakes; or natural ponds where the use, degradation, or destruction of which could affect interstate or foreign commerce.
4. All impoundments of waters otherwise defined as "waters of the U.S." under the definition.
5. All tributaries of waters identified above.
6. The territorial seas.
7. All wetlands adjacent to waters (other than waters that are themselves wetlands) identified above.

Ordinary High Water Mark

The landward limit of tidal "waters of the U.S." is the high-tide line. In non-tidal waters where adjacent wetlands are absent, jurisdiction extends to the ordinary high water mark (OHWM). In the absence of wetlands in non-tidal waters, the extent of jurisdictional limits is determined by the OHWM. The OHWM is defined as "that line on the shore established by the fluctuations of water

and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas" (33 CFR §328.3[e]).

Wetlands

A wetland is a subset of jurisdictional waters and is defined by the USACE and the USEPA as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions" (33 CFR §328.3[b]). Wetlands generally include swamps, marshes, bogs, and areas containing similar features. The definition and methodology for identifying wetland resources can be found in the USACE's *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008c), a supplement to the USACE's *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). The methodology contained in this supplement was used to identify the type and extent of wetland resources associated with the proposed Project.

On June 19, 2006, a majority of the U.S. Supreme Court overturned two Sixth Circuit Court of Appeals decisions, finding that certain wetlands constituted "waters of the U.S." under the CWA. Justice Scalia argued that "waters of the U.S." should not include channels through which water flows intermittently or ephemerally, or channels that periodically provide drainage for rainfall. He also stated that a wetland may not be considered "adjacent to" remote "waters of the U.S." based on a mere hydrologic connection. On June 5, 2007, the USACE published a memorandum that provides guidance to both the USEPA regions and the USACE districts that implement the Supreme Court's decision in the Rapanos cases (which address the jurisdiction over "waters of the U.S." under the CWA).[2] The memorandum includes a chart that summarizes its key points, which is intended to be used as a reference tool along with a complete discussion of issues and guidance furnished throughout the memorandum.

In summary, the USACE and the USEPA will assert jurisdiction over the following waters: (1) traditional navigable waters (TNW); (2) wetlands adjacent to a TNW; (3) relatively permanent, non-navigable tributaries of a TNW that typically flow year-round or have continuous flow at least seasonally (e.g., typically three months); and (4) wetlands that directly abut such tributaries.

The USACE and the USEPA will decide jurisdiction over the following waters based on a fact-specific analysis to determine whether they have a significant nexus with a TNW: (1) non-navigable tributaries that are not relatively permanent; (2) wetlands adjacent to non-navigable tributaries that are not relatively permanent; and (3) wetlands adjacent to but that do not directly abut a relatively permanent, non-navigable tributary.

The USACE and the USEPA generally will not assert jurisdiction over the following features: (1) swales or erosional features (e.g., gullies or small washes characterized by low volume, infrequent, or short duration flow) and (2) ditches (including roadside ditches) excavated wholly within and draining only uplands and that do not carry a relatively permanent flow of water.

[2] Consolidated cases: *Rapanos v. United States* and *Carabell v. United States* refer to the U.S. Supreme Court's decision concerning USACE jurisdiction over "Waters of the U.S." under the CWA.

The USACE and the USEPA will apply the significant nexus standard defined as follows:

1. A significant nexus analysis will assess the flow characteristics and functions of the tributary itself and the functions performed by all wetlands adjacent to the tributary to determine if they significantly affect the chemical, physical, and biological integrity of downstream TNWs.
2. A significant nexus includes consideration of hydrologic and ecological factors.

Regional Water Quality Control Board

The RWQCB is the primary agency responsible for protecting water quality in California through the regulation of discharges to surface waters under the CWA and the California Porter-Cologne Water Quality Control Act (Porter-Cologne Act). The RWQCB's jurisdiction extends to all "waters of the State" and to all "waters of the U.S.", including wetlands (isolated and non-isolated).

Section 401 of the CWA provides the RWQCB with the authority to regulate, through a Water Quality Certification, any proposed, federally permitted activity that may affect water quality. Among such activities are discharges of dredged or fill material permitted by the USACE pursuant to Section 404 of the CWA. Section 401 requires the RWQCB to provide "certification that there is reasonable assurance that an activity which may result in the discharge to 'Waters of the U.S.' will not violate water quality standards". Water Quality Certification must be based on a finding that the proposed discharge will comply with water quality standards, which contain numeric and narrative objectives that can be found in each of the nine RWQCBs' Basin Plans.

The Porter-Cologne Act provides the State with very broad authority to regulate "waters of the State" (which are defined as any surface water or groundwater, including saline waters). The Porter-Cologne Act has become an important tool in the post-SWANCC (Solid Waste Agency of Northern Cook Counties vs. Unites States Corps of Engineers) and Rapanos era with respect to the State's authority over isolated waters. Generally, any person proposing to discharge waste into a water body that could affect its water quality must file a "Report of Waste Discharge" (ROWD) when there is no federal nexus, such as under Section 404(b)(1) of the CWA. Although "waste" is partially defined as any waste substance associated with human habitation, the RWQCB interprets this to include fill discharge into water bodies.

Los Angeles Region Water Quality Control Plan

There are nine Regional Water Quality Control Boards in California. The Project site is located within Regional Water Quality Control Board Region 4, the Los Angeles Region. The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board (RWQCB) have adopted a Water Quality Control Plan (or "Basin Plan") for the Los Angeles Region. The Basin Plan contains goals and policies, descriptions of conditions, and proposed solutions to surface and groundwater issues. The Basin Plan also establishes water quality standards for surface and groundwater resources and includes beneficial uses and levels of water quality that must be met and maintained to protect these uses. These water quality standards are implemented through various regulatory permits pursuant to CWA Section 401 for Water Quality Certifications and Section 402 for Report of Waste Discharge permits.

The Basin Plan indicates that the Project site is located within the Los Angeles-Los Angeles River Hydrologic Unit, the Arroyo Seco South of Devil's Gate (U) Hydrologic Area Split, and the Arroyo Seco Hydrologic Subarea (HSA). Table 3-8 of the Basin Plan (Water Quality Objectives for Selected Constituents in Inland Surface Waters) indicates that the following numeric objectives have been established for this HSA: (1) Total Dissolved Solids (TDS), less than 300 milligrams

per liter (mg/L); (2) sulfate, less than 40 mg/L; and (3) chloride, less than 15 mg/L (Los Angeles RWQCB 1994).

The Basin Plan identifies a number of beneficial uses, some or all of which may apply to a specific HSA, including Municipal and Domestic Water Supply (MUN) waters; Industrial Service Supply waters (IND); Industrial Process Supply (PROC) waters; Groundwater Recharge (GWR) waters; Water Contact Recreation (REC 1) waters; Non-Contact Water Recreation (REC 2) waters; Warm Fresh Water Habitat (WARM) waters; Cold Fresh Water Habitat (COLD) waters; Wildlife Habitat (WILD) waters; and Potential Presence of Wetlands (WET) (Los Angeles RWQCB 1994). All of these beneficial uses exist based on the Project site's hydrologic and biological resources. Possible effects to these existing and potential beneficial uses would need to be addressed as part of the request for a CWA Section 401 Water Quality Certification for this Project.

MUN waters support community, military, or individual water supply systems including, but not limited to, drinking water supply. The Arroyo Seco Watershed is part of a water supply system owned and operated by the PWP and the LAWC; consistent with the policy.

IND waters are used for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well re-pressurization. The proposed Project will be implemented in a manner that will preserve these usages.

PROC waters are for industrial activities that depend primarily on water quality. The proposed Project will be implemented in a manner that will preserve these usages.

GWR waters are used for natural or artificial recharge of groundwater for purposes that may include, but are not limited to, future extraction, maintaining water quality, or halting saltwater intrusion into freshwater aquifers. The primary source of groundwater in the Arroyo Seco Watershed is runoff from the San Gabriel Mountains; recharge occurs as a result of the infiltration of streamflow, penetration of rain falling on alluvial surfaces, and returns from irrigation water. The proposed Project would increase the potential for groundwater recharge through the expansion and creation of spreading basins in Area 3.

REC 1 includes water for recreational activities involving bodily contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water-skiing, skin and scuba diving, surfing, white water activities, fishing, or use of natural hot springs. The proposed Project will be implemented in a manner that will preserve these usages.

REC 2 includes water for recreational activities involving proximity to water, but not normally involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities. The proposed Project will enhance recreational opportunities in Hahamongna Watershed Park by providing public parking and trail access, picnic tables, an additional trail in Area 1, interpretative signage, a pet waste station, a drinking fountain, and public restroom facilities.

WARM waters support warm water ecosystems that may include, but are not limited to, preservation and enhancement of aquatic habitats, vegetation, fish, and wildlife (including invertebrates). The Arroyo Seco consists of perennial stream(s) that contain multiple riparian vegetation communities and associated resources that are utilized by wildlife. Project construction activities would have an impact on riparian vegetation through the removal of various mature trees and implementation of bank stabilization in Area 2. Construction activities may have

an impact on wildlife though these activities will be implemented to minimize these impacts. Mitigation measures may include seasonal restrictions on construction activities, exclusionary fencing, and diverting the stream around work areas. Impacts to riparian vegetation will be mitigated through the establishment of native riparian vegetation in Area 1.

COLD waters support cold water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. Project construction activities would have an impact on riparian vegetation through the removal of various mature trees and implementation of bank stabilization in Area 2. Construction activities may have an impact on wildlife though these activities will be implemented to minimize these impacts. Mitigation measures may include seasonal restrictions on construction activity, exclusionary fencing, and diverting the stream around work areas. Impacts to riparian vegetation will be mitigated through the establishment of native riparian vegetation in Area 1.

WILD waters support wildlife habitats that may include, but are not limited to, the preservation and enhancement of vegetation and prey species used by waterfowl and other wildlife. Project construction activities would have an impact on riparian vegetation through the removal of various mature trees and implementation of bank stabilization in Area 2. Construction activities may have an impact on wildlife, though mitigation/minimization measures will be implemented to minimize these impacts. Mitigation measures may include seasonal restrictions on construction activity, exclusionary fencing, and diverting the stream around work areas. Impacts to riparian vegetation will be mitigated through the establishment of native riparian vegetation in Area 1.

WET waters support wetland ecosystems, including, but not limited to, preservation or enhancement of wetland habitats, vegetation, fish, shellfish, or wildlife, and other unique wetland functions which enhance water quality, such as providing flood and erosion control; stabilizing stream banks, and filtering and purifying naturally occurring contaminants. Hydric soils were not encountered during field surveys for this report; therefore, no wetland resources will result from proposed Project implementation.

The proposed Project will have no effect on the following beneficial uses: MUN, IND, PROC, REC 1, or WET. The proposed Project will enhance the GWR and REC 2 beneficial uses through the creation of new and expanded spreading basins and construction of recreation facilities. The proposed Project will have a negative effect on the WARM, COLD, and WILD beneficial uses due to the removal of mature riparian trees and the operation of machinery within the Arroyo Seco. These impacts will be mitigated through the installation of mitigation measures to protect aquatic wildlife during construction; to avoid negative impacts to breeding bird activity by enacting seasonal restrictions on construction; and to establish native riparian trees within disturbance areas and in Area 1.

<u>California Department of Fish and Wildlife</u>

The CDFW has jurisdictional authority over wetland resources associated with rivers, streams, and lakes pursuant to *California Fish and Game Code* (§§1600–1616). Activities of State and local agencies as well as public utilities that are project proponents are regulated by the CDFW under Section 1602 of the *California Fish and Game Code;* this section regulates any work that will (1) substantially divert or obstruct the natural flow of any river, stream, or lake; (2) substantially change or use any material from the bed, channel, or bank of any river, stream, or lake; or (3) deposit or dispose of debris, waste, or other material containing crumbled, flaked, or ground pavement where it may pass into any river, stream, or lake.

Because the CDFW includes streamside habitats under its jurisdiction that, under the federal definition, may not qualify as wetlands on a particular project site, its jurisdiction may be broader than that of the USACE. Riparian forests in California often lie outside the plain of ordinary high

water regulated under Section 404 of the CWA, and often do not have all three parameters (wetland hydrology, hydrophytic vegetation, and hydric soils) sufficiently present to be regulated as a wetland. However, riparian forests are frequently within CDFW regulatory jurisdiction under Section 1602 of the *California Fish and Game Code.*

The CDFW enters into a Lake or Streambed Alteration Agreement (SAA) with a project proponent and can impose conditions on the agreement. The notification process involves the completion of the applications which will serve as the basis for the CDFW's issuance of a Section 1602 SAA. Section 1602 of the *California Fish and Game Code* applies to all perennial, intermittent, and ephemeral rivers, streams, and lakes in the State.

The CDFW jurisdictional limits are not as clearly defined by regulation as those of the USACE. While they closely resemble the limits described by USACE regulations, they include riparian habitat supported by a river, stream, or lake regardless of the presence or absence of hydric and saturated soils conditions. In general, the CDFW takes jurisdiction from the top of a stream bank or to the outer limits of the adjacent riparian vegetation (outer drip line), whichever is greater. Notification is generally required for any project that will take place within or in the vicinity of a river, stream, lake, or their tributaries. This includes rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish and other aquatic plant and/or wildlife species, and watercourses that have a surface or subsurface flow that support or have supported riparian vegetation.

SECTION 2.0 METHODS

The analysis contained in this report uses the results of field surveys conducted by BonTerra Consulting[3] Regulatory Specialist David Hughes and Biologist Dani Henning on May 10 and September 26, 2013. The three-parameter approach used to identify USACE wetlands is summarized in Sections 2.1 through 2.3; the literature reviewed for the preparation of the delineation is outlined in Section 2.4; the California Rapid Assessment Method (CRAM) is outlined in Section 2.5; and the field delineation is outlined in Section 2.6.

2.1 VEGETATION

Hydrophytic vegetation (or hydrophytes) is defined as any macrophytic plant that "grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats" (Environmental Laboratory 1987). Specifically, these plant species have specialized morphological, physiological, or other adaptations for surviving in permanently saturated to periodically saturated soils where oxygen levels are very low or the soils are anaerobic. The USACE—as part of an interagency effort with the USEPA, the U.S. Fish and Wildlife Service (USFWS), and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS)—has approved a new National Wetland Plant List (NWPL) (Lichvar and Kartesz 2009) to replace the *National List of Plant Species that Occur in Wetlands* (Reed 1988). The NWPL went into effect on June 1, 2012, and is to be used to determine whether the hydrophytic vegetation parameter is met when conducting wetland determinations under the Clean Water Act and the Wetland Conservation Provisions of the Food Security Act. The NWPL is also intended to be used for wetland restoration, establishment, and enhancement projects. This report utilized the indicator statuses for the Arid West Supplement portion of the NWPL.

The following revisions were made to the Reed (1988) pursuant to the NWPL:

1. The USACE eliminated the "probability-of-occurrence" categories (e.g., <1 percent, 1–33 percent, 34–66 percent, 67–99 percent, and >99 percent) due to the lack of numerical data to support these ratings.
2. The USACE determined that, because the wetland plant indicator statuses have shifted from a series of numerical categories to qualitative definitions, the use of +/– suffixes is difficult to apply accurately. Adding finer-scale +/– ratings implies there are data to support their assignments, which is generally not the case. Therefore, to improve the accuracy of the overall list, the USACE decided to drop the +/– suffixes.

Lichvar and Gillrich (2011) provide updated technical definitions of wetland plant indicator status categories as part of the procedures used in updating the NWPL:

- **Obligate Wetland (OBL):** These wetland-dependent plants (herbaceous or woody) require standing water or seasonally saturated soils (14 or more consecutive days) near the surface to assure adequate growth, development, and reproduction and to maintain healthy populations. These plants are of four types:
    - *submerged:* plants that conduct virtually all of their growth and reproductive activity under water.

[3] Although BonTerra Consulting merged with Psomas and became "BonTerra Psomas" as of January 1, 2014, "BonTerra Consulting" is still used throughout this document for all work completed and documents produced before January 1, 2014.

- *floating:* plants that grow with leaves and most often their vegetative and reproductive organs floating on the water surface.
- *floating-leaved:* plants that are rooted in sediment but also have leaves that float on the water surface.
- *emergent:* herbaceous and woody plants that grow with their bases submerged and rooted in inundated sediment or seasonally saturated soil and their upper portions, including most of the vegetative and reproductive organs, growing above the water level.

- **Facultative Wetlands (FACW):** These plants depend on and predominantly occur with hydric soils, standing water, or seasonally high water tables in wet habitats for assuring optimal growth, development, and reproduction and for maintaining healthy populations. These plants often grow in geomorphic locations where water saturates soils or floods the soil surface at least seasonally.
- **Facultative (FAC):** These plants can occur in wetlands or non-wetlands. They can grow in hydric, mesic, or xeric habitats. The occurrence of these plants in different habitats represents responses to a variety of environmental variables other than just hydrology, such as shade tolerance, soil hydrogen potential (pH), and elevation, and they have a wide tolerance of soil moisture conditions.
- **Facultative Upland (FACU):** These plants are not wetland dependent. They can grow on hydric and seasonally saturated soils, but they develop optimal growth and healthy populations on predominantly drier or more mesic sites. Unlike FAC plants, these plants are non-wetland plants by habitat preference.
- **Obligate Upland (UPL):** These plants occupy mesic to xeric non-wetland habitats. They almost never occur in standing water or saturated soils. Typical growth forms include herbaceous, shrubs, woody vines, and trees.

As identified in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region,* the following are three procedures for determining hydrophytic vegetation: Indicator 1, "Dominance Test", using the "50/20 Rule"; Indicator 2, "Prevalence Index"; or Indicator 3, "Morphological Adaptation" (USACE 2008c). Hydrophytic vegetation is present if any indicator is satisfied. If none of the indicators are satisfied, then hydrophytic vegetation is absent unless (1) indicators of hydric soil and wetland hydrology are present and (2) the site meets the requirements for a problematic wetland situation.

- **Dominance Test:** Vegetative cover is estimated and is ranked according to its dominance. Dominant species are the most abundant species for each stratum of the community (i.e., tree, sapling/shrub, herb, or woody vine) that individually or collectively amount to 50 percent of the total coverage of vegetation plus any other species that, by itself, accounts for 20 percent of the total vegetation cover (also known as the "50/20 Rule"). These species are recorded on the "Wetland Determination Data Form – Arid West Region". The wetlands indicator status of each species is also recorded on the data forms based on the NWPL (Lichvar and Kartesz 2009). If greater than 50 percent of the dominant species across all strata are OBL, FACW or FAC species, the criterion for wetland vegetation is considered to be met.
- **Prevalence Index:** The prevalence index considers all plant species in a community, not just the dominant ones. The prevalence index is the average of the wetland indicator status of all plant species in a sampling plot. Each indicator status category is given a numeric code (OBL=1, FACW=2, FAC=3, FACU=4, and UPL=5) and is weighted by the

species' abundance (percent cover). Hydrophytic vegetation is present if the prevalence index is 3.0 or less.

- **Morphological Adaptation:** Morphological adaptations, such as adventitious roots (i.e., roots that take advantage of the wet conditions) and shallow root systems, must be observed on more than 50 percent of the individuals of a FACU species for the hydrophytic vegetation wetland criterion to be met.

2.2 SOILS

The National Technical Committee for Hydric Soils (NTCHS) defines a hydric soil as a soil that is formed under conditions of saturation, flooding, or ponding that occurs long enough during the growing season to develop anaerobic conditions (or conditions of limited oxygen) at or near the soil surface and that favor the establishment of hydrophytic vegetation (USDA NRCS 2008). It should be noted that hydric soils created under artificial conditions of flooding and inundation sufficient for the establishment of hydrophytic vegetation would also meet this hydric soils indicator.

The soil conditions are verified by digging test pits along each transect to a depth of at least 20 inches (except where a restrictive layer occurs in areas containing hard pan, cobble, or solid rock). It should be noted that, at some sites, it may be necessary to make exploratory soil test pits up to 40 inches deep to more accurately document and understand the variability in soil properties and hydrologic relationships on the site. Soil test pit locations are usually dug within the drainage invert or at the edge of a drainage course within vegetated areas. Soil extracted from each soil test pit is then examined for texture and color using the standard plates within the Munsell Soil Color Chart (1994) and recorded on the Data Form. The Munsell Soil Color Chart aids in designating soils by color labels based on gradations of three simple variables: hue, value, and chroma. Any indicators of hydric soils such as the following are also recorded on the Data Form: redoximorphic features (i.e., areas where iron is reduced under anaerobic conditions and oxidized following a return to aerobic conditions); buried organic matter; organic streaking; reduced soil conditions; gleyed (i.e., soils having a characteristic bluish-gray or greenish-gray in color) or low-chroma soils; or sulfuric odor. If hydric soils are found, progressive pits are dug along the transect moving laterally away from the active channel area until hydric soil features are no longer present within the top 20 inches of the soil.

2.3 HYDROLOGY

Wetlands hydrology is represented by either (1) all of the hydrological elements or characteristics of areas permanently or periodically inundated or (2) areas containing soils that are saturated for a sufficient duration of time to create hydric soils suitable for the establishment of plant species that are typically adapted to anaerobic soil conditions. The presence of wetland hydrology is evaluated at each intersect by recording the extent of observed surface flows, the depth of inundation, the depth to saturated soils, and the depth to free water in soil test pits. In instances where stream flow is divided into multiple channels with intervening sandbars, the entire area between the channels is considered within the OHWM. Therefore, an area containing these features would meet the indicator requirements for wetland hydrology.

2.4 LITERATURE

Prior to conducting the delineation field investigations, BonTerra Consulting reviewed USGS topographic maps; the Report and General Soil Map, Los Angeles County, California (USDA NRCS 1969); the National Hydric Soils List (USDA NRCS 2012); the National Wetlands Inventory's (NWI) Wetland Mapper (USFWS 2013); and digital color aerial photography to identify

areas on the Project site that may fall under an agency's jurisdiction. A description of this literature is provided below.

USGS Topographic Quadrangle. USGS quadrangle maps show geological formations and their characteristics; they describe the physical settings of an area through topographic contour lines and other major surface features. These features include lakes, streams, rivers, buildings, roadways, landmarks, and other features that may fall under the jurisdiction of one or more regulatory agencies. In addition, the USGS maps provide topographic information that is useful in determining elevations, latitude and longitude, and Universal Transverse Mercator Grid coordinates for a project site.

The proposed Project site is shown on the USGS Pasadena 7.5-minute quadrangle. Arroyo Seco is identified on the quadrangle map as are associated tributaries Millard Creek, El Prieto Creek, and Fern Creek.

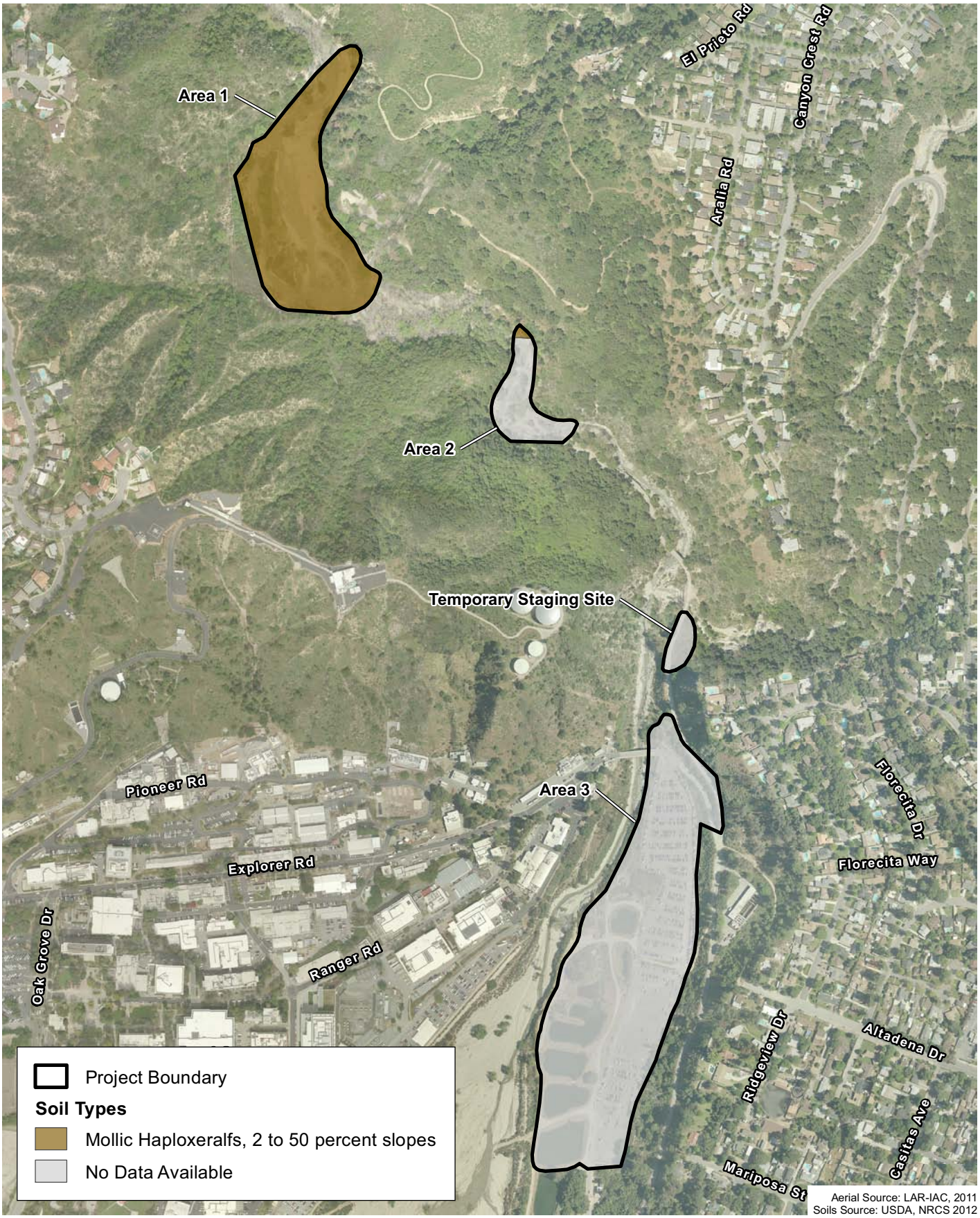
Color Aerial Photography. BonTerra Consulting reviewed an existing color aerial photograph prior to the delineation field investigations to identify the extent of any drainages and riparian vegetation occurring on the Project site.

U.S. Department of Agriculture, Natural Resources Conservation Service. The presence of hydric soils is one of the chief indicators of jurisdictional wetlands. BonTerra Consulting reviewed the U.S. Department of Agriculture (USDA) soil data for the Project site (USDA NRCS 2012).

Soils within the Project site are shown on Exhibit 8 and consist of Mollic Haploxeralfs (2 to 50 percent slopes) in Area 1 and the northern tip of Area 2. No soil data were available for most of Area 2 and all of Area 3. No soils mapped on the proposed Project site are listed as "hydric" on the National Hydric Soils List (USDA NRCS 2011). A description of the soil series mapped on the Project site is provided in Attachment A of this report.

U.S. Fish and Wildlife Service, National Wetlands Inventory (NWI). The NWI Wetlands Mapper shows wetland resources available from the Wetlands Spatial Data Layer of the National Spatial Data Infrastructure (USFWS 2013). This resource provides the classification of known wetlands following the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). This classification system is arranged in a hierarchy of (1) systems that share the influence of similar hydrologic, geomorphologic, chemical, or biological factors (i.e., Marine, Estuarine, Riverine, Lacustrine, and Palustrine); (2) subsystems (i.e., Subtidal and Intertidal; Tidal, Lower Perennial, Upper Perennial, and Intermittent; or Littoral and Limnetic); (3) classes, which are based on substrate material and flooding regime or on vegetative life forms; (4) subclasses; and (5) dominance types, which are named for the dominant plant or wildlife forms. In addition, there are modifying terms applied to Classes or Subclasses.

Wetlands that are identified in the NWI are shown in Exhibit 9. Resources on the Project site are mapped as PABHh (Palustrine, Aquatic Bed, Permanently Flooded, Diked/Impounded [Area 1]); PFOC (Palustrine, Forested, Seasonally Flooded [Area 1]); PFOA (Palustrine, Forested, Temporarily Flooded [Areas 1 and 2]); PEMCh (Palustrine, Emergent, Seasonally Flooded, Diked/Impounded [Area 3]); PEMCx (Palustrine, Emergent, Seasonally Flooded, Excavated [Area 3]); and PUSCh (Palustrine, Unconsolidated Shore, Seasonally Flooded, Diked/Impounded [Area 3]). Additionally, PUSCx (Palustrine, Unconsolidated Shore, Seasonally Flooded, Excavated) is mapped within Area 1 though that spreading basin feature was scoured away during a flood event in late 2009.



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Soil Types

Exhibit 8

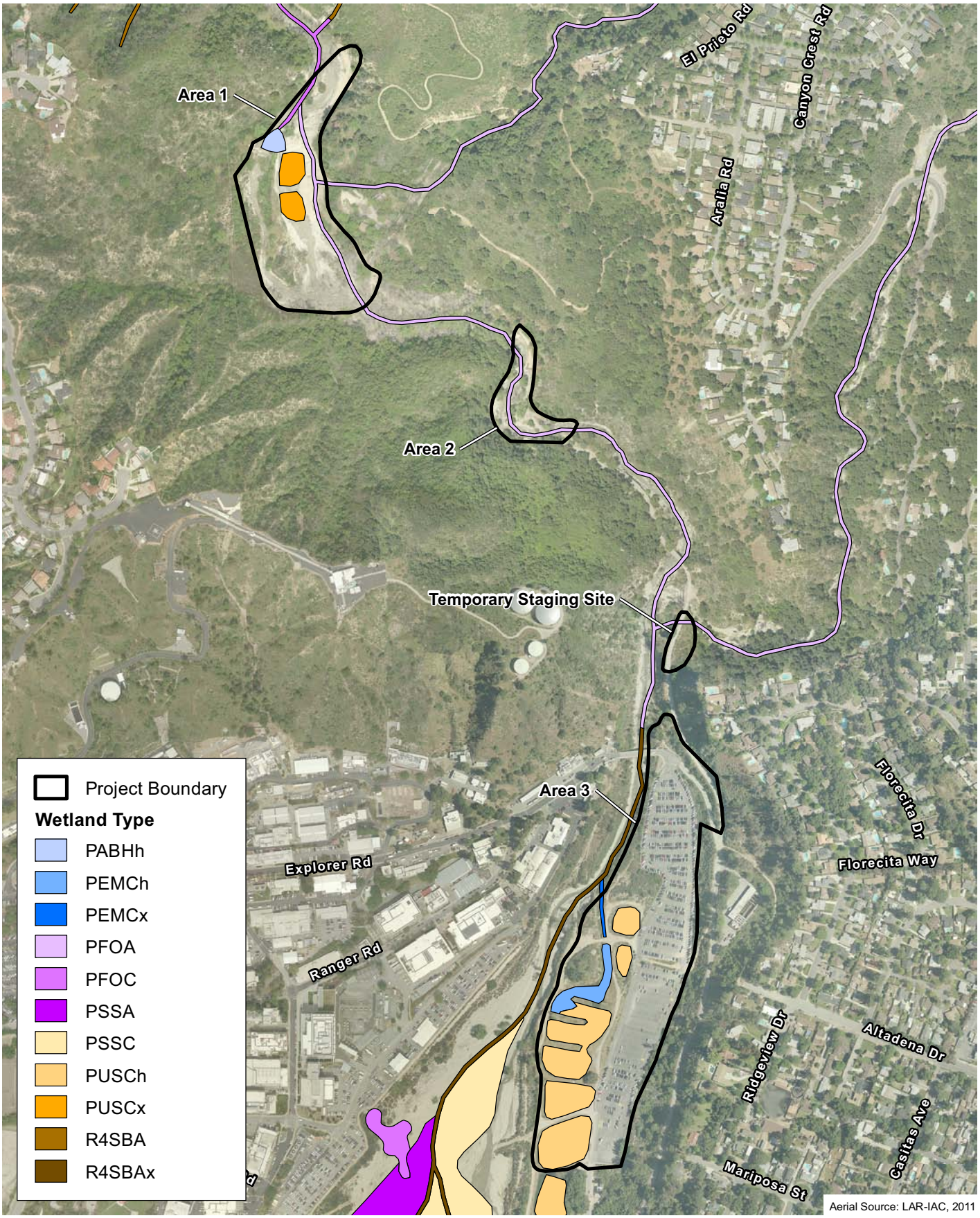
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

600 300 0 600 Feet

BonTerra CONSULTING

(Rev: 2-04-2014 MMD) R:\Projects\Carollo\J041\Graphics\JD\ex8_soils.pdf



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National Wetland Inventory

Exhibit 9

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

600 300 0 600 Feet

BonTerra CONSULTING

(Rev: 2-04-2014 MMD) R:\Projects\Carollo\J041\Graphics\JD\Ex9_NWI.pdf

Descriptions for the above-listed codes (PABHh, PEMCh, PEMCx, PFOA, PFOC, PUSCh, and PUSCx) are as follows:

- ***P: System PALUSTRINE.*** The Palustrine System includes all nontidal wetlands dominated by trees, shrubs, emergents, mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 part per trillion (ppt). Wetlands lacking (such vegetation) are also included if they exhibit all of the following characteristics: (1) are less than 8 hectares (20 acres); (2) do not have an active wave-formed or bedrock shoreline feature; (3) have at low water a depth of less than 6.6 feet in the deepest part of the basin; and (4) have salinity due to ocean-derived salts of less than 0.5 ppt.
  - ***AB: Class AQUATIC BED.*** This Class is characterized by wetlands and deepwater habitats dominated by plants that grow principally on or below the surface of the water for most of the growing season in most years (e.g., erect, rooted, herbaceous hydrophytes, excluding mosses and lichens). The vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
    - ***H: Water Regime Modifier PERMANENTLY FLOODED.*** This modifier refers to areas in which Water covers the land surface throughout the year in all years.
      - → ***h: Special Water Regime Modifier DIKED/IMPOUNDED.*** This special modifier refers to areas that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.
  - ***EM: Class EMERGENT.*** This Class is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. The vegetation is present for most of the growing season in most years. These wetlands are usually dominated by perennial plants.
    - ***C: Water Regime Modifier SEASONALLY FLOODED.*** This modifier refers to areas in which surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.
      - → ***h: Special Water Regime Modifier DIKED/IMPOUNDED.*** This special modifier refers to areas that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.
      - → ***x: Special Water Regime Modifier EXCAVATED.*** This special modifier refers to areas within a basin or channel that have been dug, gouged, blasted or suctioned through artificial means by man that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.
  - ***FO: Class FORESTED.*** This Class is characterized by woody vegetation that is 6 meters (20 feet) tall or taller.
    - ***A: Water Regime Modifier TEMPORARILY FLOODED.*** This modifier refers to areas in which surface water is present for brief periods during growing season, but the water table usually lies well below the soil surface for most of the growing season. Plants that grow both in uplands and wetlands may be characteristic of this water regime.
    - ***C: Water Regime Modifier SEASONALLY FLOODED.*** This modifier refers to areas in which surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.

- ***US: Class UNCONSOLIDATED SHORE.*** This Class Includes all wetland habitats having two characteristics: (1) unconsolidated substrates with less than 75 percent areal cover of stones, boulders or bedrock and; (2) less than 30 percent areal cover of vegetation. Landforms such as beaches, bars, and flats are included in the Unconsolidated Shore class.

- ***C: Water Regime Modifier SEASONALLY FLOODED.*** This modifier refers to areas in which surface water is present for extended periods especially early in the growing season, but is absent by the end of the growing season in most years. The water table after flooding ceases is variable, extending from saturated to the surface to a water table well below the ground surface.

  - → ***h: Special Water Regime Modifier DIKED/IMPOUNDED.*** This special modifier refers to areas that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.

  - → ***x: Special Water Regime Modifier EXCAVATED.*** This special modifier refers to areas within a basin or channel that have been dug, gouged, blasted or suctioned through artificial means by man that have been created or modified by a man-made barrier or dam which obstructs the inflow or outflow of water.

2.5 CALIFORNIA RAPID ASSESSMENT METHOD

CRAM is a wetland monitoring tool that was developed in response to a monitoring framework recommended by the USEPA (2006) to help States meet monitoring requirements stated in the CWA. Personnel from the USACE, the CDFW, and the RWQCB (among other agencies) participated in the development of CRAM, which is an accepted assessment tool by these agencies.

A CRAM analysis was conducted by concurrently with the jurisdictional delineation field studies. Surveys were conducted in accordance with the *California Rapid Assessment Method (CRAM) for Wetlands and Riparian Areas (Version 6.0)* (CWMW 2013). The CRAM analysis for Riverine Wetlands[4] was used to establish and score 3, approximately 100-meter-long Assessment Areas (AAs) along Arroyo Seco. Two AA's were established within Area 1 (one above the headworks structure and one below), and another AA was established within Area 2. No AAs were established within Area 3 due to a lack of riverine wetland features in that area.

The AA is the fundamental unit of evaluation for CRAM analysis. The length of the AA depends on the bankfull width of each streambed (approximately equal to the OHWM). The AA width was defined as the outer canopy of vegetation that overhung the channel, where present.

Information recorded for the AA include: (1) percentage of the AA that was surrounded by a buffer and the condition of the buffer; (2) number of plant layers within the AA; (3) number of co-dominant species and invasive species; and (4) cross-sectional measurements to determine hydrologic connectivity to adjacent areas. Qualitative factors that were assessed include: (1) degree of plant zonation; (2) vertical plant structure; (3) buffer condition; and (4) complexity of the channel's bank features. Worksheets that identified different structural patches and the degree of channel stability

[4] CRAM uses the definition of a wetland provided by the National Wetland Inventory (NWI) of the USFWS: "Wetlands are lands transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface or the land is covered by shallow water. For the purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is not a soil and is saturated with water or covered by shallow water at some time during the growing season of each year" (Cowardin et al. 1979).

were also filled out for use in the assessment. Aerial photos of the site were later analyzed to determine the site's overall landscape connectivity, buffer width, and water sources.

Individual scores are obtained by "choosing the best-fit set of narrative descriptions of observable conditions ranging from the worst commonly observed [D] to the best achievable [A] for the type of wetland being assessed" (CWMW 2013). Each description has a fixed numerical value. This information was used to assess four primary attributes that are equally weighted: (1) Buffer and Landscape Context; (2) Hydrology; (3) Physical Structure; and (4) Biotic Structure. Table 1 provides a description of these attributes and associated metrics. The attribute score is calculated by first adding the values of the chosen narrative descriptions for the attribute's component metrics, and then converting the sum into a percentage of the maximum possible score for the attribute. The overall CRAM score is the average of the final attribute scores.

TABLE 1
DESCRIPTION OF CRAM ATTRIBUTES AND METRICS

Attribute	Metric		Description
Buffer and Landscape Context	Landscape Connectivity		Measures connectivity along the riparian corridor for wildlife movement; non-buffer land types are identified 500 meters upstream and downstream of Assessment Area.
	Buffer Condition		Combination of the three sub-metric scores described below.
	Sub-metrics	Percent of Assessment Area with Buffer	Measures percentage of Assessment Area perimeter that contains land cover types that provide a buffer.
		Average Buffer Width	Measures the average width of identified buffer land types around Assessment Area.
		Buffer Condition	Qualitatively evaluates buffer condition .
Hydrology	Water Source		Qualitatively evaluates impacts to the extent, duration, and frequency of saturated or ponded conditions .
	Hydroperiod/Channel Stability		Qualitatively evaluates channel equilibrium, degradation, or aggradation.
	Hydrologic Connectivity		Measures the entrenchment of the channel to determine the ability for water to inundate adjacent upland areas.
Physical Structure	Structural Patch Richness		Measures the diversity of physical riparian features that may potentially provide habitat for aquatic species (e.g., vegetated islands, pools, riffles).
	Topographic Complexity		Qualitatively evaluates the variety of elevations (i.e. micro-topographic heterogeneity).
Biotic Structure	Plant Community		Average of the three sub-metric scores described below.
	Sub-metrics	Number of Plant Layers	Identifies of number of plant strata.
		Number of Co-dominant Species	Identifies the number of co-dominant plant species based on visual estimation.
		Percent Invasive Species	Measures the percent of invasive plant species among the co-dominant species identified above.
	Horizontal Interspersion		Qualitatively evaluates the variety and distribution of plant associations.
	Vertical Biotic Structure		Identifies the number and distribution of plant strata.
Source: CWMW 2013.			

CRAM scores for each of the 4 attributes range from 25 to 100. CRAM scores provide an assessment of the level of the various functions and services provided by an aquatic system. The score is a relative measurement to indicate how an individual site compares to the best achievable conditions for that wetland type in the State. It is assumed that the same scores for different wetlands of the same type represent the same overall condition and functional capacity. Therefore, these scores may be used to track the progress of restoration efforts over time; to compare impacted sites to their in-kind mitigation sites; or to compare an individual wetland to the status and trends in ambient condition of its wetland type.

2.6 JURISDICTIONAL DELINEATION

In September 2008, the USACE issued the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region.* This regional supplement is designed for use with the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987). Both the 1987 Wetlands Manual and the Arid West Supplement to the manual provide technical methods and guidelines for determining the presence of wetland "waters of the U.S.". A three-parameter approach is used to identify wetlands and requires evidence of wetland hydrology, hydrophytic vegetation, and hydric soils. Wetlands generally include swamps, marshes, bogs, and similar areas. In order to be considered a wetland, an area must exhibit at least minimal hydric characteristics within the three parameters. However, problem areas may periodically or permanently lack certain indicators due to seasonal or annual variability of the nature of the soils or plant species on site. Atypical wetlands lack certain indicators due to recent human activities or natural events. Guidance for determining the presence of wetlands in these situations is presented in the regional supplement.

Non-wetland "waters of the U.S." are delineated based on the limits of the OHWM, which can be determined by a number of factors including erosion, the deposition of vegetation or debris, and changes in vegetation. The OHWM limits (i.e., active floodplain) occurring within the survey area were further verified using methodologies contained in *A Field Guide for the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States, A Delineation Manual* (Lichvar and McColley 2008) and *Updated Datasheet for the Identification of the Ordinary High Water Mark (OHWM) In the Arid West Region of the Western United States* (Curtis and Lichvar 2010) (Attachment B).

It should be noted that the RWQCB shares USACE jurisdiction unless isolated conditions are present. If isolated waters conditions are present, the RWQCB takes jurisdiction using the USACE's definition of the OHWM and/or the three-parameter wetlands methodology pursuant to the 1987 Wetlands Manual. The CDFW's jurisdiction is defined as the top of the bank to the top of the bank of the stream, channel, or basin or to the outer limit of riparian vegetation located within or immediately adjacent to the river, stream, creek, pond, or lake or other impoundment.

Jurisdictional features were delineated using a 1 inch equals 100-foot (1″ = 100′) scale aerial photograph. The field survey included the collection of vegetation, soils, and hydrologic data from eight sampling points in the survey area; this information was recorded on Wetland Determination Data Forms (Attachment C). Representative photographs of the survey area are included in Attachment D.

SECTION 3.0 RESULTS

Eight sampling locations were assessed within drainage features on the proposed Project site. This included six sampling locations within Area 1 and two sampling locations within Area 2. No sampling locations were located within Area 3 given the sparse vegetation overall in the spreading basins and the lack of hydrophytic vegetation specifically. The results of collected data are summarized in Table 2.

3.1 VEGETATION

The following native vegetation types were observed on the Project site: arroyo willow thickets, California buckwheat scrub, California buckwheat scrub/annual brome grasslands, California sagebrush scrub/laurel sumac scrub, California sycamore woodland, coast live oak woodland, laurel sumac scrub, mule fat thickets, poison oak scrub, riparian herb, scrub oak chaparral, white alder grove/California sycamore woodland, and unvegetated wash. In some cases, these vegetation types overlapped and were mapped as a combination of vegetation types (e.g., arroyo willow thickets/mule fat thickets and coast live oak/California sycamore woodland). Non-native vegetation types include annual brome grasslands. Other areas were mapped as developed (paved roads and parking lots) and disturbed (unpaved roads, area of unvegetated compacted soil). The locations of the various vegetation types within the Project boundaries are shown in Exhibit 10.

The hydrophytic vegetation criterion was met at all of sampling locations. Most of sampling locations (Nos. 1, 3, 5, 6, 7, and 8) were located within either arroyo willow thickets or white alder grove/California sycamore woodland. These areas were dominated by mature arroyo willow, white alder, and/or California sycamore, species that are either obligate or facultative wetland species (Lichvar and Gillrich 2011). Vegetation in these areas was generally undisturbed. Sampling location 2 was located within a riparian herb area that was dominated by water cress (*Nasturtium officinale*) along with willow-herb (*Epilobium ciliatum*) and tall umbrella sedge (*Cyperus eragrostis*). Arroyo willow and white alder were located on the periphery of this sampling location.

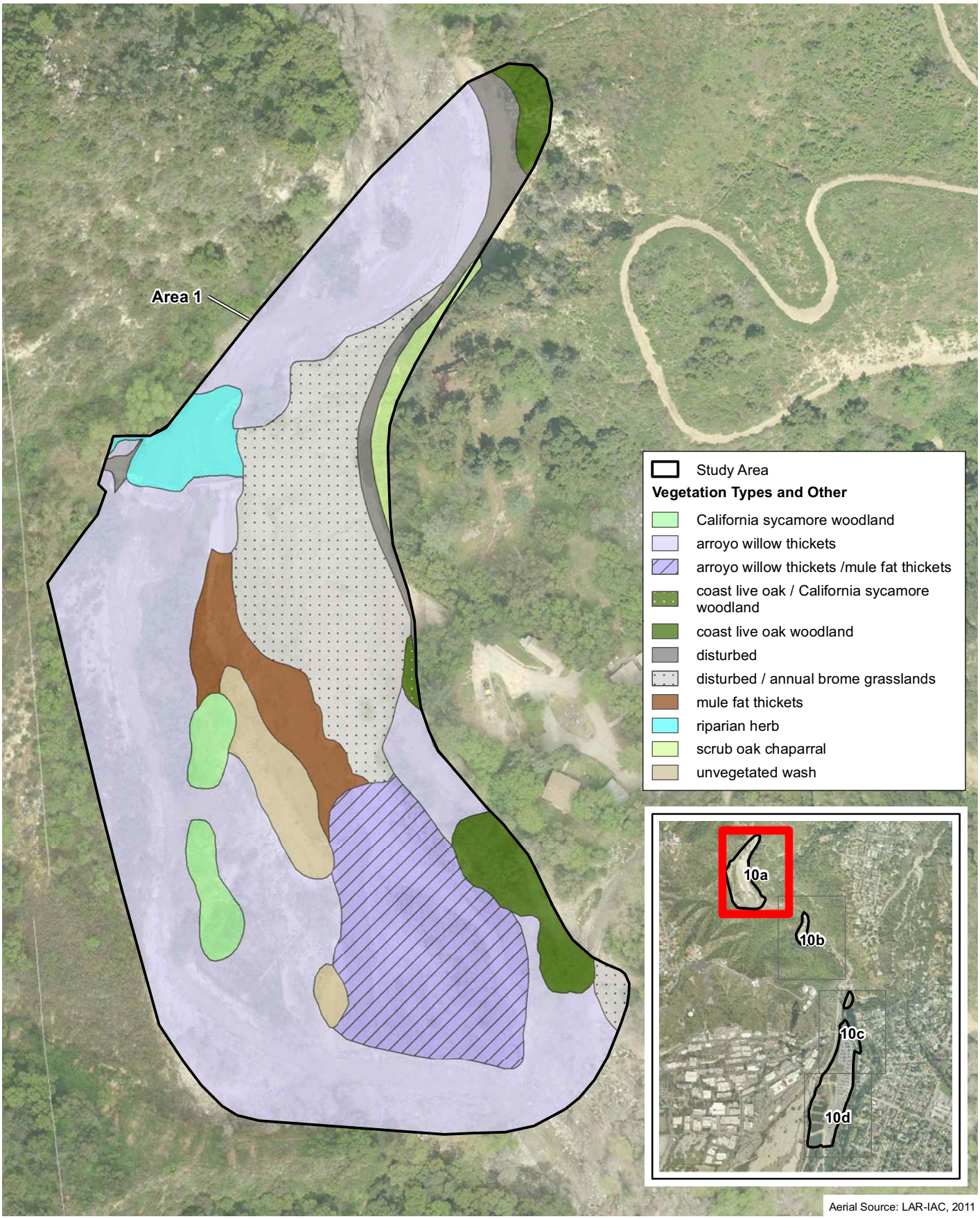
3.2 SOILS

Soils within the Arroyo Seco generally consist of sand or coarse sand. Soil within Area 1 and northern tip of Area 2 consists of Mollic Haploxeralfs (2 to 50 percent slopes). No soil data were available for most of Area 2 and all of Area 3. No hydric soil indicators were observed at any of the sampling locations.

3.3 HYDROLOGY

The Project site is within the 834-square-mile Los Angeles River Watershed. Upper Arroyo Seco (Hydrologic Unit Code 18070105) flows southwest towards Devil's Gate Dam, where it is released through a concreted channel eventually discharging into the Los Angeles River, a traditionally navigable water (TNW), approximately ten river miles and nine aerial miles from the survey area.

All sampling points exhibit indicators of wetland hydrology, principally determined by the presence of flowing water. Sampling location 4 was located out of the perennially flowing channel in Area 1, but drainage patterns were observed and historical aerial photographs show water flowing through the area.



Aerial Source: LAR-IAC, 2011

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Existing Vegetation

Exhibit 10a

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

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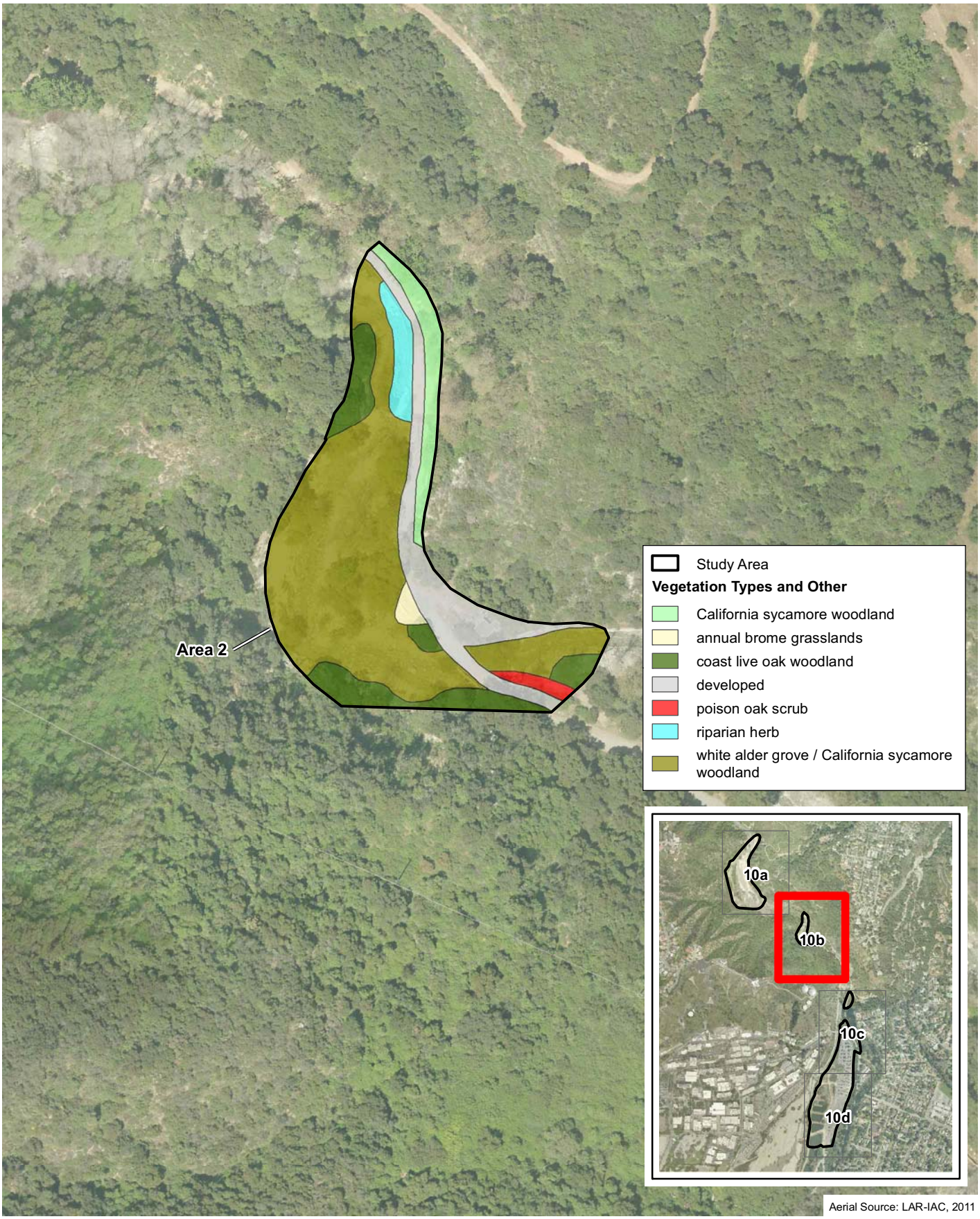

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Existing Vegetation

Exhibit 10b

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

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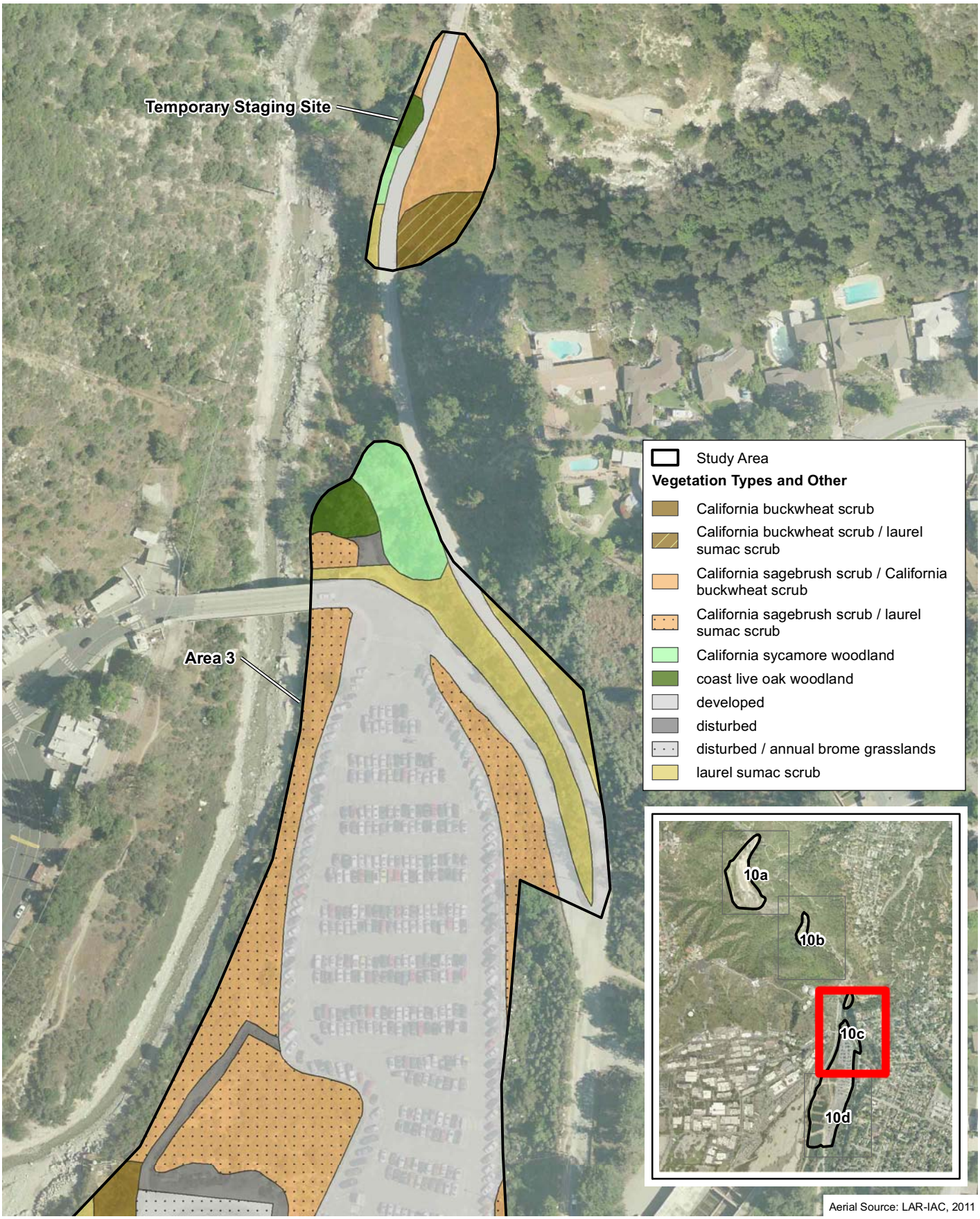

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Existing Vegetation

Exhibit 10c

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

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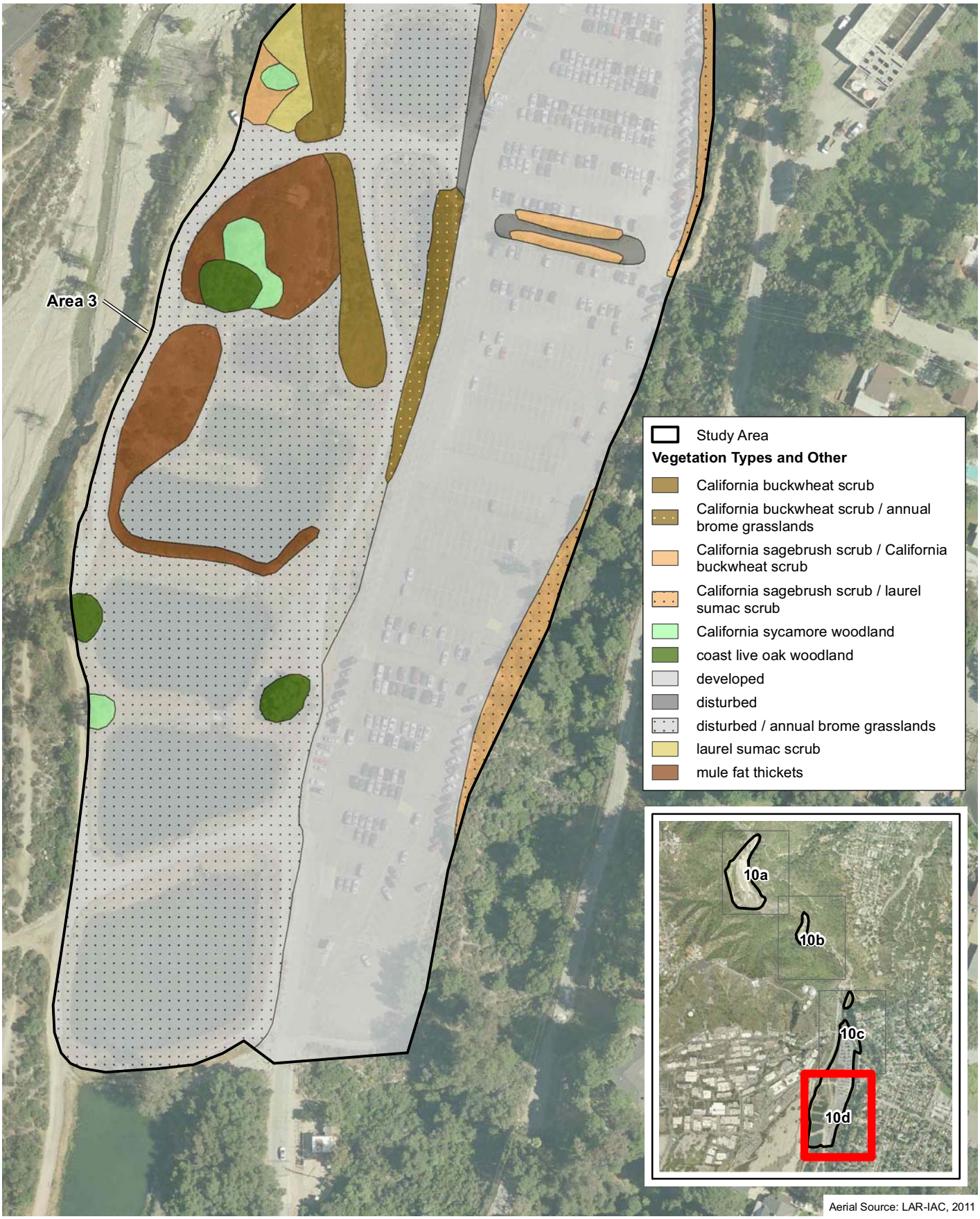

Aerial Source: LAR-IAC, 2011

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Existing Vegetation

Exhibit 10d

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

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TABLE 2
SUMMARY OF HYDROPHYTIC VEGETATION, HYDRIC SOILS, AND WETLANDS HYDROLOGY WETLANDS INDICATOR STATUS BY SOIL TEST PIT LOCATION

Soil Test Pit	Plant Species		Wetland Indicator Status*	Passed Dominance Test	Passed Prevalence Index	Meets Hydrophytic Vegetation Criterion	Meets Hydric Soils Criterion	Meets Wetlands Hydrology Criterion
	Botanical Name	**Common Name**						
1	*Salix lasiolepis*	arroyo willow	FACW	Yes	Yes	Yes	No	Yes
	Alnus rhombifolia	white alder	FACW					
	Typha latifolia	broad-leaved cattail	OBL					
	Baccharis salicifolia	mule fat	FAC					
	Rubus ursinus	California blackberry	FACU					
	Epilobium ciliatum	willow-herb	FACW					
	Nasturtium officinale	water cress	OBL					
	Hordeum murinum	barley	FACU					
	Ageratina adenophora	crofton weed	FACU					
2	*Salix lasiolepis*	arroyo willow	FACW	Yes	Yes	Yes	No	Yes
	Alnus rhombifolia	white alder	FACW					
	Baccharis salicifolia	mule fat	FAC					
	Epilobium ciliatum	willow-herb	FACW					
	Nasturtium officinale	water cress	OBL					
	Cyperus eragrostis	tall umbrella sedge	FACW					
	Urtica dioica	hoary nettle	FAC					
	Solanum douglasii	Douglas' nightshade	FAC					
3	*Salix lasiolepis*	arroyo willow	FACW	Yes	Yes	Yes	No	Yes
	Alnus rhombifolia	white alder	FACW					
	Platanus racemosa	western sycamore	FACW					
	Cyperus eragrostis	tall umbrella sedge	FACW					
	Urtica dioica	hoary nettle	FAC					

TABLE 2
SUMMARY OF HYDROPHYTIC VEGETATION, HYDRIC SOILS, AND WETLANDS HYDROLOGY WETLANDS INDICATOR STATUS BY SOIL TEST PIT LOCATION

Soil Test Pit	Plant Species		Wetland Indicator Status*	Passed Dominance Test	Passed Prevalence Index	Meets Hydrophytic Vegetation Criterion	Meets Hydric Soils Criterion	Meets Wetlands Hydrology Criterion
	Botanical Name	Common Name						
4	*Baccharis salicifolia*	mule fat	FAC	Yes	No	Yes	No	Yes
	Salix lasiolepis	arroyo willow	FACW					
	Artemisia douglasiana	mugwort	FAC					
	Pseudognaphalium californicum	California everlasting	UPL					
	Acmispon glaber	deerweed	UPL					
	Eulobus californicus	mustard-like evening primrose	UPL					
	Erigeron canadensis	common horseweed	FACU					
	Acmispon strigosus	strigose lotus	UPL					
	Isocoma menziesii	coastal goldenbush	FACU					
5	*Platanus racemosa*	western sycamore	FACW	No	Yes	Yes	No	Yes
	Salix lasiolepis	arroyo willow	FACW					
	Stipa miliacea	smilo grass	UPL					
6	*Quercus chrysolepis*	canyon live oak	UPL	Yes	Yes	Yes	No	Yes
	Alnus rhombifolia	white alder	FACW					
	Salix gooddingii	Goodding's black willow	FACW					
	Baccharis salicifolia	mule fat	FAC					
	Ageratina adenophora	crofton weed	FACU					
	Nasturtium officinale	water cress	OBL					
	Pseudognaphalium luteoalbum	weedy cudweed	UPL					
	Hirschfeldia incana	Shortpod mustard	UPL					
	Veronica anagallis-aquatica	water speedwell	OBL					
	Asclepias sp.	milkweed	FAC					

TABLE 2
SUMMARY OF HYDROPHYTIC VEGETATION, HYDRIC SOILS, AND WETLANDS HYDROLOGY WETLANDS INDICATOR STATUS BY SOIL TEST PIT LOCATION

Soil Test Pit	Plant Species		Wetland Indicator Status*	Passed Dominance Test	Passed Prevalence Index	Meets Hydrophytic Vegetation Criterion	Meets Hydric Soils Criterion	Meets Wetlands Hydrology Criterion
	Botanical Name	**Common Name**						
7	*Salix gooddingii*	Goodding's black willow	FACW	Yes	Yes	Yes	No	Yes
	Platanus racemosa	western sycamore	FACW					
	Baccharis salicifolia	mule fat	FAC					
	Cyperus eragrostis	tall umbrella sedge	FACW					
	Pseudognaphalium luteoalbum	weedy cudweed	UPL					
	Ageratina adenophora	crofton weed	FACU					
8	*Salix lasiolepis*	arroyo willow	FACW	Yes	Yes	Yes	No	Yes
	Alnus rhombifolia	white alder	FACW					
	Salix exigua	sandbar willow	FACW					
	Epilobium ciliatum	willow-herb	FACW					
	Nasturtium officinale	water cress	OBL					
	Schoenoplectus sp.	bulrush	OBL					
	Veronica anagallis-aquatica	water speedwell	OBL					

* FACW: facultative wetland; OBL: obligate wetland; FAC: facultative; FACU: facultative upland; UPL: obligate upland; NI: no indicator (i.e., insufficient information available to determine an indicator status).

3.4 CALIFORNIA RAPID ASSESSMENT METHOD

A total of three AAs were established in the proposed Project areas (two AAs in Area 1 and one AA in Area 2). CRAM scores associated with the jurisdictional resources were very high, which reflects the high quality of streambed resources on the proposed Project site. CRAM scores for the three AAs are (from north to south) are 91.5, 75.9, and 92.9. As described above in Section 2.5, scores for each of the four attributes can range from a minimum of 25 to a maximum of 100. CRAM scores provide an assessment of the level of the various functions and services provided by an aquatic system. A recent CRAM study in the San Gabriel River Watershed performed by the Southern California Coastal Water Research Project (SCCWRP 2010) provides some context for these scores. In this study, the highest score in this study was 91, recorded in areas of the upper San Gabriel River Watershed in the Angeles National Forest. The lowest score was 35, recorded in the lower portion of the river, which was channelized and lined with concrete. Two of the three CRAM scores recorded in the Arroyo Seco exceeded the highest recorded scores for the San Gabriel River. A summary of the results of the CRAM evaluation is provided in Table 3. The CRAM datasheets for each AA are provided in Attachment E. A summary of field conditions that determined the CRAM scores for each attribute is provided below.

TABLE 3
SUMMARY OF CRAM SCORES

Attribute	Metric	Score		
		AA1	**AA2**	**AA3**
Buffer and Landscape Context	Landscape Connectivity	A (12)	A (12)	A (12)
	Buffer Condition (sub-metrics below)			
	Percentage of Assessment Area Perimeter with Buffer	A (12)	A (12)	A (12)
	Average Buffer Width	B (9)	B (9)	B (9)
	Buffer Condition	A (12)	A (12)	A (12)
	Attribute Score	**96.5**	**96.5**	**96.5**
Hydrology	Water Source	A (12)	A (12)	B (9)
	Hydroperiod/Channel Stability	A (12)	B (9)	A (12)
	Hydrologic Connectivity	B (9)	B (9)	A (12)
	Attribute Score	**91.7**	**83.3**	**91.7**
Physical Structure	Structural Patch Richness	A (12)	C (6)	A (12)
	Topographic Complexity	A (12)	B (9)	A (12)
	Attribute Score	**100.0**	**62.5**	**100.0**
Biotic Structure	Plant Community (sub-metrics below)			
	Number of Plant Layers	A (12)	A (12)	A (12)
	Number of Co-dominant Species	C (6)	C (6)	A (12)
	Percent of Co-dominant Species Known to be Invasive	A (12)	A (12)	A (12)
	Horizontal Interspersion/Plant Zonation	B (9)	C (6)	B (9)
	Vertical Biotic Structure	B (9)	C (6)	B (9)
	Attribute Score	**77.8**	**61.1**	**83.3**
	Overall AA Score	***91.5***	***75.9***	***92.9***

Note: Scores are shown as the letter grade given to each metric with the corresponding numeric score in parentheses.

3.4.1 BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE

Each of the AAs received the same overall score for this attribute. The Landscape Connectivity, Perimeter Buffer, and Buffer Condition metrics all received maximum scores of 'A" due to the setting in a natural open space area. Minor obstacles to connectivity exist in the vicinity of the AAs, but they are minor, consisting of small bridges that primarily handle pedestrian traffic and small water-control structures (e.g., the PWP headworks structure in Area 1 and the inlet diversion structure in Area 2). A slightly lower score of 'B' was given to the AAs for the Buffer Width metric, as each AA has a non-buffering land use to the east of the AAs. For AAs 1 and 3, this consisted of a paved road, approximately 5–10 meters away and for AA 2, this consisted of a developed housing parcel approximately 100 meters away. Generally undisturbed native vegetation and soils exist for a buffering distance of more than 250 meters to the west of each AA.

3.4.2 HYDROLOGY ATTRIBUTE

Each of AAs received scores of either 'A' or 'B' for each of the metrics under this attribute. Scores for the Water Source metric were high because water that enters the proposed Project area flows directly out of the Angeles National Forest with no apparent diversions or urban runoff. A slightly lower score was given to AA3 in Area 2 due to the water diversion weir and inlet structure that affects the natural water regime for the area. The streambed in AA1 and AA3 was in equilibrium (no aggradation or degradation indicators observed) and received a score of 'A' for the Hydroperiod/Channel Stability metric. However, AA2 (downstream portion of Area 1) was slightly more incised with some evidence of undercut banks and received a score of 'B'. This is likely due to the presence of the headworks structure, which decreases the amount sediment passing downstream, allowing water to slightly erode the banks without providing sediment to reestablish the bank profile. The slight degradation and steeper banks that were noted in AA2 also resulted in a slightly lower score for the Hydrologic Connectivity metric.

3.4.3 PHYSICAL STRUCTURE ATTRIBUTE

For the Structural Patch Richness and Topographic Complexity metrics that comprise this attribute, AAs 1 and 3 both received maximum scores. Both of these areas exhibited a good deal of microtopographic heterogeneity that provides a variety of habitat niches. Slightly lower scores were given to AA2. This is also likely a result of the presence of the PWP headworks structure. Because this AA is slightly more incised, the banks are steeper with only a single break in the bank. Water also moves through the area more quickly, discouraging the development of physical patch types observed in AAs 1 and 3.

3.4.4 BIOTIC STRUCTURE ATTRIBUTE

Maximum scores for the Number of Plant Layers and Percent of Invasive Species metrics were given to each of the AAs. The only invasive species noted as a dominant species was tree tobacco (*Nicotiana glauca*) in AA2. The composition and overall cover of vegetation within the three AAs was similar, with white alder, mule fat (*Baccharis salicifolia*), California sycamore, and arroyo willow all being commonly observed. AAs 1 and 2 received a lower score for the total number of dominant species only because AA3 had a greater number of dominant annual herbaceous species in the lowest strata. Scores for the Horizontal Interspersion/Plant Zonation and Vertical Biotic Structure metrics were slightly lower for AA2. Where AAs 1 and 3 have a variety of herbaceous, shrub, and tree species that provide significant overlap, as well as occasional open gaps in vegetation along the banks, AA2 has a more uniform coverage of species, principally arroyo willow with less developed shrub and groundlayer strata.

SECTION 4.0 JURISDICTIONAL DELINEATION

Jurisdictional resources delineated in the survey area include the Arroyo Seco Channel (Areas 1 and 2) and the PWP spreading grounds (Area 3).

4.1 U.S. ARMY CORPS OF ENGINEERS DETERMINATION

4.1.1 "WATERS OF THE U.S." DETERMINATION (NON-WETLAND)

The Arroyo Seco appears to be a perennial stream. This channel receives waters from the San Gabriel Mountains; it receive waters from urban runoff from commercial and residential neighborhoods; and it receives surface water as it infiltrates into the soil, resulting in a distribution of surface water year-round (see distribution of open water in Exhibit 11). The spreading grounds at the southern end of the Project site display intermittent surface water controlled by an inlet structure within Area 2. Beyond the southern extent of the study area for this report, the Arroyo Seco flows southwest towards Devil's Gate Dam, where it is released through a concreted channel that eventually discharges into the Los Angeles River, a traditionally navigable water (TNW), approximately ten river miles and nine aerial miles from the survey area.

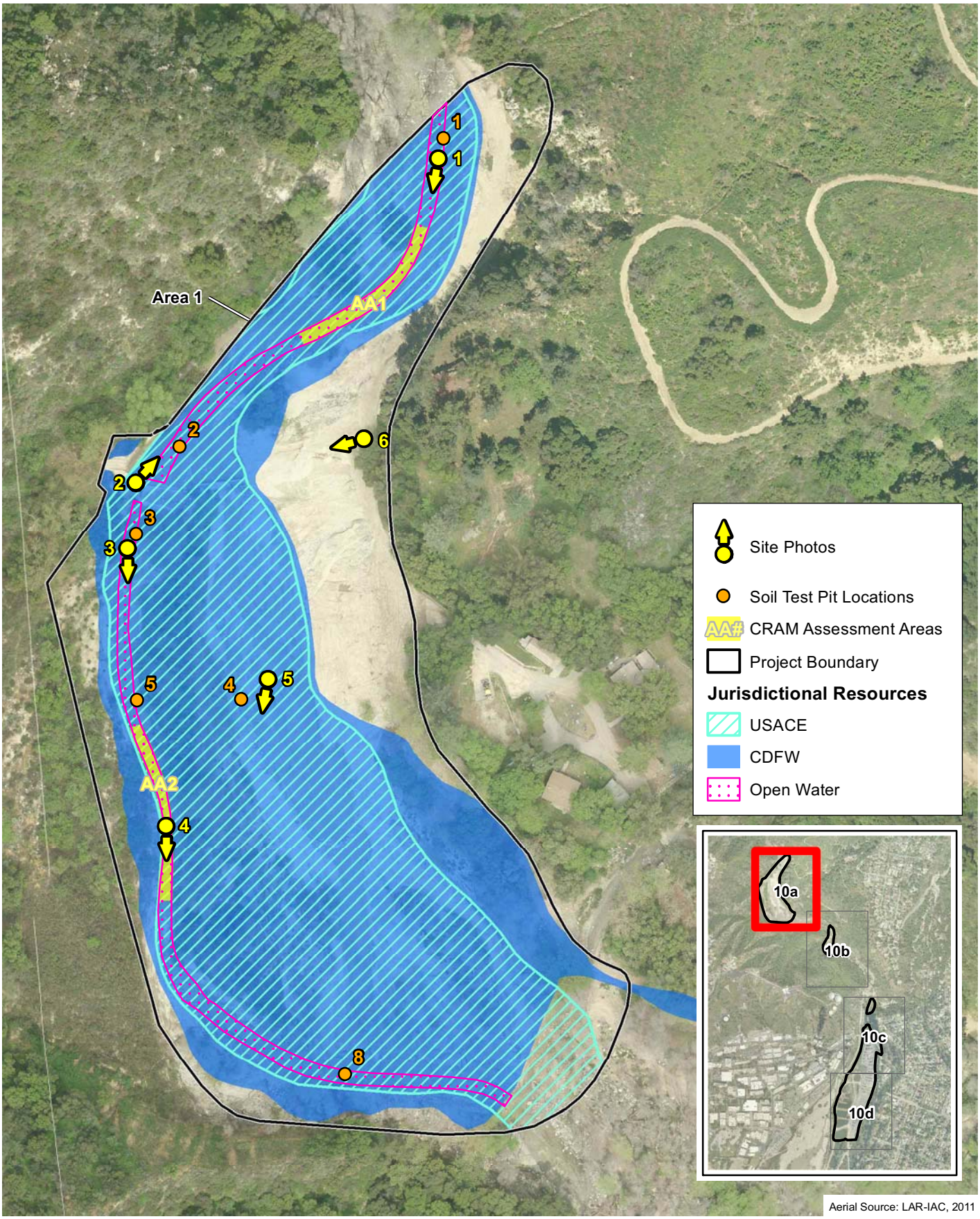
Non-wetland "waters of the U.S." are drainage features that conduct water at some point during the year, evidenced by the presence of an OHWM, but do not satisfy all three criteria to be considered a wetland. The limits of non-wetland "waters of the U.S." are defined by the presence of the OHWM. Evidence of the OHWM in the survey area includes surface relief, scour line(s), flowing water and break(s) in bank slopes.

Based on field observations and data collected, the Arroyo Seco would be considered "Relatively Permanent Waters" and based on the evident connection with the Los Angeles River, the Arroyo Seco has a "Significant Nexus" with a TNW. For these reasons, waters within the OHWM limits of Areas 1 and 2 would be under the jurisdiction of the USACE. In all, a total of 10.22 acres of non-wetland "waters of the U.S." occur within the Project boundaries (Table 4; Exhibit 11).

Based on the currently proposed limits of disturbance, approximately 0.48 acre of non-wetland "waters of the U.S." (of which 0.02 acre is open water) would be permanently impacted (Exhibit 12). However, it should be noted that three of the proposed activities (removal of the headworks structure, and placement of woody structures) are considered permanent impacts but are self-mitigating aspects of the Project. This is because the jurisdictional areas will benefit from these proposed activities (e.g., water will move naturally into Area 1 instead of managed with a weir system) and compensatory mitigation should not be required. The establishment of an at-grade pedestrian trail within Area 1 should also not require compensatory mitigation because no dredging or filling of jurisdictional waters will be required. Therefore, the total amount of permanent impacts to "waters of the U.S." that would require compensatory mitigation would be 0.11 acre.

In addition to the permanent impacts described above, a total of 3.67 acres of "waters of the U.S." will be temporarily impacted during Project construction. These impacts consist of (1) minor grading in Area 1 to create a new stream channel; (2) construction buffers where construction equipment will need to be operated in Areas 1 and 2; and (3) placement of sand bags upstream of construction areas in Areas 1 and 2 to divert water around the work area.

No jurisdictional waters are located within the temporary staging site area.



Aerial Source: LAR-IAC, 2011

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Jurisdictional Resources

Exhibit 11a

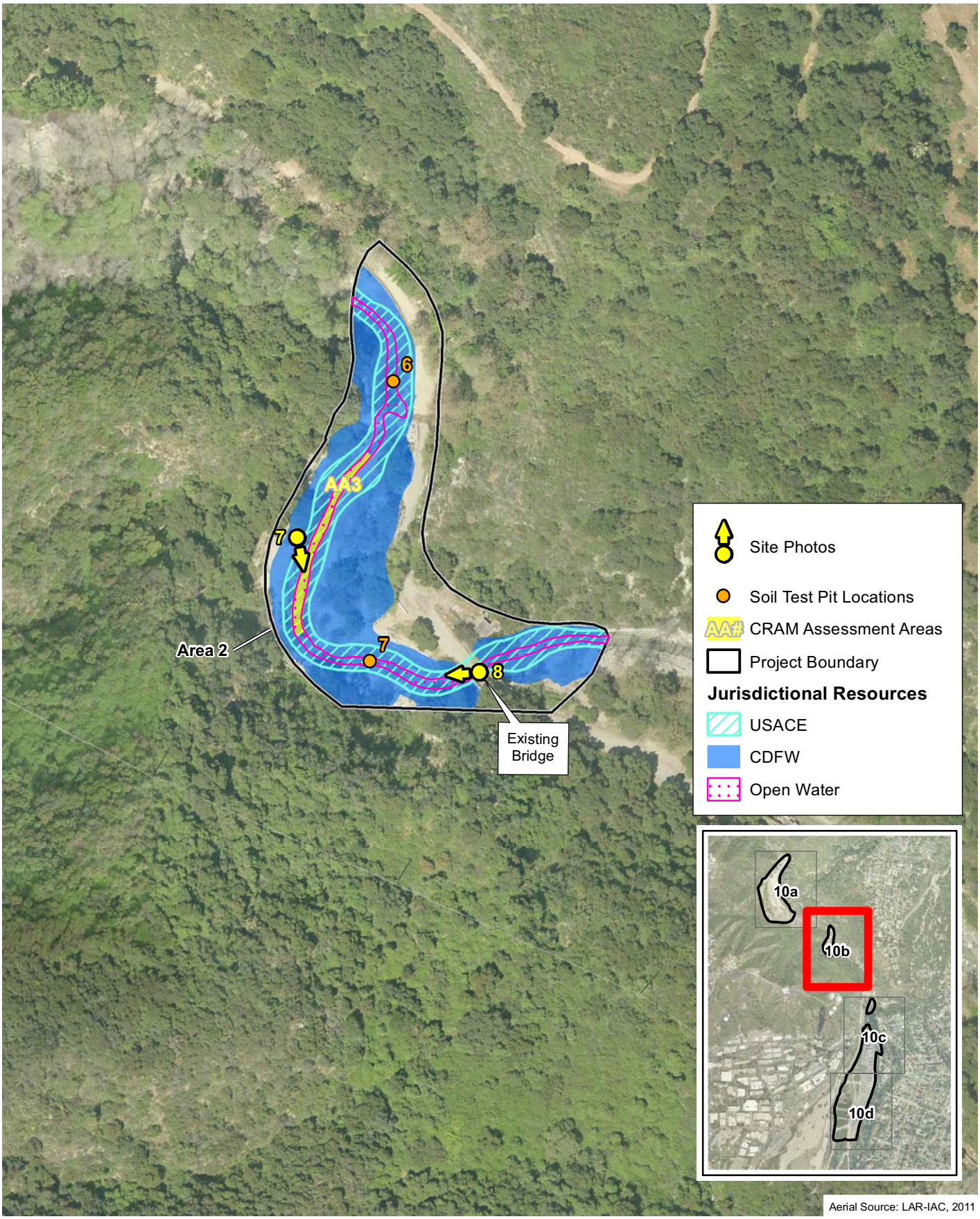
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

(Rev: 5-21-2014 CJS) Projects\Carollo\J041\Graphics\JD\ex11_juris_resources.pdf



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Jurisdictional Resources

Exhibit 11b

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

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Jurisdictional Resources

Exhibit 11c

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

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Jurisdictional Resources

Exhibit 11d

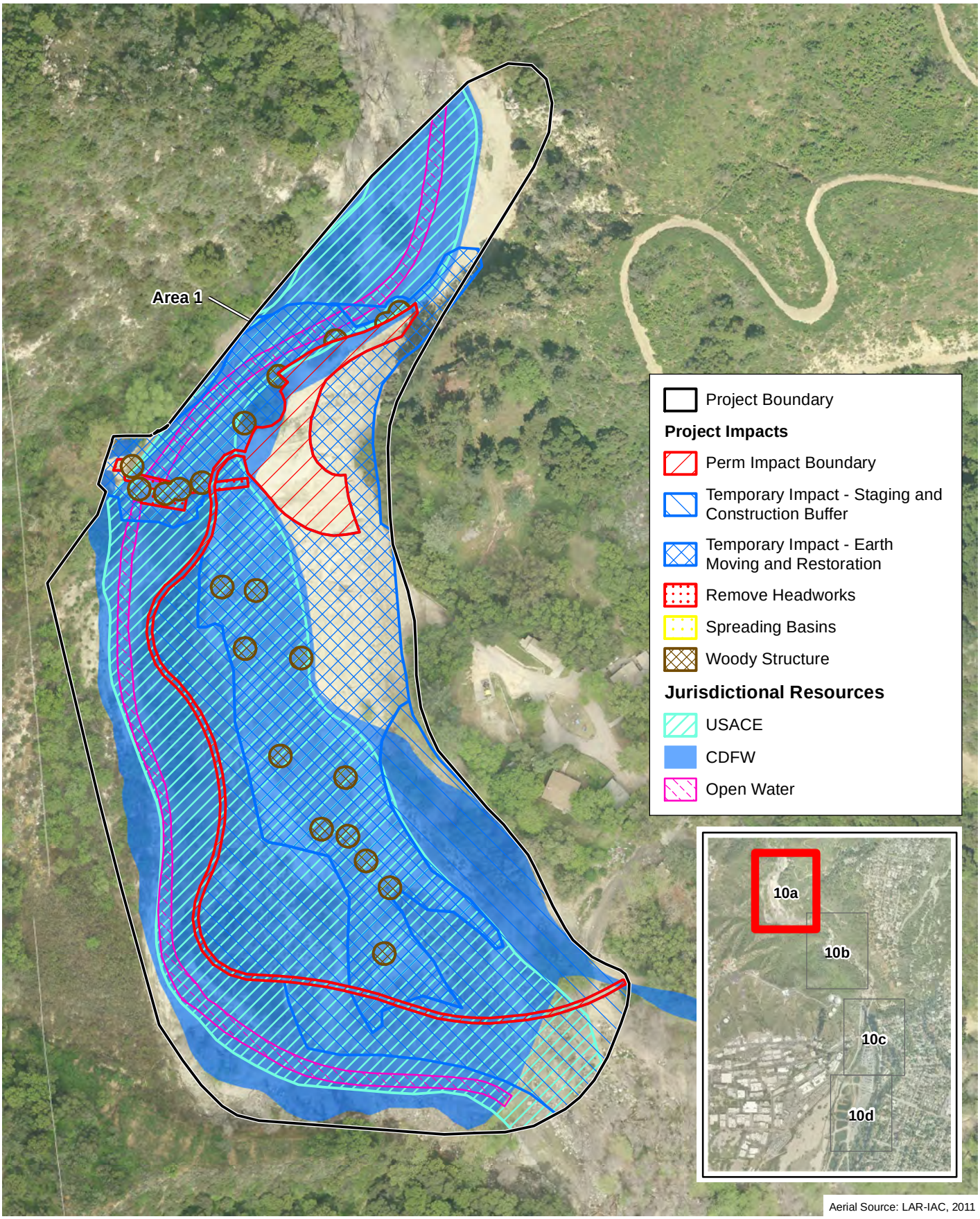
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra CONSULTING

(Rev: 5-21-2014 CJS) Projects\Carollo\J041\Graphics\JD\ex11_juris_resources.pdf



Aerial Source: LAR-IAC, 2011

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Jurisdictional Resources – Proposed Impacts

Exhibit 12a

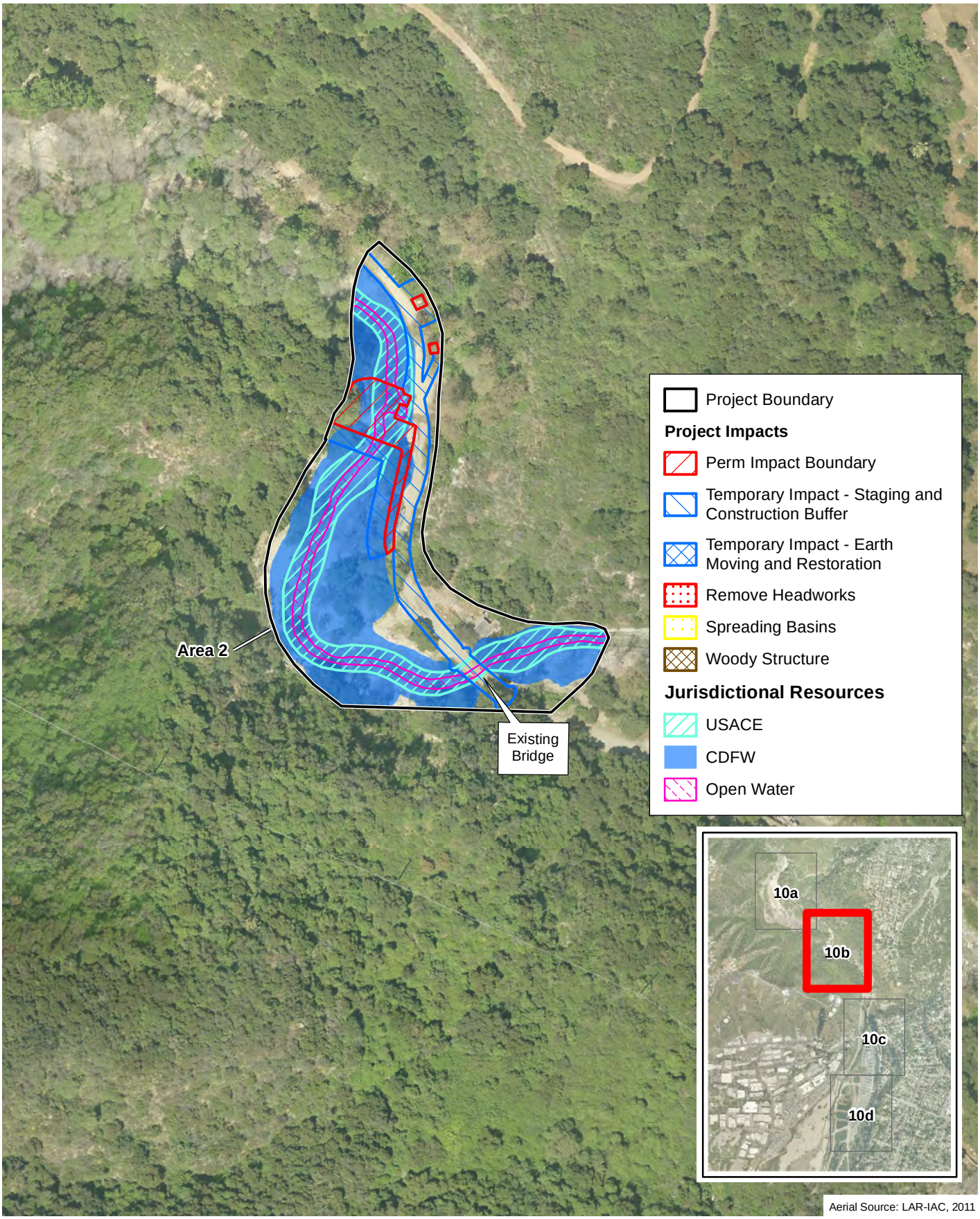
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra PSOMAS

(Rev: 8-19-2014 CJS) Projects\Carollo\J041\Graphics\JD\ex12_Impact_JD.pdf



Aerial Source: LAR-IAC, 2011

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Jurisdictional Resources – Proposed Impacts

Exhibit 12b

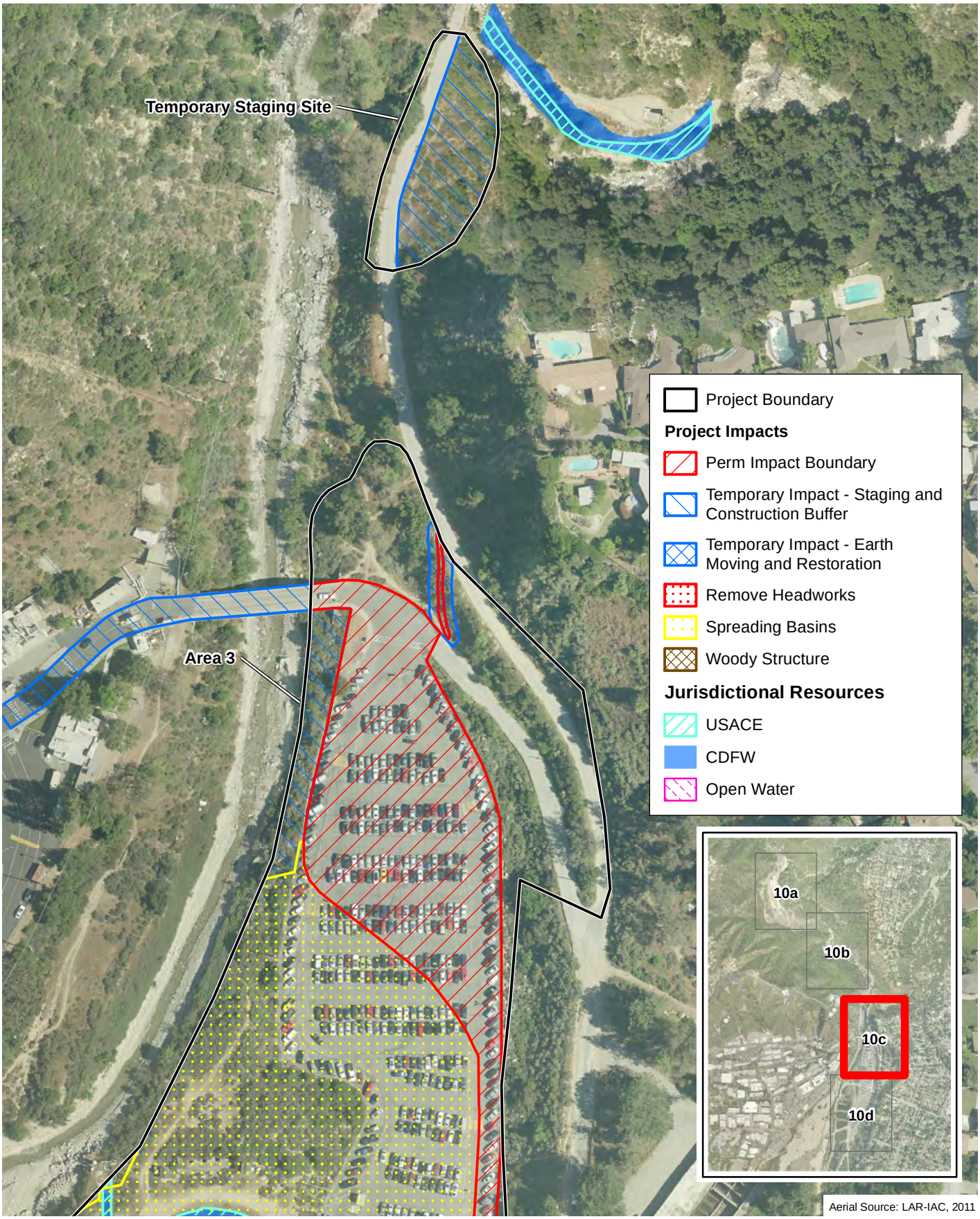
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra PSOMAS

(Rev: 8-19-2014 CJS) Projects\Carollo\J041\Graphics\JD\ex12_Impact_JD.pdf



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Jurisdictional Resources – Proposed Impacts

Exhibit 12c

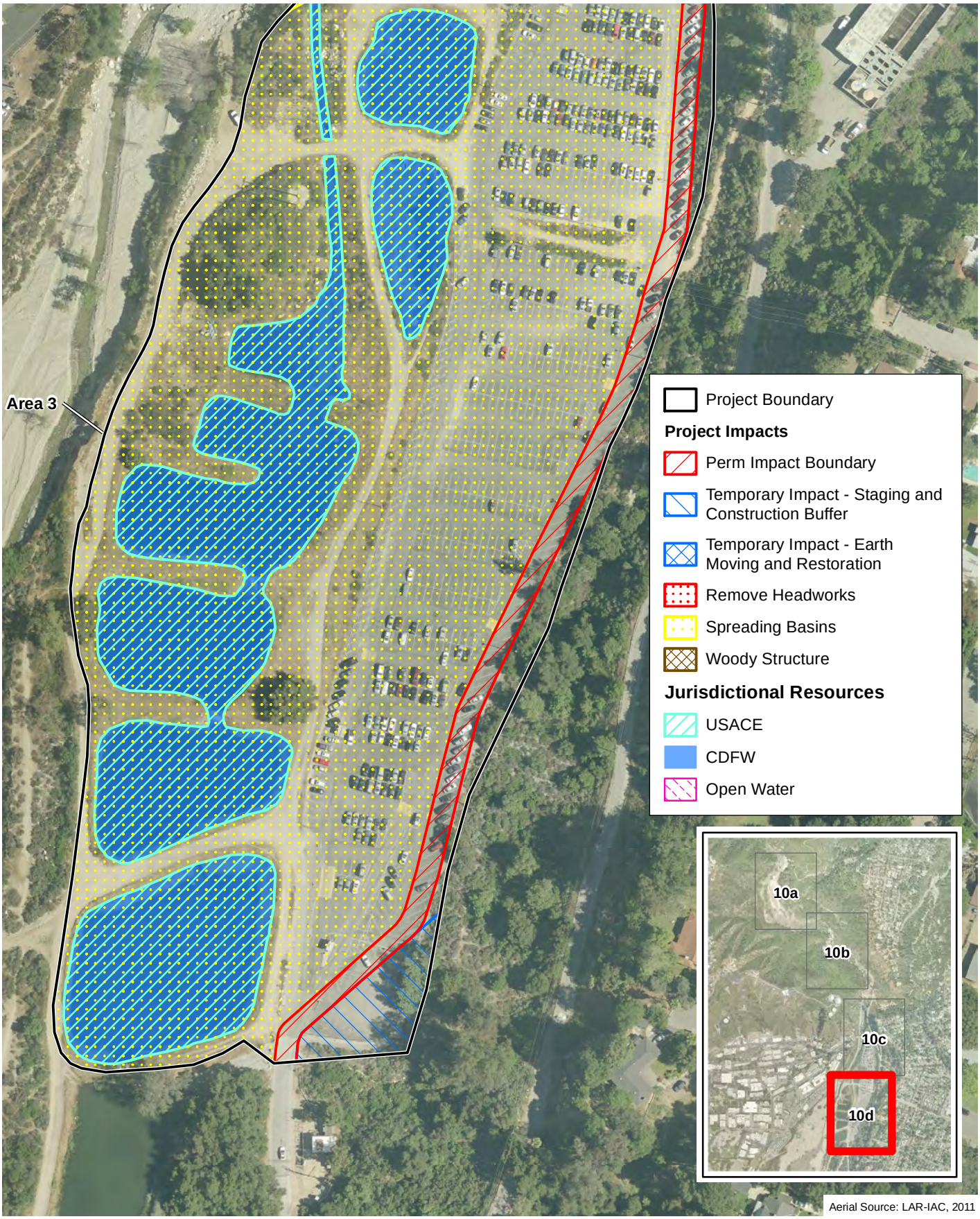
Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

BonTerra PSOMAS

(Rev: 8-19-2014 CJS) Projects\Carollo\J041\Graphics\JD\ex12_Impact_JD.pdf



Aerial Source: LAR-IAC, 2011

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Jurisdictional Resources – Proposed Impacts

Exhibit 12d

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

N W E S

150 75 0 150 Feet

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4.1.2 WETLAND "WATERS OF THE U.S." DETERMINATION

As previously described in Section 2.0 of this report, an area must exhibit all three wetland parameters, as described in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008c) and the *Corps of Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) in order to be considered a jurisdictional wetland. Because none of the eight sampling locations within the survey areas for the Project exhibited all three of the necessary parameters to be considered a wetland (i.e., hydrophytic vegetation, hydric soils, wetland hydrology), it was determined that wetland conditions do not exist on site. Wetland Determination Data Forms that document field observations are provided in Attachment C.

TABLE 4
JURISDICTIONAL RESOURCES IMPACTED FOR EACH PROJECT IMPROVEMENT

	Jurisdictional Resources					
	USACE Jurisdiction					
	Open Water	Other Non-Wetland "Waters of the U.S."	Total	Isolated Waters	Total RWQCB Jurisdiction[a]	Total CDFW Jurisdiction
Existing Jurisdictional Resources (acres)						
Area 1	0.52	5.26	5.78	0.00	5.78	6.90
Area 2	0.17	0.40	0.57	0.00	0.57	1.32
Area 3	0.00	0.00	0.00	3.87	3.87	3.87
Total	*0.69*	*5.66*	**6.35**	**3.87**	**10.22**	**12.09**
Permanent Impacts (acres)						
Removal of headworks structure (Area 1)	–	0.02	0.02[b]	–	0.02[b]	0.02[b]
Bank stabilization for picnic area (Area 1)	–	0.04	0.04	–	0.04	0.11
Trail construction (Area 1)	–	0.15	0.15[b]	–	0.15[b]	0.16
Placement of woody structures (Area 1)	–	0.20	0.20[b]	–	0.20[b]	0.20[b]
Construction of new diversion weir/inlet structure (Area 2)	0.02	0.05	0.07	–	0.07	0.08
Construction of rip-rap bank stabilization (Area 2)	–	–	–	–	–	0.03
Total Permanent Impacts	**0.02**	**0.46**	**0.48**	**0.00**	**0.48**	**0.60**
Temporary Impacts (acres)						
Streambed restoration (Area 1)	–	1.52	1.52	–	1.52	1.52
Construction buffer for headworks removal, streambed restoration, bank stabilization (Area 1)	0.07	2.05	2.12	–	2.12	2.40

TABLE 4
JURISDICTIONAL RESOURCES IMPACTED FOR EACH PROJECT IMPROVEMENT

	Jurisdictional Resources					
	USACE Jurisdiction					
	Open Water	Other Non-Wetland "Waters of the U.S."	Total	Isolated Waters	Total RWQCB Jurisdiction[a]	Total CDFW Jurisdiction
Place sand bags for streambed diversion (Areas 1 and 2)	0.01	–	0.01	–	0.01	0.01
Construction buffer for new diversion weir/inlet structure and bank stabilization (Area 2)	0.01	0.01	0.02	–	0.02	0.08
Expansion of Spreading Basins (Area 3)	–	–	–	3.87	3.87	3.87
Total Temporary Impacts	**0.09**	**3.58**	**3.67**	**3.87**	**7.54**	**7.88**

USACE: U.S. Army Corps of Engineers; RWQCB: Regional Water Quality Control Board; CDFW: California Department of Fish and Wildlife.

[a] RWQCB jurisdiction generally matches that of the USACE, but also includes "isolated waters".
[b] These impacts should not result in a loss of ecological/hydrological functioning of the streambed and should not require compensatory mitigation.

4.2 CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD DETERMINATION

The RWQCB jurisdictional boundaries are defined as those determined for the USACE under "waters of the U.S.". However, the RWQCB takes jurisdiction over both connected and isolated waters. Isolated features (those that do not have a direct connection to a TNW or do not meet the "significant nexus" threshold) are under the jurisdiction of the RWQCB, but not the USACE.

In addition to the 0.48 acre of permanent impacts to non-wetland "waters of the U.S." that are described above in Section 4.1, the RWQCB's jurisdiction would include 3.87 acres of isolated waters (i.e., the spreading basins within Area 3) that will be permanently impacted. Therefore the total amount of RWQCB jurisdictional "waters of the State" that will be permanently impacted by the Project would be 4.33 acres (Table 4; Exhibits 11 and 12). However, as noted above, the removal of the headworks structure; the placement of woody structures to encourage natural recruitment of vegetation; the creation of the pedestrian trail; and the expansion of the spreading basins are all aspects of the proposed Project that are either self-mitigating (i.e., will result in an improvement of riparian or wetland function) or will not involve dredging/filling of jurisdictional waters. The total amount of permanent impacts to RWQCB jurisdiction that would require compensatory mitigation would be 0.11 acre.

In addition to the permanent impacts described above, a total of 7.54 acres of RWQCB jurisdiction will be temporarily impacted during Project construction. These impacts consist of (1) minor grading in Area 1 to create a new stream channel; (2) construction buffers where construction equipment will need to be operated in Areas 1 and 2; (3) placement of sand bags upstream of construction areas in Areas 1 and 2 to divert water around the work area; and (4) grading within the spreading basis in Area 3 for expansion.

4.3 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE DETERMINATION

The CDFW jurisdiction extends from the top of the bank to the top of the bank, except where there is adjacent riparian vegetation. Based on field observations and data collected, a total of 8.42 acres under CDFW jurisdiction pursuant to Section 1602 of the *California Fish and Game Code* occur in the survey area.

The Arroyo Seco Canyon Project would impact a total of 8.48 acres under the jurisdiction of the CDFW (0.60 acre permanent; 7.88 acre temporary) (Table 4; Exhibits 11 and 12). Permanent impacts consist of removal of the PWP headworks structure, bank stabilization for the picnic area; pedestrian trail construction; placement of woody structures; and construction of a new diversion weir/inlet structure. As noted above, several of these tasks should be considered self-mitigating as they will improve the quality and functioning of the jurisdictional areas. However, while the pedestrian trail construction in Area 1 is discussed as not requiring mitigation as an impact to "waters of the U.S." the trail will require the removal and permanent maintenance of willow and mule fat habitat. As a result, the pedestrian trail is considered a permanent impact to CDFW jurisdiction. Therefore, the total amount of permanent impacts that would require compensatory mitigation is 0.38 acre.

Temporary impacts consist of (1) minor grading in Area 1 to create a new stream channel; (2) construction buffers where construction equipment will need to be operated in Areas 1 and 2; (3) placement of sand bags upstream of construction areas in Areas 1 and 2 to divert water around the work area; and (4) grading within the spreading basis in Area 3 for expansion.

SECTION 5.0 CONCLUSION OF REGULATORY APPROVAL PROCESS

5.1 REGULATORY PERMIT REQUIREMENTS

The following is a general summary of the various permits, agreements, and certifications required prior to initiation of Project activities that would involve impacts to areas under the jurisdiction of the USACE, the RWQCB, and/or the CDFW.

- USACE Section 404 Permit;
- RWQCB Section 401 Water Quality Certification; and
- CDFW Section 1602 Streambed Alteration Agreement.

It should be noted that all regulatory permit applications can be processed concurrently. The USACE permit would be issued subject to the receipt of the RWQCB's Section 401 Water Quality Certification. There is no filing fee for the Section 404 Permit. The Section 401 Water Quality Certification filing fee has a $1,097 base fee with additional fees based on the size of the dredge or fill unless the Project qualifies for a flat fee. For low impact discharges (e.g., discharge of less than 0.1 acre, 200 linear feet, and 25 cubic yards), there is no charge above the base fee. For fill and excavation discharges, there is an additional $4,717 per acre of discharge. For dredging discharges, there is an additional $0.174 per cubic yard of dredge volume. For channel and shoreline discharges, there is an additional $10.97 per linear foot of discharge. For discharges to isolated waters the applicable fee is doubled, except for restoration projects.

The CDFW's Streambed Alteration Agreement filing fee is based on project cost and length of permit authorization. For projects lasting 5 years or less, the maximum fee is $4,912.25 for projects costing $500,000 or more; the fee decreases as cost decreases. For projects lasting longer than five years, there is a base fee of $2,947.50 plus a maximum of $4,912.25. The current fee schedule can be found on the CDFW website at: http://www.dfg.ca.gov/habcon/1600/forms.html. The CDFW will not deem the application complete until the application fees have been paid and the agency is provided with a certified California Environmental Quality Act (CEQA) document and a signed copy of the receipt of County Clerk filing fees for the Notice of Determination (NOD). In addition, land use jurisdictions can no longer make "de minimis" findings if they determine that the project will not impact resources under the CDFW's jurisdiction. Therefore, the finding of "No Impact" to the CDFW jurisdictional resources must now be made by the CDFW prior to the payment of CDFW fees.

A detailed explanation of the regulatory permitting requirements for impacts to jurisdictional resources is provided in Sections 5.2 through 5.5.

5.2 U.S. ARMY CORPS OF ENGINEERS

Regulatory authorization in the form of an NWP is provided for certain categories of activities (e.g., repair, rehabilitation, or replacement of a structure or fill which was previously authorized; utility line placement; bank stabilization). The current set of NWPs became effective on March 19, 2012, and will expire in on March 18, 2017. NWPs authorize only those activities with minimal adverse effects on the aquatic environment and are valid only if the conditions applicable to the permits are met or waivers to these conditions are provided in writing from the USACE. Please note that waivers may require consultation with affected federal and State agencies, a lengthy process with no mandated processing time frames. If these conditions cannot be met, an Individual Permit (IP) will be required. "Waters of the U.S." temporarily filled, flooded, excavated, or drained but restored to pre-construction contours and elevations after construction are not

included in the measurement of loss of “waters of the U.S.”. The appropriate permit authorization will be based on the amount of impacts to “waters of the U.S.”, as determined by the USACE.

5.2.1 JURISDICTIONAL DETERMINATIONS

Pursuant to USACE Regulatory Guidance Letter (RGL) 08-02 (dated June 26, 2008), the USACE can issue two types of jurisdictional determinations to implement Section 404 of the CWA: Approved Jurisdictional Determinations (JDs) and Preliminary JDs (USACE 2008a). An Approved JD is an official USACE determination that jurisdictional “waters of the U.S.”, “Navigable Waters of the U.S.”, or both are either present or absent on a site. An Approved JD also identifies the precise limits of jurisdictional waters within a Project site.

The USACE will provide an Approved Jurisdictional Determination when (1) an applicant requests an official jurisdictional determination; (2) an applicant contests jurisdiction over a particular water body or wetland; or (3) when the USACE determines that jurisdiction does not exist over a particular water body or wetland. The Approved Jurisdictional Determination then becomes the USACE’s official determination that can then be relied upon over a five-year period to request regulatory authorization as part of the permit application.

In addition, an Applicant may decline to request an Approved Jurisdictional Determination and instead obtain a USACE IP or General Permit Authorization based on a Preliminary Jurisdictional Determination or, in certain circumstances (e.g., authorizations by non-reporting nationwide general permits), with no Jurisdictional Determination.

Preliminary Jurisdictional Determinations are non-binding, advisory in nature, and may not be appealed. They indicate that there may be “waters of the U.S.” on a project site. An applicant may elect to use a Preliminary Jurisdictional Determination to voluntarily waive or set aside questions regarding CWA jurisdiction over a site, usually in the interest of allowing the applicant to move ahead expeditiously with the permitting process. The USACE will determine what form of Jurisdictional Determination is appropriate for a particular project site. Given the type and extent of project impacts and duration of construction, the USACE will likely approve the Jurisdictional Delineation Report through a Preliminary Jurisdictional Determination.

On January 31, 2007, the USACE published a memorandum clarifying the Interim Guidance for amendments to the National Historic Preservation Act and the Advisory Council on Historic Preservation (ACHP) implementing regulations (USACE 2007). The Interim Guidance applies to all Department of the Army requests for authorization/verification, including Individual Permits (standard permits and letters of permission) and all Regional General Permits (RGPs) and NWPs. The State or Tribal Historic Preservation Officer (SHPO/THPO) has 30 days to respond to a determination that a proposed activity, that otherwise qualifies for an NWP or RGP, has no effect or no adverse effect on a historic property. If the SHPO/THPO does not respond within 30 days of notification, the Los Angeles District may proceed with verification. If the SHPO/THPO disagrees with the District’s determination, the District may work with the SHPO/THPO to resolve the disagreement or request an opinion from the ACHP. The USACE will submit the Draft Jurisdictional Delineation Report to the SHPO/THPO for review prior to initiating the actual regulatory process.

The USACE Regulatory Branch Offices will coordinate with the USEPA Regional Office and USACE Headquarters (HQ), as outlined in its January 28, 2008, memorandum entitled the "Process for Coordinating Jurisdictional Delineations Conducted Pursuant to Section 404 of the Clean Water Act in Light of the *Rapanos* and *SWANCC* Supreme Court Decisions" (USACE 2008b). The guidance provided in this memorandum is quoted as follows:

1. Effective immediately, unless and until paragraph 5(b) of the June 5, 2007, Rapanos guidance coordination memorandum is modified by a joint memorandum from Army and EPA, we will follow these procedures:
    a. For jurisdictional determinations involving significant nexus determinations, USACE districts will send copies of draft jurisdictional delineations via e-mail to appropriate EPA regional offices. The EPA regional office will have 15 calendar days to decide whether to take the draft jurisdictional delineation as a special case under the January 19, 1989, "Memorandum of Agreement Between the Department of the Army and the USEPA Concerning the Determination of the Section 404 Program and the Application of the Exceptions under Section 404(f) of the Clean Water Act." If the EPA regional office does not respond to the district within 15 days, the district will finalize the jurisdictional determination.
    b. For jurisdictional determinations involving isolated waters determinations, the agencies will continue to follow the procedure in paragraph 5(b) of June 5, 2007, coordination memorandum, until a new coordination memorandum is signed by USACE and EPA. (In accordance with paragraph 6 of the June 5, 2007, coordination memorandum, this is a 21-day timeline that can only be changed through a joint memorandum between agencies).
2. Approved JDs are not required for non-reporting NWPs, unless the project proponent specifically requests an approved JD. For proposed activities that may qualify for authorization under a State Programmatic General Permit (SPGP) or RGP, an approved JD is not required unless requested by the project proponent.
3. The USACE will continue to work with EPA to resolve the JDs involving significant nexus and isolated waters determinations that are currently in the elevation process.
4. USACE districts will continue posting completed Approved JD Forms on their web pages.

Please note that if the USACE determines that the channels are jurisdictional and would be impacted by project implementation, the Applicant will be required to obtain a CWA Section 401 Water Quality Certification from the RWQCB before the USACE will issue the Section 404 permit. That is, the USACE may issue a "Denial Without Prejudice" as part of the issuance of the Section 404 permit that makes the permit valid once the Section 401 Water Quality Certification is issued. If the USACE determines that the impacted drainage is not jurisdictional, the Applicant will be required to obtain RWQCB authorization under the provisions of a Report of Waste Discharge (ROWD).

Please also note that the USACE has prepared Draft Guidelines on Identifying Waters Protected by the Clean Water Act (Act) to implement the U.S. Supreme Court's decisions concerning the extent of waters covered by the Act (*Solid Waste Agency of Northern Cook County v. USACE* [SWANCC] and *Rapanos v. United States* [Rapanos]). The review period for the draft guidelines ended in July 2011. The Environmental Protection Agency and the USACE will now consider comments received on the draft guidelines, make revisions where appropriate, finalize and undertake rulemaking consistent with the Administrative Procedure Act. The result will be a "nonbinding guidance" for the identification of resources under the jurisdiction of the USACE. The final guidance will not affect jurisdictional delineations that have already received approval from the USACE.

5.3 REGIONAL WATER QUALITY CONTROL BOARD

As noted above, issuance of the USACE Section 404 permit would be contingent upon the approval of a Section 401 Water Quality Certification from the Los Angeles RWQCB. Also, the RWQCB requires certification of the project's CEQA documentation before it will approve the Section 401 Water Quality Certification or ROWD. The RWQCB, as a responsible agency, will use the project's CEQA document to satisfy its own CEQA-compliance requirements.

Upon acceptance of a complete permit application, the RWQCB has between 60 days and 1 year to make a decision regarding the permit request. That is, USACE regulations indicate that the RWQCB has 60 days from the date of receipt of a completed application that requests water quality certification to make a decision (33 CFR §325.2[b][1][ii]). The USACE District Engineer may specify a longer time (up to one year) or shorter time based on his/her determination of a reasonable processing time (33 CFR §325.2[b][1][ii]). If the RWQCB determines that more than 60 days are needed to process the request, it has the option of requesting additional time from the USACE. Also, the RWQCB has the option of issuing a "Denial Without Prejudice", which does not mean that the request is denied, but that it requires more information in order to make a decision. This effectively stops the processing clock until this information is provided.

The RWQCB is required under *California Code of Regulations* (CCR) (Title 23, §3858[a]) to have a "minimum 21 day public comment period" before any action can be taken on the Section 401 application. This period closes when the RWQCB acts on the application. Since projects often change or are revised during the Section 401 permit process, the comment period can remain open. The public comment period starts as soon as an application has been received. Generally, the RWQCB Section 401, USACE Section 404, and CDFW Section 1602 permit applications are submitted at the same time. However, the RWQCB Section 401 Water Quality Certification may take longer to process.

The RWQCB requires the Applicant to address urban storm water runoff during and after construction in the form of Best Management Practices (BMPs). These BMPs are intended to address the treatment of pollutants carried by storm water runoff and are required in all complete applications. Please note that the application would also require the payment of an application fee, which would be based on project impacts.

5.4 CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The CDFW regulates all work (including initial construction and ongoing operation and maintenance) that may substantially divert or obstruct the natural flow of or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake through its Streambed Alteration Program. An Applicant must enter into an agreement with the CDFW to ensure no net loss of wetland values and acreages.

Impacts resulting from Project implementation will require a Section 1602 Streambed Alteration Agreement. The Streambed Alteration Agreement must address the initial construction and long-term operation and maintenance of any structures within areas identified as "waters of the State" (such as a culvert or desilting basin) that may require periodic maintenance if these are included in the project design.

Prior to construction, a notification (Streambed Alteration Agreement application) must be submitted to the CDFW that describes any proposed streambed alteration contemplated by the proposed Project. In addition to the formal application materials and the fee, a copy of the appropriate environmental document (e.g., MND) should be included in the submittal, consistent with CEQA requirements. The CDFW will prepare a draft Streambed Alteration Agreement, which will include standard measures to protect sensitive plant and wildlife resources during project

construction and during ongoing operation and maintenance of any project element that occurs within a CDFW jurisdictional area.

If a Streambed Alteration Agreement is required, the CDFW may want to conduct an on-site inspection. The CDFW then prepares a draft agreement, which will include measures to protect fish and wildlife resources that will be directly or indirectly impacted by project construction. The draft agreement will be transmitted to the Applicant within 60 calendar days of the CDFW's determination that the notification is complete. It should be noted that the 60-day timeframe may not apply to long-range agreements.

The Applicant has 30 calendar days to notify the CDFW concerning the acceptability of the proposed terms, conditions, and measures. If the Applicant agrees with these terms, conditions, and measures, the agreement must be signed and returned to the CDFW. The agreement becomes final once the CDFW executes it and a Streambed Alteration Agreement is issued. Please note that all application fees must be paid and the final certified CEQA documentation must be provided prior to the CDFW's execution of the agreement.

If the CDFW does not respond in writing concerning the completeness of the Notification within 30 days of its submittal, the Notification automatically becomes complete. If the CDFW does not submit a draft Streambed Alteration Agreement to the Applicant within 60 days of the determination of a completed Notification package, the CDFW will issue a letter that either (1) identifies the final date to transmit a draft Streambed Alteration Agreement or (2) indicates that a Streambed Alteration Agreement was not required. The CDFW will also indicate that it was unable to meet this date and that by law the Applicant must complete the project without a Streambed Alteration Agreement and must comply with all avoidance, minimization, and mitigation measures described in the submitted Notification package.

5.5 AGENCY COORDINATION

A pre-application field meeting was arranged with regulatory agency staff to present the proposed project, review findings of the draft Jurisdictional Delineation Report, and observe current field conditions. The field meeting occurred on April 10, 2014 and was attended by Brianne McGuffie (USACE), Sarah Rains (CDFW), Gary Takara (Pasadena Water and Power), Brad Boman (Pasadena Water and Power), Rebecca Shields Moose (Arroyo Seco Foundation), Inge Wiersema (Carollo Engineers), Azhar Khan (Carollo Engineers), and David Hughes (BonTerra Psomas). Valerie Carrillo Zara (RWQCB) was not able to attend the meeting. The following is a list of issues that were discussed:

1. Mr. Takara and Mr. Boman provided a summary of past maintenance activities at the headworks structure in Area 1 and described removal of the headworks structure. Ms. Rains requested copies of the Streambed Alteration Agreements that authorized past maintenance activities. These agreements were provided via e-mail to Ms. Rains on May 20, 2014.

2. Within Area 2, Ms. Rains indicated that the CDFW jurisdictional boundary should be expanded to include the stream bank that is adjacent to the Arroyo Seco trail. The limits of CDFW jurisdictional resources shown in Exhibits 11 and 12 reflect this change.

3. The spreading basins in Area 3 were reviewed and it was discussed whether these basins should be considered "waters of the U.S." and/or under the jurisdiction of the CDFW. Both Ms. McGuffie and Ms. Rains indicated that they would discuss the matter with their supervisors and provide an answer. Ms. McGuffie subsequently responded that the basins would not be considered jurisdictional by the USACE. As a result, these basins are described in this report as isolated waters. The CDFW have not provided a response to

date. As a result, these basins are described in this report as under the jurisdiction of the CDFW, but this may change during the permit issuance process.

5.6 RECOMMENDATIONS

Based on the conclusions of this Jurisdictional Delineation Report, the following recommendations are identified:

1. If long-term maintenance of facilities will be needed, it is recommended that a long-term permit for recurring maintenance activities is considered. The CDFW issues Routine Maintenance Streambed Alteration Agreements that cover long-term operation and maintenance activities. Please note that the USACE and the RWQCB do not issue long-term permits.
2. Mitigation for proposed impacts should be considered as soon as possible for an efficient regulatory permitting process. The agencies will require the approval of a Habitat Mitigation and Monitoring Plan (HMMP) prior to issuing permits. Mitigation ratios for impacts to USACE jurisdictional resources would be based on the CRAM assessment and USACE *Standard Procedure for Determination of Mitigation Ratios* checklist.

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ATTACHMENT A

SOIL SURVEY

The Official Soil Series Descriptions identified below were obtained from the U.S. Department of Agriculture, Natural Resources Conservation Service.[5]

Mollic Haploxerafls

Mollic Haploxeralfs are a well-drained soil type, typically found in alluvial fans These soils are like Typic Haploxeralfs, but they have an A horizon that, throughout its upper 10 cm, has a color value, moist, of 3 or less and has 0.7 percent or more organic carbon; rarely, they have an Ap horizon that has both a color value, moist, of 3 or less and 0.7 percent or more organic carbon. The epipedon of these soils meets all of the requirements for a mollic epipedon as a rule, but it is both massive and hard or very hard when dry. These soils are extensive in the United States. They are intergrades between Haploxeralfs and Argixerolls. Their slopes range from nearly level to very strong. Where slopes are suitable, many of the soils are cultivated. The soils that have strong slopes are mainly under forest vegetation. The typical profile of these soils consists of gravelly sandy loam (0 to 8 inches from the surface), gravelly clay loam or sandy clay loam (8 to 35 inches from the surface), and unweathered bedrock (35 to 41 inches from the surface).

[5] U.S. Department of Agriculture, Natural Resources Conservation Service (USDA NRCS). 2010 (September). Official Soil Series Descriptions. Fort Worth, TX: USDA, NRCS. http://soils.usda.gov/technical/classification/osd/index.html.

ATTACHMENT B

ORDINARY HIGH WATER MARK DATA FORMS

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Carolla
Project Number:
Stream: arroyo Seco
Investigator(s): Dave Hughes/ Dani Henning

Date: 5/10/13 **Time:** 1230
Town: Pasadena **State:** CA
Photo begin file#: **Photo end file#:**

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details: soil pit #1 location

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system:

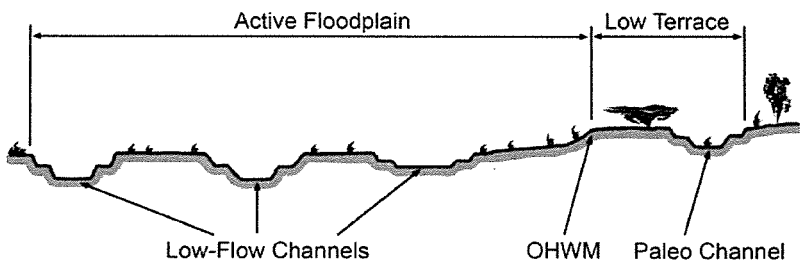
Brief site description: Alder-willow woodland. Sandy soils.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

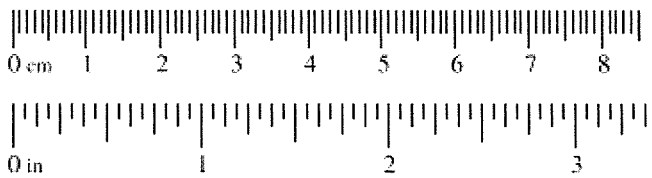


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

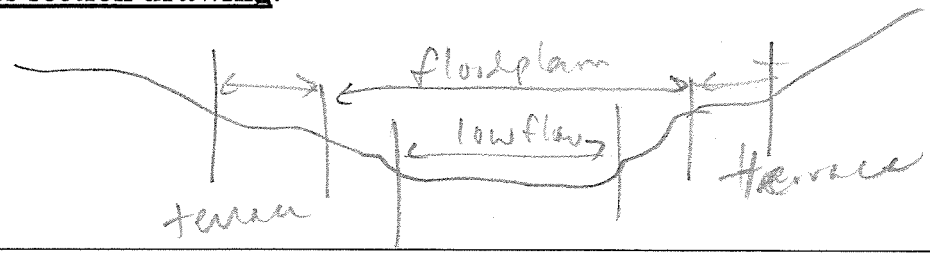
Wentworth Size Classes

Inches (in)		Millimeters (mm)	Wentworth size class	
	10.08	256	Boulder	Gravel
	2.56	64	Cobble	
	0.157	4	Pebble	
	0.079	2.00	Granule	
	0.039	1.00	Very coarse sand	Sand
	0.020	0.50	Coarse sand	
1/2	0.0098	0.25	Medium sand	
1/4	0.005	0.125	Fine sand	
1/8	0.0025	0.0625	Very fine sand	
1/16	0.0012	0.031	Coarse silt	Silt
1/32	0.00061	0.0156	Medium silt	
1/64	0.00031	0.0078	Fine silt	
1/128	0.00015	0.0039	Very fine silt	
			Clay	Mud



Project ID: **Cross section ID:** 1 **Date:** 5/10/13 **Time:** 1230

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sandy

Total veg cover: 50 % Tree: 10 % Shrub: 5 % Herb: 50 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: scour line
- ☐ Other: _____
- ☐ Other: _____

Comments:

flowing water

Project ID: **Cross section ID:** 1 **Date:** 5/10/13 **Time:** 120

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Coarse sand

Total veg cover: 50 % Tree: 10 % Shrub: 10 % Herb: 50 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: scour lines
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Coarse sand

Total veg cover: 100 % Tree: 80 % Shrub: 10 % Herb: 10 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Carollo
Project Number: JB41
Stream: Arroyo Seco
Investigator(s): Dave Hughes & Dani Hennings

Date: 5/10/13 **Time:** 1130
Town: Pasadena **State:** CA
Photo begin file#: **Photo end file#:**

Y ☑ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☑ Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system: Flood control

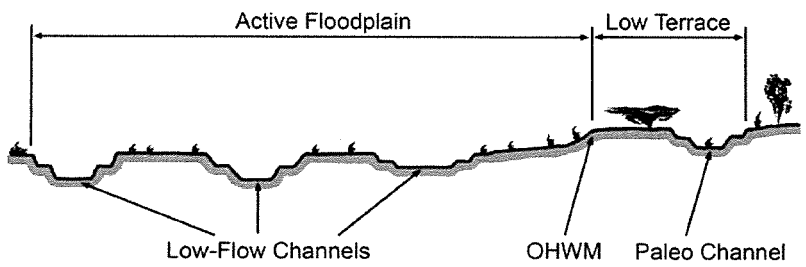
Brief site description: Alder-willow woodland. Very sandy soils. Within Hahamonga Reserve park.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☒ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies

- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

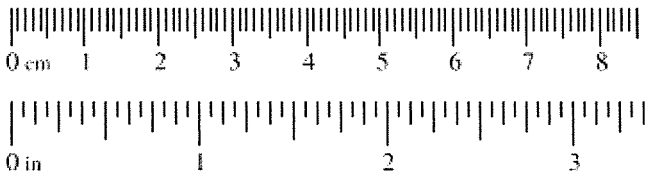


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

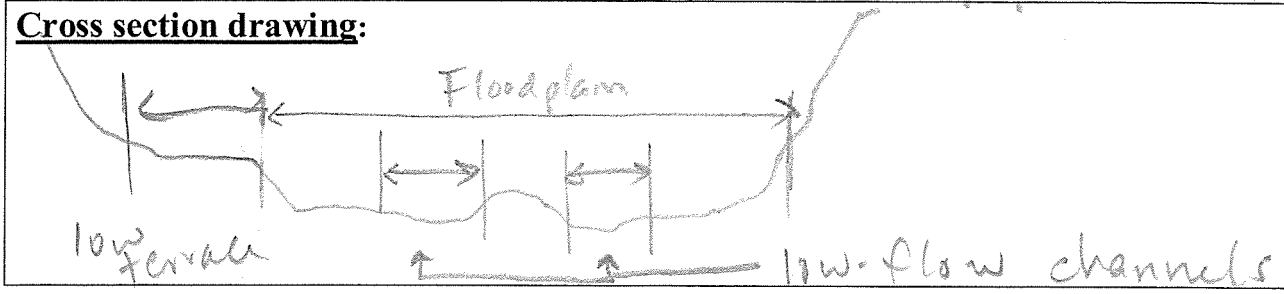
Wentworth Size Classes

Inches (in)		Millimeters (mm)	Wentworth size class	
	10.08	256	Boulder	Gravel
	2.56	64	Cobble	
	0.157	4	Pebble	
	0.079	2.00	Granule	
	0.039	1.00	Very coarse sand	Sand
	0.020	0.50	Coarse sand	
1/2	0.0098	0.25	Medium sand	
1/4	0.005	0.125	Fine sand	
1/8	0.0025	0.0625	Very fine sand	
1/16	0.0012	0.031	Coarse silt	Silt
1/32	0.00061	0.0156	Medium silt	
1/64	0.00031	0.0078	Fine silt	
1/128	0.00015	0.0039	Very fine silt	
			Clay	Mud



Project ID: **Cross section ID:** 2 **Date:** 5/10/13 **Time:** 1130

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand

Total veg cover: 50 % Tree: 10 % Shrub: 0 % Herb: 40 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

surface water is flowing

Project ID: **Cross section ID:** **Date:** 5/10/13 **Time:** 1130

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand

Total veg cover: 60 % Tree: 20 % Shrub: 20 % Herb: 20 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: scour line
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand

Total veg cover: 95 % Tree: 80 % Shrub: 5 % Herb: 10 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Carollo
Project Number:
Stream: Arroyo Seco
Investigator(s): Dave Hughes/Dani Henning

Date: 5/10/13
Town:
Photo begin file#:

Time: 2:30
State: CA
Photo end file#:

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system:

weir system for water management

Brief site description:

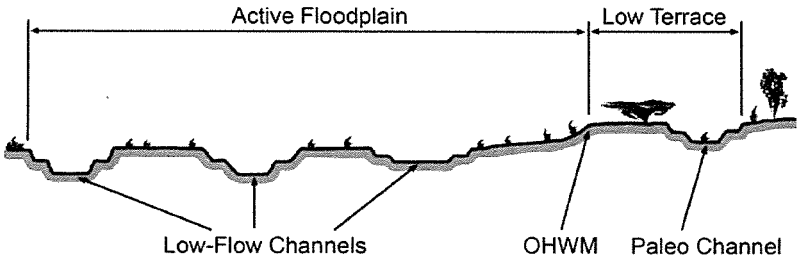
willow-sycamore woodland
incised low-flow w/ 2° channels on floodplain

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

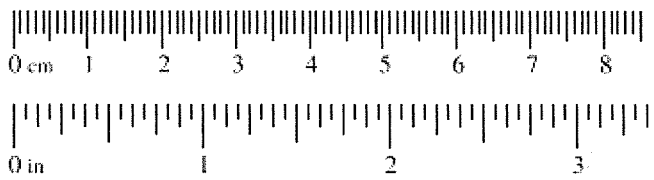


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [X] Mapping on aerial photograph
   - [ ] GPS
   - [ ] Digitized on computer
   - [ ] Other:

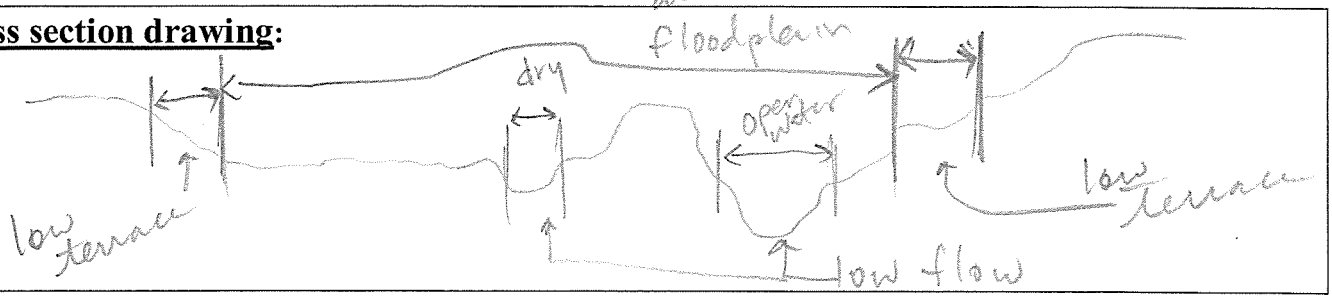
Wentworth Size Classes

Inches (in)	Millimeters (mm)	Wentworth size class	
10.08	256	Boulder	Gravel
2.56	64	Cobble	
0.157	4	Pebble	
0.079	2.00	Granule	
0.039	1.00	Very coarse sand	Sand
0.020	0.50	Coarse sand	
1/2 0.0098	0.25	Medium sand	
1/4 0.005	0.125	Fine sand	
1/8 0.0025	0.0625	Very fine sand	
1/16 0.0012	0.031	Coarse silt	Silt
1/32 0.00061	0.0156	Medium silt	
1/64 0.00031	0.0078	Fine silt	
1/128 0.00015	0.0039	Very fine silt	
		Clay	Mud



Project ID: **Cross section ID:** **Date:** **Time:**

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☐ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: sand

Total veg cover: 60 % Tree: 60 % Shrub: 5 % Herb: 10 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☒ Other: flowing water
- ☐ Other: _____
- ☐ Other: _____

Comments:

incised low-flow channel, secondary low-flow channel is dry

Project ID: **Cross section ID:** **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: sand

Total veg cover: 50 % Tree: 50 % Shrub: 10 % Herb: 10 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

braided conditions above low-flow channel.

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: _____

Total veg cover: _____ % Tree: 70 % Shrub: 10 % Herb: 5 %

Community successional stage:

- ☐ NA
- ☒ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Carollo
Project Number:
Stream: Arroyo Seco
Investigator(s): Dave Hagyes / Dan Hamming
Date: 9/10/13
Town:
Photo begin file#:
Time: 230
State: CA
Photo end file#:

Y ☒ / N ☐ Do normal circumstances exist on the site?

Y ☐ / N ☒ Is the site significantly disturbed?

Location Details: Soil pit # 6 + 7

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system:

Weir controls surface flow

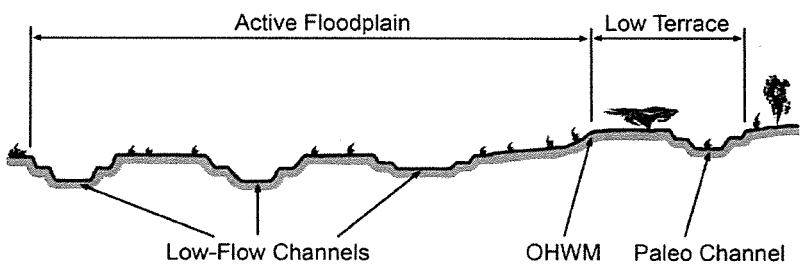
Brief site description:

Sycamore-alder woodland

Checklist of resources (if available):

- ☒ Aerial photography
  Dates:
- ☒ Topographic maps
- ☐ Geologic maps
- ☐ Vegetation maps
- ☐ Soils maps
- ☐ Rainfall/precipitation maps
- ☐ Existing delineation(s) for site
- ☒ Global positioning system (GPS)
- ☐ Other studies
- ☐ Stream gage data
  Gage number:
  Period of record:
  - ☐ History of recent effective discharges
  - ☐ Results of flood frequency analysis
  - ☐ Most recent shift-adjusted rating
  - ☐ Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units



Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - ☒ Mapping on aerial photograph
   - ☐ Digitized on computer
   - ☐ GPS
   - ☐ Other:

Wentworth Size Classes

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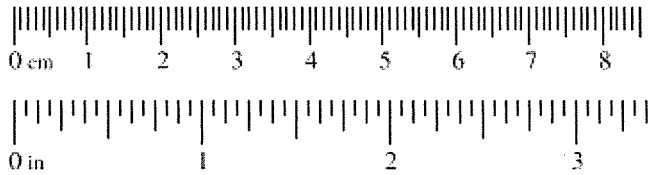
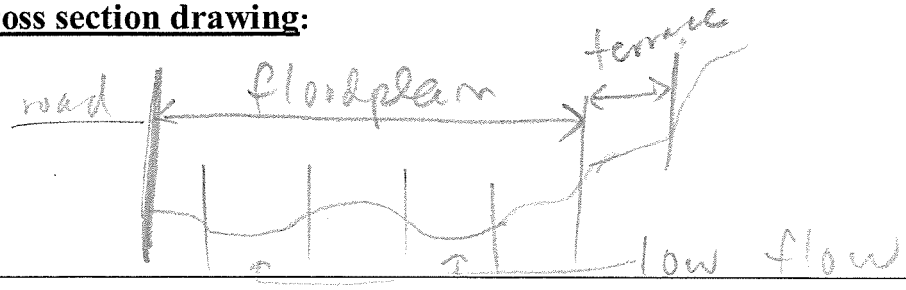
	10.08	256	Boulder	Gravel
	2.56	64	Cobble	
	0.157	4	Pebble	
	0.079	2.00	Granule	
	0.039	1.00	Very coarse sand	Sand
	0.020	0.50	Coarse sand	
1/2	0.0098	0.25	Medium sand	
1/4	0.005	0.125	Fine sand	
1/8	0.0025	0.0625	Very fine sand	
1/16	0.0012	0.031	Coarse silt	Silt
1/32	0.00061	0.0156	Medium silt	
1/64	0.00031	0.0078	Fine silt	
1/128	0.00015	0.0039	Very fine silt	
			Clay	Mud



Project ID: **Cross section ID:** 1 **Date:** 5/10/13 **Time:** 230

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: coarse sand

Total veg cover: 50 % Tree: 50 % Shrub: 10 % Herb: 50 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: surface water flow
- ☐ Other: _____
- ☐ Other: _____

Comments:

Project ID: **Cross section ID:** **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☑ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: coarse sand
Total veg cover: 80 % Tree: 50 % Shrub: 30 % Herb: 70 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☑ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☑ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☑ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: Coarse Sand
Total veg cover: 100 % Tree: 100 % Shrub: 5 % Herb: 10 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☑ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☑ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: CAR0110
Project Number:
Stream: Arroyo Seco
Investigator(s): Dave Hughes / Dani Hannigs

Date: 5/10/13
Town:
Photo begin file#:

Time: 330
State: CA
Photo end file#:

Y [x] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [x] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates:

Potential anthropogenic influences on the channel system:

dropstructure

Brief site description:

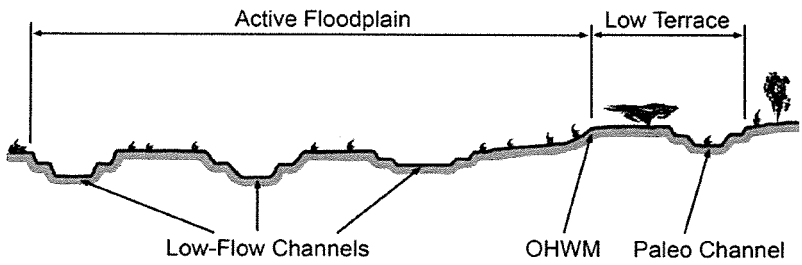
willow alder perennial stream

Checklist of resources (if available):

- [x] Aerial photography
  Dates:
- [x] Topographic maps
- [ ] Geologic maps
- [ ] Vegetation maps
- [ ] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [x] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

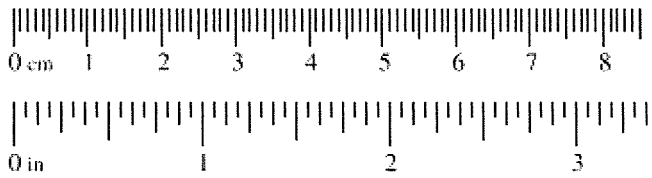


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [x] Mapping on aerial photograph
   - [ ] GPS
   - [ ] Digitized on computer
   - [ ] Other:

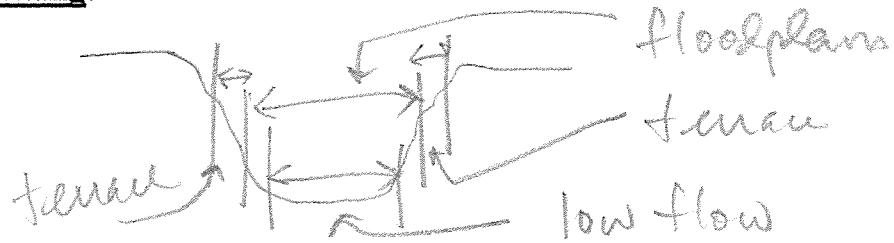
Wentworth Size Classes

Inches (in)		Millimeters (mm)	Wentworth size class	
	10.08	256	Boulder	Gravel
	2.56	64	Cobble	
	0.157	4	Pebble	
	0.079	2.00	Granule	
	0.039	1.00	Very coarse sand	Sand
	0.020	0.50	Coarse sand	
1/2	0.0098	0.25	Medium sand	
1/4	0.005	0.125	Fine sand	
1/8	0.0025	0.0625	Very fine sand	
1/16	0.0012	0.031	Coarse silt	Silt
1/32	0.00061	0.0156	Medium silt	
1/64	0.00031	0.0078	Fine silt	
1/128	0.00015	0.0039	Very fine silt	
			Clay	Mud



Project ID: **Cross section ID:** 8 **Date:** 5/10/13 **Time:** 330

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☐ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☒ Other: scour/shelving
- ☐ Other: _____

Comments:

Floodplain unit:

☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: sand/gravel

Total veg cover: 90 % Tree: 80 % Shrub: 10 % Herb: 50 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☒ Other: flowing water
- ☐ Other: _____
- ☐ Other: _____

Comments:

Project ID: **Cross section ID:** **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: coarse sand
Total veg cover: 90 % Tree: 80 % Shrub: 10 % Herb: 50 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☑ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☑ Surface relief
- ☑ Other: shelving
- ☐ Other: _____
- ☐ Other: _____

Comments:

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: coarse sand
Total veg cover: 90 % Tree: 80 % Shrub: 10 % Herb: 50 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☑ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☐ Presence of bed and bank
- ☒ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
because the bank is very steep, the terrace is very narrow

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project:
Project Number:
Stream:
Investigator(s): David Hughes Dan Penning

Date: 9/26 **Time:** 1030
Town: Pasadena **State:** CA
Photo begin file#: **Photo end file#:**

Y [X] / N [ ] Do normal circumstances exist on the site?

Y [ ] / N [X] Is the site significantly disturbed?

Location Details:

Projection: **Datum:**
Coordinates: same as #19

Potential anthropogenic influences on the channel system:

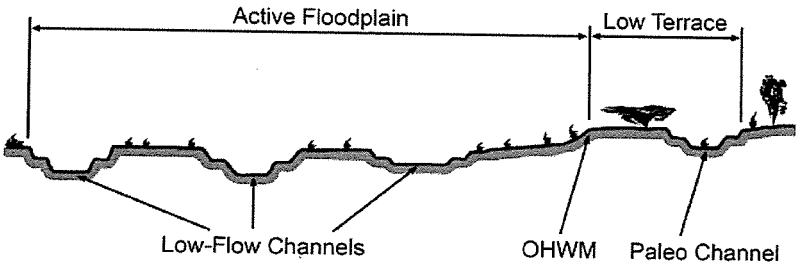
Brief site description: Upper arroyo seco willow riparian habitat

Checklist of resources (if available):

- [X] Aerial photography
  Dates:
- [X] Topographic maps
- [ ] Geologic maps
- [X] Vegetation maps
- [X] Soils maps
- [ ] Rainfall/precipitation maps
- [ ] Existing delineation(s) for site
- [X] Global positioning system (GPS)
- [ ] Other studies

- [ ] Stream gage data
  Gage number:
  Period of record:
  - [ ] History of recent effective discharges
  - [ ] Results of flood frequency analysis
  - [ ] Most recent shift-adjusted rating
  - [ ] Gage heights for 2-, 5-, 10-, and 25-year events and the most recent event exceeding a 5-year event

Hydrogeomorphic Floodplain Units

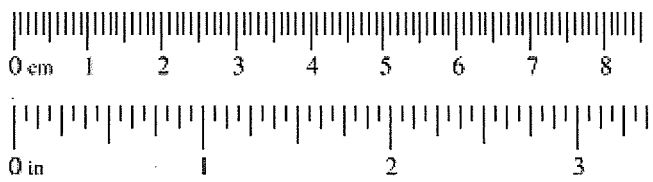


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

1. Walk the channel and floodplain within the study area to get an impression of the geomorphology and vegetation present at the site.
2. Select a representative cross section across the channel. Draw the cross section and label the floodplain units.
3. Determine a point on the cross section that is characteristic of one of the hydrogeomorphic floodplain units.
   a) Record the floodplain unit and GPS position.
   b) Describe the sediment texture (using the Wentworth class size) and the vegetation characteristics of the floodplain unit.
   c) Identify any indicators present at the location.
4. Repeat for other points in different hydrogeomorphic floodplain units across the cross section.
5. Identify the OHWM and record the indicators. Record the OHWM position via:
   - [X] Mapping on aerial photograph
   - [ ] Digitized on computer
   - [ ] GPS
   - [ ] Other:

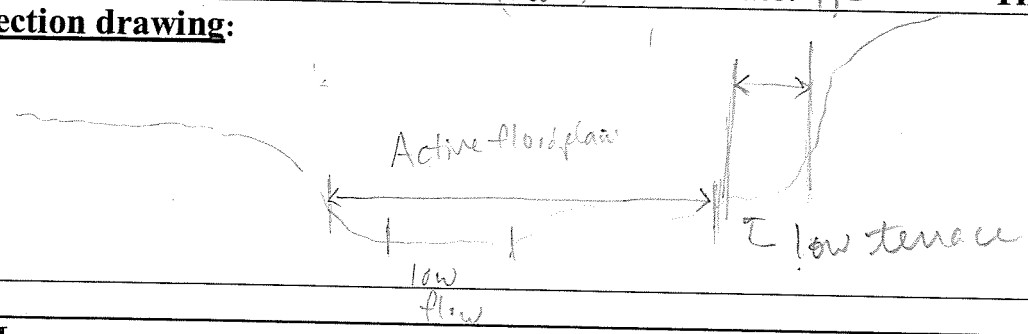
Wentworth Size Classes

Inches (in)		Millimeters (mm)	Wentworth size class	
	10.08	256	Boulder	Gravel
	2.56	64	Cobble	Gravel
	0.157	4	Pebble	Gravel
	0.079	2.00	Granule	Gravel
	0.039	1.00	Very coarse sand	Sand
	0.020	0.50	Coarse sand	Sand
1/2	0.0098	0.25	Medium sand	Sand
1/4	0.005	0.125	Fine sand	Sand
1/8	0.0025	0.0625	Very fine sand	Sand
1/16	0.0012	0.031	Coarse silt	Silt
1/32	0.00061	0.0156	Medium silt	Silt
1/64	0.00031	0.0078	Fine silt	Silt
1/128	0.00015	0.0039	Very fine silt	Silt
			Clay	Mud



Project ID: **Cross section ID:** (New) **Date:** 9/26 **Time:** 1030

Cross section drawing:



OHWM

GPS point: _____

Indicators:

- ☐ Change in average sediment texture
- ☒ Change in vegetation species
- ☐ Change in vegetation cover
- ☒ Break in bank slope
- ☐ Other: _____
- ☐ Other: _____

Comments:

OHWM delineated by shelving on bank and change in vegetation from willow trees to upland vegetation

Floodplain unit: ☒ Low-Flow Channel ☐ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:

Average sediment texture: Sand

Total veg cover: ____ % Tree: 60 % Shrub: 5 % Herb: 90 %

Community successional stage:

- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☒ Mid (herbaceous, shrubs, saplings)
- ☐ Late (herbaceous, shrubs, mature trees)

Indicators:

- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:

low flow channel defined by presence of flowing water in September.

Project ID: **Cross section ID:** **Date:** **Time:**

Floodplain unit: ☐ Low-Flow Channel ☒ Active Floodplain ☐ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: Sand
Total veg cover: 100 % Tree: 80 % Shrub: 10 % Herb: 40 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☐ Drift and/or debris
- ☒ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☐ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
OHWM defined by shelving / mid banks

Floodplain unit: ☐ Low-Flow Channel ☐ Active Floodplain ☒ Low Terrace

GPS point: _____

Characteristics of the floodplain unit:
Average sediment texture: Sand
Total veg cover: _____ % Tree: 60 % Shrub: 10 % Herb: 5 %
Community successional stage:
- ☐ NA
- ☐ Early (herbaceous & seedlings)
- ☐ Mid (herbaceous, shrubs, saplings)
- ☒ Late (herbaceous, shrubs, mature trees)

Indicators:
- ☐ Mudcracks
- ☐ Ripples
- ☒ Drift and/or debris
- ☐ Presence of bed and bank
- ☐ Benches
- ☐ Soil development
- ☒ Surface relief
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

Comments:
small low terrace area west of low-flow channel between low flow + canyon wall

APPENDIX C

WETLAND DATA FORMS

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 1

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.2119° Long: -118.1714° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PSSA

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	20	Y	FACW
2. Alnus rhombifolia	5	Y	FACW
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Salix lasiolepis	10	Y	FACW
2. Typha latifolia	5	Y	OBL
3. Baccharis salicifolia	5	Y	FAC
4. Rubus ursinus	5	Y	FACU
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Baccharis salicifolia	5	N	FAC
2. Epilobium ciliatum	50	Y	FACW
3. Nasturtium officinale	20	Y	OBL
4. Hordeum murinum	5	N	FACU
5. Ageratina adenophora	5	N	FACU
6.			
7.			
8.			
	85	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 5 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 8 (A)

Total Number of Dominant Species Across All Strata: 8 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	25	x 1 =	25
FACW species	85	x 2 =	170
FAC species	10	x 3 =	30
FACU species	15	x 4 =	60
UPL species	0	x 5 =	0
Column Totals:	135 (A)		285 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

Area is recovering from wind storm damage about one year ago.

SOIL

Sampling Point: 1

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/2	100					sand	within roots of Nasturtium
1-8	10YR 4/3	100					coarse sa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 8"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 2

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.2107° Long: -118.1719° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PSSA

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	40	Y	FACW
2. Alnus rhombifolia	10	Y	FACW
3.			
4.			
	50	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Baccharis salicifolia	35	Y	FAC
2.			
3.			
4.			
5.			
	35	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Nasturtium officinale	60	Y	OBL
2. Epilobium ciliatum	10	N	FACW
3. Cyperus eragrostis	5	N	FACW
4. Urtica dioica	5	N	FAC
5. Solanum douglasii	5	N	FAC
6.			
7.			
8.			
	85	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 50 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	60	x 1 =	60
FACW species	65	x 2 =	130
FAC species	45	x 3 =	135
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	170 (A)		325 (B)

Prevalence Index = B/A = 1.91

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

SOIL

Sampling Point: 2

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 3/2	100					sand	
1-4	10YR 4/3	100					coarse sa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: cobble

Depth (inches): 4"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 3

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.21015° Long: -118.17218° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PEMCh

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	60	Y	FACW
2. Alnus rhombifolia	10	N	FACW
3. Platanus racemosa	30	N	FACW
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Salix lasiolepis	10	Y	FACW
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Cyperus eragrostis	30	Y	FACW
2. Urtica dioica	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	35	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	140	x 2 =	280
FAC species	5	x 3 =	15
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	145 (A)		295 (B)

Prevalence Index = B/A = 2.03

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

Ground is covered with leaf litter.

SOIL

Sampling Point: 3

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/3	100					coarse sa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: cobble

Depth (inches): 6"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

Flowing water.

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 4

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.2095° Long: -118.1715° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PFOC

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Baccharis salicifolia	5	Y	FAC
2.			
3.			
4.			
	5 = Total Cover		
Sapling/Shrub Stratum (Plot size: 5)			
1. Salix lasiolepis	5	N	FACW
2. Baccharis salicifolia	10	Y	FACW
3.			
4.			
5.			
	15 = Total Cover		
Herb Stratum (Plot size: 5)			
1. Artemisia douglasiana	40	Y	FAC
2. Pseudognaphalium californicum	5	N	UPL
3. Acmispon glaber	2	N	UPL
4. Eulobus californicus	2	N	UPL
5. Erigeron canadensis	2	N	FACU
6. Acmispon strigosus	2	N	UPL
7. Isocoma menziesii	2	N	FACU
8.			
	55 = Total Cover		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0 = Total Cover		

% Bare Ground in Herb Stratum 40 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	15	x 2 =	30
FAC species	45	x 3 =	135
FACU species	4	x 4 =	16
UPL species	11	x 5 =	55
Column Totals:	75 (A)		236 (B)

Prevalence Index = B/A = 3.15

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

___ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

SOIL

Sampling Point: 4

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/3	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 12"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

Overflow channel

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ✓ Water Marks (B1) (**Riverine**)
- ✓ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 5

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.2095° Long: -118.1712° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PFOC

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes _____	No ✓	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Platanus racemosa	10	N	FAC
2. Salix lasiolepis	90	Y	FACW
3.			
4.			
	100	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1.			
2.			
3.			
4.			
5.			
	0	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Stipa miliacea	30	Y	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	30	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	90	x 2 =	180
FAC species	10	x 3 =	30
FACU species	0	x 4 =	0
UPL species	30	x 5 =	150
Column Totals:	130 (A)		360 (B)

Prevalence Index = B/A = 2.77

Hydrophytic Vegetation Indicators:

___ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

Deep leaf litter >1"

SOIL

Sampling Point: 5

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-8	10YR 4/2	100					sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 8"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ✓ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ✓ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No ✓ Depth (inches): ___

Water Table Present? Yes ___ No ✓ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No ✓ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 6

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.20765° Long: -118.16828° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PFOC

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

top end of area 2, get gps from map

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus chrysolepis	5	Y	UPL
2. Alnus rhombifolia	20	Y	FACW
3.			
4.			
	25	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Salix gooddingii	10	Y	FACW
2. Baccharis salicifolia	5	Y	FAC
3. Ageratina adenophora	10	Y	FACU
4.			
5.			
	25	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Nasturtium officinale	25	Y	OBL
2. Pseudognaphalium luteoalbum	5	N	UPL
3. Hirschfeldia incana	2	N	UPL
4. Veronica anagallis-aquatica	5	N	OBL
5. Asclepias sp.	5	N	FAC
6.			
7.			
8.			
	42	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 30 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	30	x 1 =	30
FACW species	30	x 2 =	60
FAC species	10	x 3 =	30
FACU species	10	x 4 =	40
UPL species	12	x 5 =	60
Column Totals:	92 (A)		220 (B)

Prevalence Index = B/A = 2.39

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

SOIL

Sampling Point: 6

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-12	10YR 4/3	100					sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: cobble

Depth (inches): 12"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 5/10/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 7

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T1N, R2W, sec 6

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.20711° Long: -118.16823° Datum: NAD 83

Soil Map Unit Name: no data available NWI classification: PFOC

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix gooddingii	25	Y	FACW
2. Platanus racemosa	10	N	FAC
3.			
4.			
	35	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Baccharis salicifolia	10	Y	FAC
2.			
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Cyperus eragrostis	25	Y	FACW
2. Pseudognaphalium luteoalbum	5	N	FAC
3. Baccharis salicifolia	5	N	FAC
4. Ageratina adenophora	5	N	FACU
5.			
6.			
7.			
8.			
	40	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 60 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	50	x 2 =	100
FAC species	30	x 3 =	90
FACU species	5	x 4 =	20
UPL species	0	x 5 =	0
Column Totals:	85 (A)		210 (B)

Prevalence Index = B/A = 2.47

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

SOIL

Sampling Point: 7

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-3	10YR 4/3	100					coarse sa	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: cobble

Depth (inches): 3"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

WETLAND DETERMINATION DATA FORM – Arid West Region

Project/Site: Arroyo Seco City/County: Pasadena/Los Angeles Sampling Date: 9/26/13

Applicant/Owner: City of Pasadena State: CA Sampling Point: 8

Investigator(s): David Hughes, Dani Henning Section, Township, Range: T2N, R12W, sec 31

Landform (hillslope, terrace, etc.): canyon Local relief (concave, convex, none): none Slope (%): < 5%

Subregion (LRR): Mediterranean California (LRR C) Lat: 34.20852° Long: -118.17089° Datum: NAD 83

Soil Map Unit Name: Mollic Haploxeralfs, 2 to 50 percent slopes NWI classification: PFOC

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

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes ✓ No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

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

Hydrophytic Vegetation Present?	Yes ✓	No _____	**Is the Sampled Area within a Wetland?** **Yes** _____ **No** ✓
Hydric Soil Present?	Yes _____	No ✓	
Wetland Hydrology Present?	Yes ✓	No _____	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. Salix lasiolepis	50	Y	FACW
2. Alnus rhombifolia	30	Y	FACW
3. Salix exigua	5	N	FACW
4.			
	85	= Total Cover	
Sapling/Shrub Stratum (Plot size: 5)			
1. Salix exigua	5	Y	FACW
2. Salix lasiolepis	5	Y	FACW
3.			
4.			
5.			
	10	= Total Cover	
Herb Stratum (Plot size: 5)			
1. Nasturtium officinale	80	Y	OBL
2. Epilobium ciliatum	10	N	FACW
3. Schoenoplectus sp.	10	N	OBL
4. Veronica anagallis-aquatica	5	N	OBL
5.			
6.			
7.			
8.			
	105	= Total Cover	
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
	0	= Total Cover	

% Bare Ground in Herb Stratum 0 % Cover of Biotic Crust _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	95	x 1 =	95
FACW species	105	x 2 =	210
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	200 (A)		305 (B)

Prevalence Index = B/A = 2.11

Hydrophytic Vegetation Indicators:

✓ Dominance Test is >50%

✓ Prevalence Index is ≤3.0[1]

___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes** ✓ **No** _____

Remarks:

Area is recovering from wind storm damage about one year ago.

SOIL

Sampling Point: 8

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

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-1	10YR 2/1	100					fibric	organic material
1-12	10YR 4/3	100					sandy	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

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

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

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

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type: rock

Depth (inches): 12"

Hydric Soil Present? **Yes** ___ **No** ✓

Remarks:

top layer of soil consists of fairly undecomposed organic matter, less than one inch thick.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ✓ Surface Water (A1)
- ✓ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ✓ No ___ Depth (inches): ___

Water Table Present? Yes ✓ No ___ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ✓ No ___ Depth (inches): ___

Wetland Hydrology Present? **Yes** ✓ **No** ___

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

Remarks:

Flowing water 3" deep at driest time of year.

ATTACHMENT D

SITE PHOTOGRAPHS

May 10, 2013. Photo Location 1. Typical view of Arroyo Seco in Area 1.

May 10, 2013. Photo Location 2. Typical view of Arroyo Seco in Area 1.

May 10, 2013. View of soil test pit 1.

May 10, 2013. Soil sample from soil test pit 1.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP1.ai

Site Photographs

Exhibit D-1

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP1.pdf

May 10, 2013. Photo Location 3. Typical view of Arroyo Seco in Area 1.

May 10, 2013. Photo Location 4. Typical view of Arroyo Seco in Area 1.

May 10, 2013. View of soil test pit 2.

May 10, 2013. Soil sample from soil test pit 2.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP2.ai

Site Photographs

Exhibit D-2

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP2.pdf

May 10, 2013. View of soil test pit 3.

May 10, 2013. Soil sample from soil test pit 3.

May 10, 2013. View of soil test pit 4.

May 10, 2013. Photo Location 5. View of unvegetated wash area in Area 1.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP3.ai

Site Photographs

Exhibit D-3

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP3.pdf

September 26, 2013. Photo Location 6. Overview of eastern portion of Area 1.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP4.ai

Site Photographs

Exhibit D-4

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP4.pdf

May 10, 2013. Photo Location 7. View of Arroyo Seco looking downstream in Area 2.

May 10, 2013. Photo Location 8. View of Arroyo Seco from bridge in Area 2.

May 10, 2013. View of soil test pit 6.

May 10, 2013. Soil sample from soil test pit 6.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP5.ai

Site Photographs

Exhibit D-5

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP5.pdf

September 26, 2013. View of soil test pit 7.

September 26, 2013. View of soil test pit 8.

September 26, 2013. Photo location 9. View of spreading basins facing north.

September 26, 2013. Photo location 10. View of spreading basins facing south.

D:\Projects\Carollo\J041\Graphics\JD\ex_SP6.ai

Site Photographs

Exhibit D-6

Jurisdictional Delineation Report for the Arroyo Seco Canyon Project

BonTerra CONSULTING

(01/24/2014 MMD) PAS R:\Projects\Carollo\J041\Graphics\JD\ex_SP6.pdf

ATTACHMENT E

CALIFORNIA RAPID ASSESSMENT METHOD DATASHEETS

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: Arroyo Seco Canyon Project				
Project Site ID: Carollo 10-11				
Assessment Area Name: AA1				
Project Name:	**Date (m/d/y)**	05	10	13

Assessment Team Members for This AA:

Dave Hughes,

Dani Henning

Average Bankfull Width: 35'

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Upstream Point Latitude: 34.21174° **Longitude:** -118.17135°

Downstream Point Latitude: 34.2107° **Longitude:** -118.17189°

Wetland Sub-type:

☒ Confined ☐ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted ☐ Ambient ☐ Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☒ yes ☐ no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☒ perennial ☐ intermittent ☐ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1		Upstream			
2		Middle Left			
3		Middle Right			
4		Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Comments:

Scoring Sheet: Riverine Wetlands

AA Name:				(m/d/y)			
Attribute 1: Buffer and Landscape Context				**Comments**			
Aquatic Area Abundance Score (D)			Alpha. A	Numeric 12			
Buffer:							
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric 12					
Buffer submetric B: Average Buffer Width	B	9					
Buffer submetric C: Buffer Condition	A	12					
Raw Attribute Score = D+[C x (A x B)^{½}]^{½} (use numerical value to nearest whole integer)				23.16	**Final Attribute Score = (Raw Score/24) x 100**		96.5
Attribute 2: Hydrology							
Water Source			Alpha. A	Numeric 12			
Channel Stability			A	12			
Hydrologic Connectivity			B	9			
Raw Attribute Score = sum of numeric scores				33	**Final Attribute Score = (Raw Score/36) x 100**		91.7
Attribute 3: Physical Structure							
Structural Patch Richness			Alpha. A	Numeric 12			
Topographic Complexity			A	12			
Raw Attribute Score = sum of numeric scores				24	**Final Attribute Score = (Raw Score/24) x 100**		100
Attribute 4: Biotic Structure							
Plant Community Composition (based on sub-metrics A-C)							
Plant Community submetric A: Number of plant layers	Alpha. A	Numeric 12					
Plant Community submetric B: Number of Co-dominant species	C	6					
Plant Community submetric C: Percent Invasion	A	12					
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)				10.0			
Horizontal Interspersion			B	9			
Vertical Biotic Structure			B	9			
Raw Attribute Score = sum of numeric scores				28	**Final Attribute Score = (Raw Score/36) x 100**		77.8
Overall AA Score (average of four final Attribute Scores)					91.5		

Table 5: Rating for Riparian Continuity for Riverine wetlands.

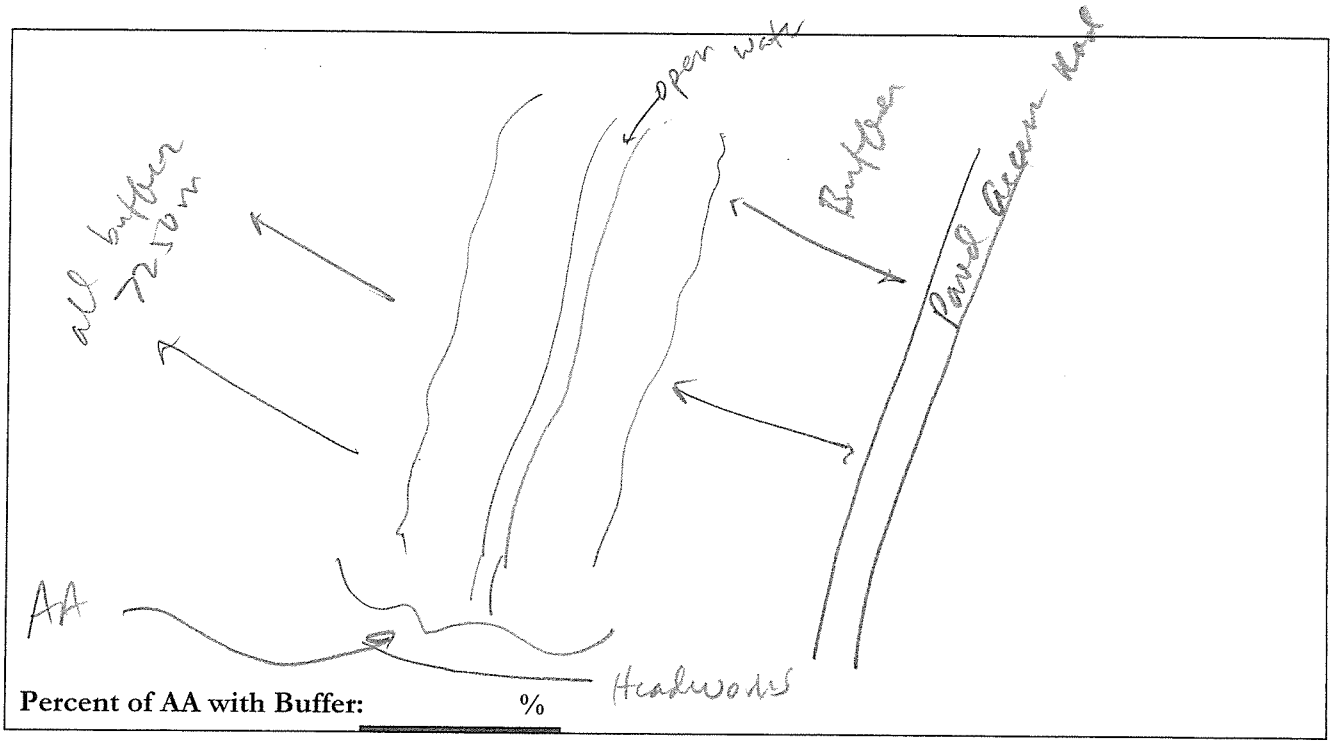
Rating	For Distance of 500 m Upstream of AA:	For Distance of 500 m Downstream of AA:
A	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).
B	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; 50 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
	OR	
	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; is less than 50 m for "1-sided" AAs.
C	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
D	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.	any condition
	OR	
	any condition	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.

Worksheet for Riparian Continuity Metric for Riverine Wetlands

Lengths of Non-buffer Segments For Distance of 500 m Upstream of AA		Lengths of Non-buffer Segments For Distance of 500 m Downstream of AA	
Segment No.	Length (m)	Segment No.	Length (m)
1		1	
2		2	
3		3	
4		4	
5		5	
Upstream Total Length		Downstream Total Length	

Percent of AA with Buffer Worksheet

In the space provided below make a quick sketch of the AA, or perform the assessment directly on the aerial imagery; indicate where buffer is present, estimate the percentage of the AA perimeter providing buffer functions, and record the estimate amount in the space provided.



Percent of AA with Buffer: _____ %

Worksheet for calculating average buffer width of AA

Line	Buffer Width (m)
A	250 m
B	250 m
C	250 m
D	250 m
E	8 m
F	5 m
G	13 m
H	36 m
Average Buffer Width	132.7

Site is buffered by native vegetation on all sides

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Table 10: Rating for Buffer Condition.

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by an intermediate mix of native and non-native vegetation (25% to 75% non-native), but mostly undisturbed soils and is apparently subject to little or low impact human visitation.
	OR
	Buffer for AA is dominated by native vegetation, but shows some soil disturbance and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by substantial (>75%) amounts of non-native vegetation AND there is at least a moderate degree of soil disturbance/compaction, and/or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground and/or highly compacted or otherwise disturbed soils, and/or there is evidence of very intense human visitation.

site is within a natural open space. Both sides are dominated by scrub oak chaparral. No evidence of high human visitation — trash, foot trails, ect.

Table 9: Rating for average buffer width.

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

Table 11: Rating for Water Source.

Rating	Alternative States
A	Freshwater sources that affect the dry season condition of the AA, such as its flow characteristics, hydroperiod, or salinity regime, are precipitation, snow melt, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the dry season. There is **no indication** that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season condition of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises **less than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or that is characterized by the presence of a few small stormdrains or scattered homes with septic systems. No large point sources or dams control the overall hydrology of the AA.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water, artificially impounded water, water remaining after diversions, regulated releases of water through a dam, or other artificial hydrology. Indications of substantial artificial hydrology include developed or irrigated agricultural land that comprises **more than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or the presence of major point source discharges that obviously control the hydrology of the AA. OR Freshwater sources that affect the dry season conditions of the AA are **substantially controlled** by known diversions of water or other withdrawals directly from the AA, its encompassing wetland, or from its drainage basin.
D	Natural, freshwater sources that affect the dry season conditions of the AA have **been eliminated** based on the following indicators: impoundment of all possible wet season inflows, diversion of all dry-season inflow, predominance of xeric vegetation, etc.

Worksheet for Assessing Channel Stability for Riverine Wetlands.

Condition	Field Indicators (check all existing conditions)
Indicators of Channel Equilibrium	☑ The channel (or multiple channels in braided systems) has a well-defined bankfull contour that clearly demarcates an obvious active floodplain in the cross-sectional profile of the channel throughout most of the AA. ☑ Perennial riparian vegetation is abundant and well established along the bankfull contour, but not below it. ☐ There is leaf litter, thatch, or wrack in most pools. ☑ The channel contains embedded woody debris of the size and amount consistent with what is naturally available in the riparian area. ☑ There is little or no active undercutting or burial of riparian vegetation. ☑ There are no densely vegetated mid-channel bars and/or point bars that support perennial vegetation. ☐ Channel bars consist of well-sorted bed material. ☐ There are channel pools, the spacing between pools tends to be regular and the bed is not planar through out the AA ☐ The larger bed material supports abundant mosses or periphyton.
Indicators of Active Degradation	☐ The channel is characterized by deeply undercut banks with exposed living roots of trees or shrubs. ☐ There are abundant bank slides or slumps. ☐ The lower banks are uniformly scoured and not vegetated. ☐ Riparian vegetation is declining in stature or vigor, or many riparian trees and shrubs along the banks are leaning or falling into the channel. ☐ An obvious historical floodplain has recently been abandoned, as indicated by the age structure of its riparian vegetation. ☐ The channel bed appears scoured to bedrock or dense clay. ☐ Recently active flow pathways appear to have coalesced into one channel (i.e. a previously braided system is no longer braided). ☐ The channel has one or more knickpoints indicating headward erosion of the bed.
Indicators of Active Aggradation	☐ There is an active floodplain with fresh splays of coarse sediment (sand and larger that is not vegetated) deposited in the current or previous year. ☐ There are partially buried living tree trunks or shrubs along the banks. ☐ The bed is planar overall; it lacks well-defined channel pools, or they are uncommon and irregularly spaced. ☐ There are partially buried, or sediment-choked, culverts. ☐ Perennial terrestrial or riparian vegetation is encroaching into the channel or onto channel bars below the bankfull contour. ☐ There are avulsion channels on the floodplain or adjacent valley floor.
Overall	☑ **Equilibrium** ☐ **Degradation** ☐ **Aggradation**

No evidence of aggradation or degradation noted

Riverine Wetland Entrenchment Ratio Calculation Worksheet

The following 5 steps should be conducted for each of 3 cross-sections located in the AA at the approximate midpoints along straight riffles or glides, away from deep pools or meander bends. An attempt should be made to place them at the top, middle, and bottom of the AA.

Steps	Replicate Cross-sections →	TOP	MID	BOT
Estimate bankfull width.	This is a critical step requiring familiarity with field indicators of the bankfull contour. Estimate or measure the distance between the right and left bankfull contours.	35'	18'	37'
Estimate max. bankfull depth.	Imagine a level line between the right and left bankfull contours; estimate or measure the height of the line above the thalweg (the deepest part of the channel).	1'	2.5'	1.5'
Estimate flood prone depth.	Double the estimate of maximum bankfull depth from Step 2.	2'	5'	3'
Estimate flood prone width.	Imagine a level line having a height equal to the flood prone depth from Step 3; note where the line intercepts the right and left banks; estimate or measure the length of this line.	39'	50'	46'
Calculate entrenchment ratio.	Divide the flood prone width (Step 4) by the bankfull width (Step 1).	1.11	2.78	1.24
Calculate average entrenchment ratio.	Calculate the average results for Step 5 for all 3 replicate cross-sections. Enter the average result here and use it in Table 13a or 13b.			1.71

Table 16: Rating of Topographic Complexity for Riverine Wetlands.

Rating	Alternative States (based on worksheet and diagrams in Figure 10 above)
A	AA as viewed along a typical cross-section has at least two benches at different elevations, above the active channel bottom (not including the thalweg or high riparian terraces not influenced by fluvial processes). Large point bars or in-channel bars above the active channel bed can be considered a bench. Additionally, each of these benches, plus the slopes between the benches, as well as the channel bottom area contain physical patch types or micro-topographic features such as boulders or cobbles, partially buried woody debris, undercut banks, secondary channels and debris jams that contribute to abundant micro-topographic relief as illustrated in profile A.
B	AA has at least two benches above the channel bottom area of the AA, but these benches mostly lack abundant micro-topographic complexity. The AA resembles profile B.
C	AA has a single bench that may or may not have abundant micro-topographic complexity, as illustrated in profile C.
D	AA as viewed along a typical cross-section lacks any obvious bench. The cross-section is best characterized as a single, uniform slope with or without micro-topographic complexity, as illustrated in profile D (includes concrete channels).

Structural Patch Type Worksheet for Riverine wetlands

Circle each type of patch that is observed in the AA and enter the total number of observed patches in Table below. In the case of riverine wetlands, their status as confined or non-confined must first be determined (see page 6) to determine with patches are expected in the system (indicated by a "1" in the table below).

STRUCTURAL PATCH TYPE (circle for presence)	Riverine (Non-confined)	Riverine (Confined)
Minimum Patch Size	**3 m^2**	**3 m^2**
Abundant wrackline or organic debris in channel, on floodplain	1	1
Bank slumps or undercut banks in channels or along shoreline	1	1
Cobble and/or Boulders	1	1
Debris jams	1	1
Filamentous macroalgae or algal mats	1	1
Pannes or pools on floodplain	1	N/A
Plant hummocks and/or sediment mounds	1	1
Point bars and in-channel bars	1	1
Pools or depressions in channels (wet or dry channels)	1	1
Riffles or rapids (wet or dry channels)	1	1
Secondary channels on floodplains or along shorelines	1	N/A
Standing snags (at least 3 m tall)	1	1
Submerged vegetation	1	N/A
Swales on floodplain or along shoreline	1	N/A
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	1	1
Vegetated islands (mostly above high-water)	1	N/A
Total Possible	**16**	**11**
No. Observed Patch Types (enter here and use in Table 14 below)		8

Table 13a: Rating of Hydrologic Connectivity for Non-confined Riverine wetlands.

Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 2.2.
B	Entrenchment ratio is 1.9 to 2.2.
C	Entrenchment ratio is 1.5 to 1.8.
D	Entrenchment ratio is <1.5.

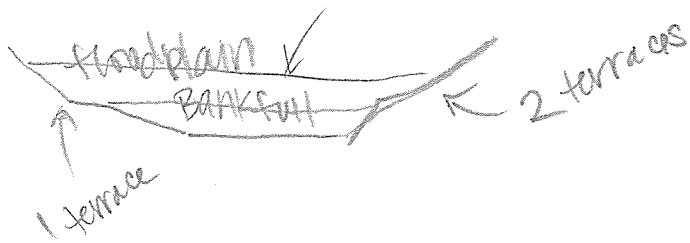
Table 13b: Rating of Hydrologic Connectivity for Confined Riverine wetlands.

Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 1.8.
B	Entrenchment ratio is 1.6 to 1.8
C	Entrenchment ratio is 1.2 to 1.5.
D	Entrenchment ratio is < 1.2.

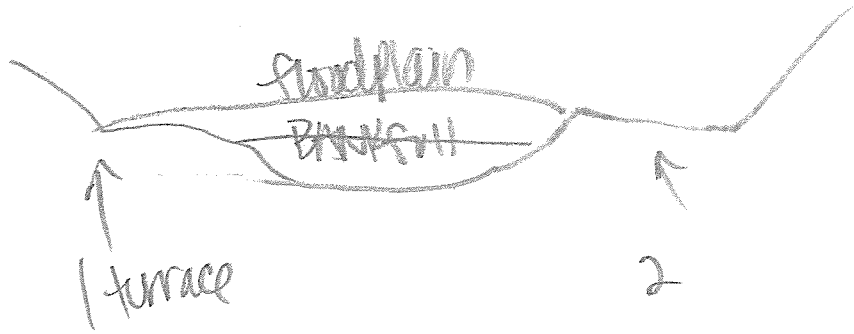
Worksheet for AA Topographic Complexity

At three locations along the AA, make a sketch of the profile of the stream from the AA boundary down to its deepest area then back out to the other AA boundary. Try to capture the benches and the intervening micro-topographic relief. To maintain consistency, make drawings at each of the stream hydrologic connectivity measurements, always facing downstream. Include the water level, an arrow at the bankfull, and label the benches. Based on these sketches and the profiles in Figure 10, choose a description in Table 16 that best describes the overall topographic complexity of the AA.

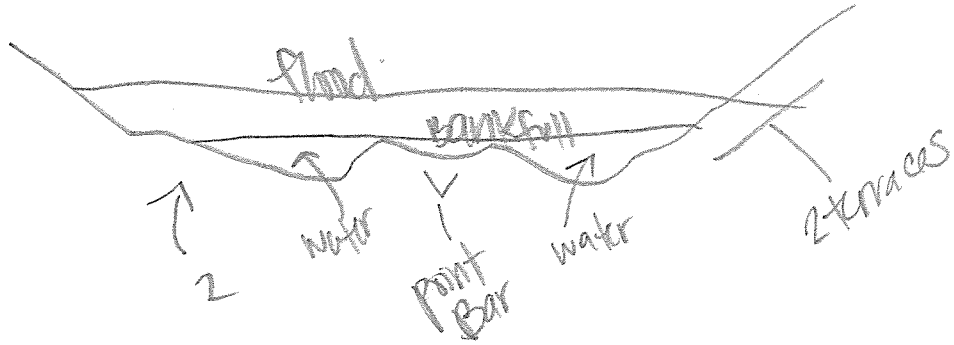
Profile 1



Profile 2



Profile 3



Plant Community Metric Worksheet: Co-dominant species richness for Riverine wetlands
(A dominant species represents ≥10% *relative* cover)

Special Note:

* *Combine the counts of co-dominant species from all layers to identify the total species count. Each plant species is only counted once when calculating the Number of Co-dominant Species and Percent Invasion submetric scores, regardless of the numbers of layers in which it occurs.*

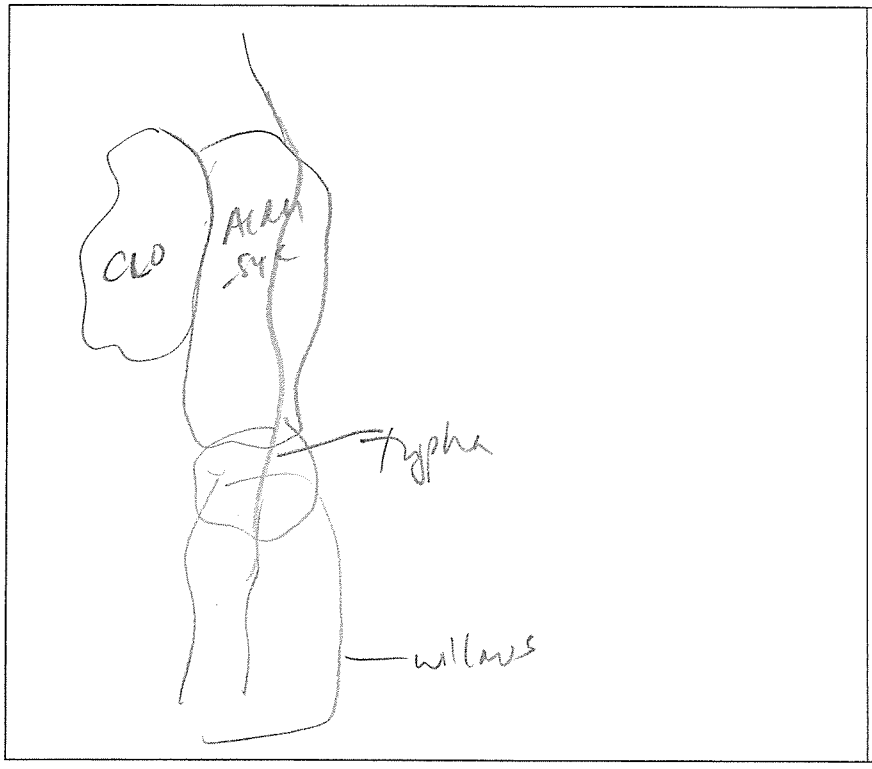
Floating or Canopy-forming (non-confined only)	Invasive?	Short (<0.5 m)	Invasive?
	1 –	Caratina	
	2 –	Oxilobium	
	3 –	Rorippa	
Medium (0.5-1.5 m)	**Invasive?**	**Tall (1.5-3.0 m)**	**Invasive?**
4 – Baccharis salicifolia		Baccharis salicifolia	
5 – Salix lasiolepis		Salix lasiolepis	
		6 – Alnus rhombifolius	
Very Tall (>3.0 m)	**Invasive?**	**Total number of co-dominant species for all layers combined (enter here and use in Table 18)**	
Salix lasiolepis			
Alnus rhombifolius			
		Percent Invasion (enter here and use in Table 18)	

Table 18: Ratings for submetrics of Plant Community Metric.

Rating	Number of Plant Layers Present	Number of Co-dominant Species	Percent Invasion
Non-confined Riverine Wetlands			
A	4 – 5	≥ 12	0 – 15%
B	3	9 – 11	16 – 30%
C	1 – 2	6 – 8	31 – 45%
D	0	0 – 5	46 – 100%
Confined Riverine Wetlands			
A	4	≥ 11	0 – 15%
B	3	8 – 10	16 – 30%
C	1 – 2	5 – 7	31 – 45%
D	0	0 – 4	46 – 100%

Horizontal Interspersion Worksheet.

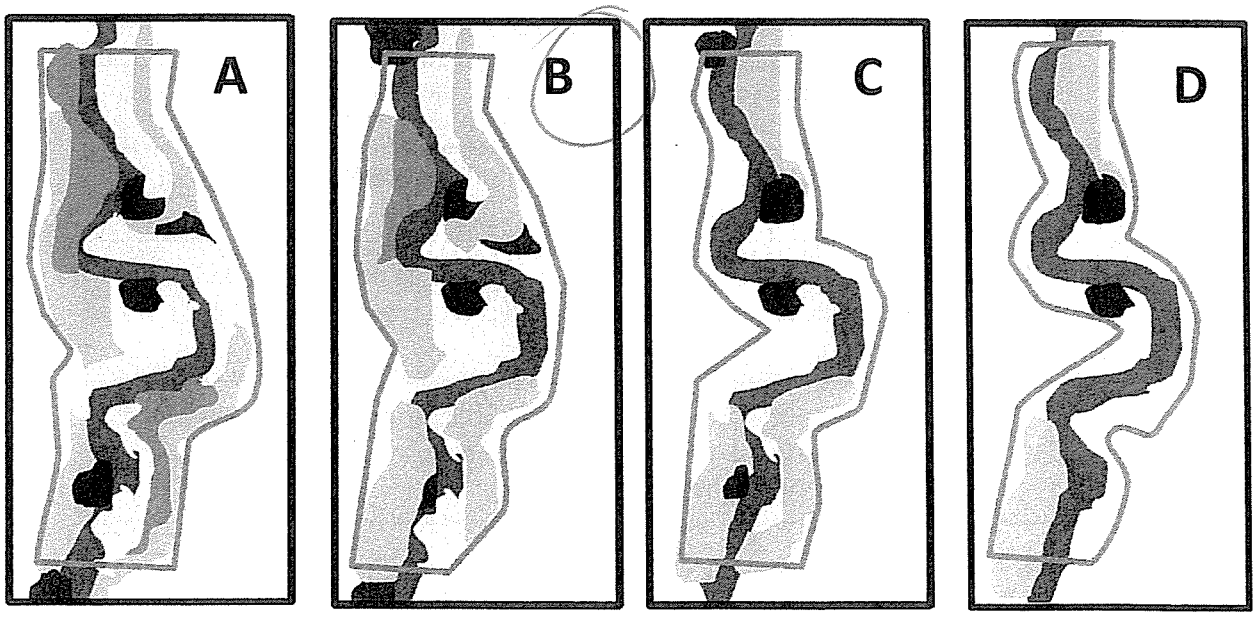
Use the spaces below to make a quick sketch of the AA in plan view, outlining the major plant zones (this should take no longer than 10 minutes). Assign the zones names and record them on the right. Based on the sketch, choose a single profile from Figure 12 that best represents the AA overall.



Assigned zones:

1) coast live oaks
2) willow scrub
3) Alder-sye
4) Typha.
5)
6)

Figure 12: Schematic diagrams illustrating varying degrees of interspersion of plant zones, open water and bare ground for all riverine wetlands. Each plant zone must comprise at least 5% of the AA. The red box represents the boundary of an AA, each color represents a unique plant zone, the speckled background represents the background "matrix" vegetation zone, and the blue represents the water.



Metric 3: Vertical Biotic Structure

Definition The vertical component of biotic structure assesses the degree of overlap among plant layers. The same plant layers used to assess the Plant Community Composition Metrics are used to assess Vertical Biotic Structure. To be counted in CRAM, a layer must cover at least 5% of the portion of the AA that is suitable for the layer.

Special Note:

**The "A" condition can be obtained only when >50% of the entire AA has three layers that overlap abundantly.*

**It is important to accurately estimate the extent of overlap, particularly when the AA contains only two layers. The aerial imagery can help in determining the extent of overlap between layers.*

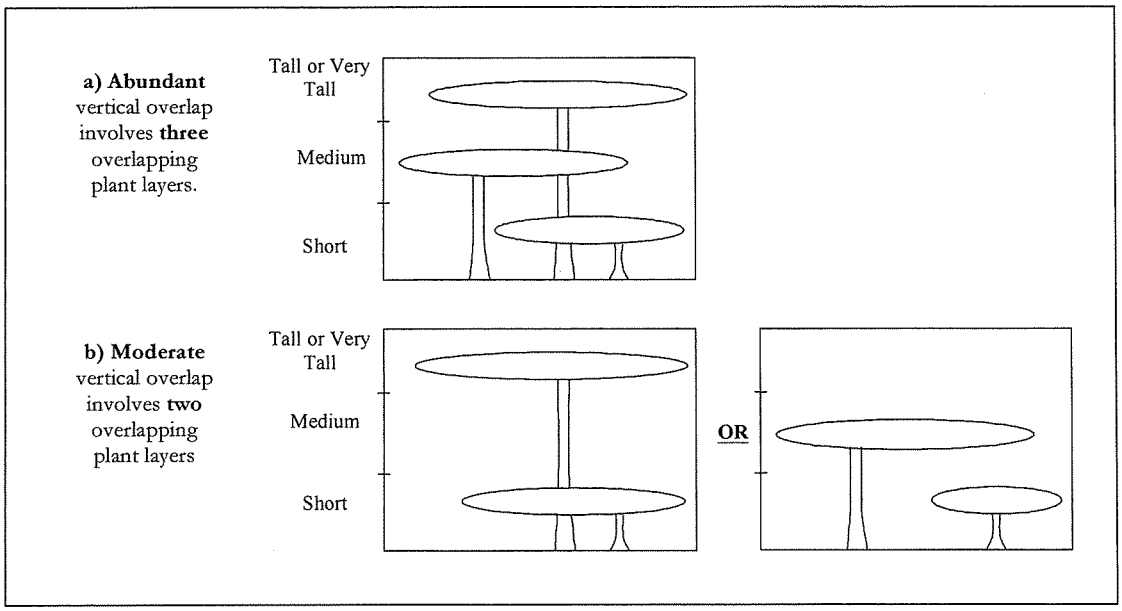


Figure 13: Schematic diagrams of (a) abundant and (b) moderate vertical overlap of plant layers for Riverine AAs.

Table 20: Rating of Vertical Biotic Structure for Riverine AAs

Rating	Alternative States
A	More than 50% of the vegetated area of the AA supports **abundant** overlap of 3 plant layers (see Figure 13a).
B	More than 50% of the area supports at least **moderate** overlap of 2 plant layers (see Figure 13b).
C	25–50% of the vegetated AA supports at least **moderate** overlap of 2 plant layers, **or** 3 plant layers are well represented in the AA but there is little to no overlap.
D	Less than 25% of the vegetated AA supports **moderate** overlap of 2 plant layers, **or** 2 layers are well represented with **little** overlap, **or** AA is sparsely vegetated overall.

Multiple areas with tall willow & underlying shrubs

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)	X	
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates		
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology		
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**	X	
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

Worksheet for Wetland disturbances and conversions

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		

Basic Information Sheet: Riverine Wetlands

AA 2

CRAM Site ID: Carollo				
Project Site ID: Carollo				
Assessment Area Name: AA 2				
Project Name: Carollo	**Date (m/d/y)**	5	10	13

Assessment Team Members for This AA:

Dave Hughes

Dan Henning

Average Bankfull Width:

Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100 m

Upstream Point Latitude: 34.20966° **Longitude:** −118.17236°

Downstream Point Latitude: 34.20866° **Longitude:** −118.17169°

Wetland Sub-type:

☐ Confined ☒ Non-confined

AA Category:

☐ Restoration ☐ Mitigation ☐ Impacted ☐ Ambient ☐ Reference ☐ Training

☐ Other:

Did the river/stream have flowing water at the time of the assessment? ☒ yes ☐ no

What is the apparent hydrologic flow regime of the reach you are assessing?

The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source.

☒ perennial ☐ intermittent ☐ ephemeral

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1		Upstream			
2		Middle Left			
3		Middle Right			
4		Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Comments:

Scoring Sheet: Riverine Wetlands

AA Name:				(m/d/y)			
Attribute 1: Buffer and Landscape Context				**Comments**			
Aquatic Area Abundance Score (D)			Alpha. A	Numeric 12			
Buffer:							
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric 12					
Buffer submetric B: Average Buffer Width	B	9					
Buffer submetric C: Buffer Condition	A	12					
Raw Attribute Score = D+[C x (A x B)$^{1/2}$]$^{1/2}$ (use numerical value to nearest whole integer)				23.16	**Final Attribute Score = (Raw Score/24) x 100**		96.5
Attribute 2: Hydrology							
Water Source			Alpha. A	Numeric 12			
Channel Stability			B	9			
Hydrologic Connectivity			B	9			
Raw Attribute Score = sum of numeric scores				30	**Final Attribute Score = (Raw Score/36) x 100**		83.3
Attribute 3: Physical Structure							
Structural Patch Richness			Alpha. C	Numeric 6			
Topographic Complexity			B	9			
Raw Attribute Score = sum of numeric scores				15	**Final Attribute Score = (Raw Score/24) x 100**		62.5
Attribute 4: Biotic Structure							
Plant Community Composition (based on sub-metrics A-C)							
Plant Community submetric A: Number of plant layers	Alpha. A	Numeric 12					
Plant Community submetric B: Number of Co-dominant species	C	6					
Plant Community submetric C: Percent Invasion	A	12					
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)				10.0			
Horizontal Interspersion			C	6			
Vertical Biotic Structure			C	6			
Raw Attribute Score = sum of numeric scores				22	**Final Attribute Score = (Raw Score/36) x 100**		61.1
Overall AA Score (average of four final Attribute Scores)					75.9		

Table 5: Rating for Riparian Continuity for Riverine wetlands.

Rating	For Distance of 500 m Upstream of AA:	For Distance of 500 m Downstream of AA:
A	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).
B	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; 50 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
	OR	
	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; is less than 50 m for "1-sided" AAs.
C	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
D	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.	any condition
	OR	
	any condition	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.

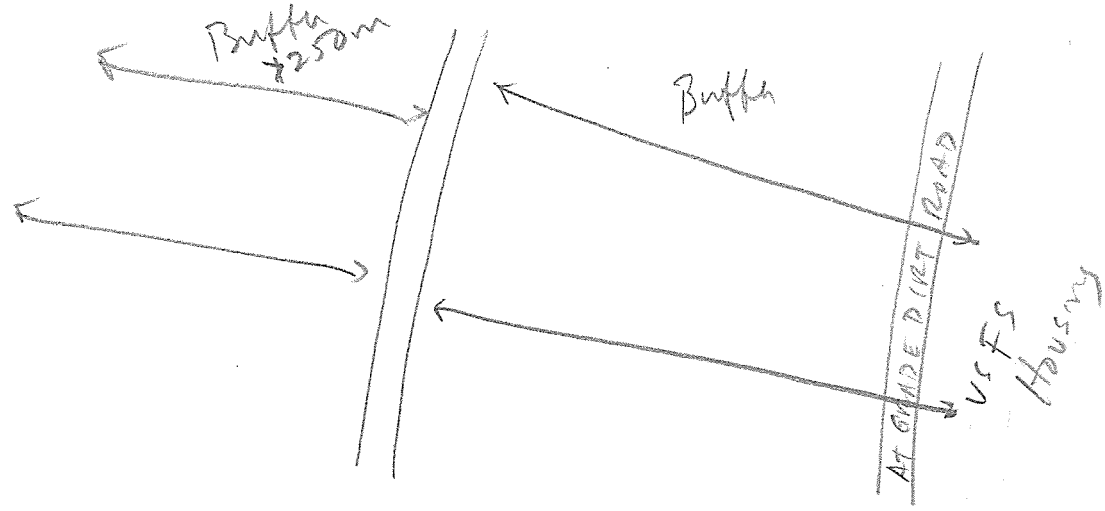
Worksheet for Riparian Continuity Metric for Riverine Wetlands

Lengths of Non-buffer Segments For Distance of 500 m Upstream of AA		Lengths of Non-buffer Segments For Distance of 500 m Downstream of AA	
Segment No.	Length (m)	Segment No.	Length (m)
1	2 m	1	
2	5 m	2	5 m
3		3	
4		4	
5		5	
Upstream Total Length	7 m	Downstream Total Length	Ø

headworks bridge

Percent of AA with Buffer Worksheet

In the space provided below make a quick sketch of the AA, or perform the assessment directly on the aerial imagery; indicate where buffer is present, estimate the percentage of the AA perimeter providing buffer functions, and record the estimate amount in the space provided.



Percent of AA with Buffer: 100 %

Worksheet for calculating average buffer width of AA

Line	Buffer Width (m)
A	250 m
B	250 m
C	250 m
D	250 m
E	111 m
F	118 m
G	120 m
H	104 m
Average Buffer Width	181.6

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Table 10: Rating for Buffer Condition.

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by an intermediate mix of native and non-native vegetation (25% to 75% non-native), but mostly undisturbed soils and is apparently subject to little or low impact human visitation.
	OR
	Buffer for AA is dominated by native vegetation, but shows some soil disturbance and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by substantial (>75%) amounts of non-native vegetation AND there is at least a moderate degree of soil disturbance/compaction, and/or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground and/or highly compacted or otherwise disturbed soils, and/or there is evidence of very intense human visitation.

Buffer to the west is a bench / canyon slope undisturbed native vegetation.
Buffer to the east is alluvial deposits from recent flooding, with establishing willow/ mule fat, and non-native grasses. In areas

Table 9: Rating for average buffer width.

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

Table 11: Rating for Water Source.

Rating	Alternative States
A	Freshwater sources that affect the dry season condition of the AA, such as its flow characteristics, hydroperiod, or salinity regime, are precipitation, snow melt, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the dry season. There is **no indication** that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season condition of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises **less than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or that is characterized by the presence of a few small stormdrains or scattered homes with septic systems. No large point sources or dams control the overall hydrology of the AA.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water, artificially impounded water, water remaining after diversions, regulated releases of water through a dam, or other artificial hydrology. Indications of substantial artificial hydrology include developed or irrigated agricultural land that comprises **more than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or the presence of major point source discharges that obviously control the hydrology of the AA. OR Freshwater sources that affect the dry season conditions of the AA are **substantially controlled** by known diversions of water or other withdrawals directly from the AA, its encompassing wetland, or from its drainage basin.
D	Natural, freshwater sources that affect the dry season conditions of the AA have **been eliminated** based on the following indicators: impoundment of all possible wet season inflows, diversion of all dry-season inflow, predominance of xeric vegetation, etc.

Water apparently flows unimpeded from SG mountains / National Forest.

Worksheet for Assessing Channel Stability for Riverine Wetlands.

Condition	Field Indicators (check all existing conditions)
Indicators of Channel Equilibrium	☒ The channel (or multiple channels in braided systems) has a well-defined bankfull contour that clearly demarcates an obvious active floodplain in the cross-sectional profile of the channel throughout most of the AA. ☒ Perennial riparian vegetation is abundant and well established along the bankfull contour, but not below it. ☐ There is leaf litter, thatch, or wrack in most pools. ☐ The channel contains embedded woody debris of the size and amount consistent with what is naturally available in the riparian area. ☐ There is little or no active undercutting or burial of riparian vegetation. ☐ There are no densely vegetated mid-channel bars and/or point bars that support perennial vegetation. ☐ Channel bars consist of well-sorted bed material. ☐ There are channel pools, the spacing between pools tends to be regular and the bed is not planar through out the AA ☐ The larger bed material supports abundant mosses or periphyton.
Indicators of Active Degradation	☒ The channel is characterized by deeply undercut banks with exposed living roots of trees or shrubs. ☐ There are abundant bank slides or slumps. ☐ The lower banks are uniformly scoured and not vegetated. ☐ Riparian vegetation is declining in stature or vigor, or many riparian trees and shrubs along the banks are leaning or falling into the channel. ☐ An obvious historical floodplain has recently been abandoned, as indicated by the age structure of its riparian vegetation. ☐ The channel bed appears scoured to bedrock or dense clay. ☐ Recently active flow pathways appear to have coalesced into one channel (i.e. a previously braided system is no longer braided). ☐ The channel has one or more knickpoints indicating headward erosion of the bed.
Indicators of Active Aggradation	☐ There is an active floodplain with fresh splays of coarse sediment (sand and larger that is not vegetated) deposited in the current or previous year. ☐ There are partially buried living tree trunks or shrubs along the banks. ☐ The bed is planar overall; it lacks well-defined channel pools, or they are uncommon and irregularly spaced. ☐ There are partially buried, or sediment-choked, culverts. ☐ Perennial terrestrial or riparian vegetation is encroaching into the channel or onto channel bars below the bankfull contour. ☐ There are avulsion channels on the floodplain or adjacent valley floor.
Overall	☐ **Equilibrium** ☒ Slight- **Degradation** ☐ **Aggradation**

Some undercut banks noted, headworks structure appears to diminish amount of new sediment reaching this area

Riverine Wetland Entrenchment Ratio Calculation Worksheet

The following 5 steps should be conducted for each of 3 cross-sections located in the AA at the approximate midpoints along straight riffles or glides, away from deep pools or meander bends. An attempt should be made to place them at the top, middle, and bottom of the AA.

Steps	Replicate Cross-sections →	TOP	MID	BOT
Estimate bankfull width.	This is a critical step requiring familiarity with field indicators of the bankfull contour. Estimate or measure the distance between the right and left bankfull contours.	19'	22'	23'
Estimate max. bankfull depth.	Imagine a level line between the right and left bankfull contours; estimate or measure the height of the line above the thalweg (the deepest part of the channel).	3'	4'	4'
Estimate flood prone depth.	Double the estimate of maximum bankfull depth from Step 2.	6'	8'	8'
Estimate flood prone width.	Imagine a level line having a height equal to the flood prone depth from Step 3; note where the line intercepts the right and left banks; estimate or measure the length of this line.	23'	50'	55'
Calculate entrenchment ratio.	Divide the flood prone width (Step 4) by the bankfull width (Step 1).	1.2	2.27	2.39
Calculate average entrenchment ratio.	Calculate the average results for Step 5 for all 3 replicate cross-sections. Enter the average result here and use it in Table 13a or 13b.			1.96

Table 16: Rating of Topographic Complexity for Riverine Wetlands.

Rating	Alternative States (based on worksheet and diagrams in Figure 10 above)
A	AA as viewed along a typical cross-section has at least two benches at different elevations, above the active channel bottom (not including the thalweg or high riparian terraces not influenced by fluvial processes). Large point bars or in-channel bars above the active channel bed can be considered a bench. Additionally, each of these benches, plus the slopes between the benches, as well as the channel bottom area contain physical patch types or micro-topographic features such as boulders or cobbles, partially buried woody debris, undercut banks, secondary channels and debris jams that contribute to abundant micro-topographic relief as illustrated in profile A.
B	AA has at least two benches above the channel bottom area of the AA, but these benches mostly lack abundant micro-topographic complexity. The AA resembles profile B.
C	AA has a single bench that may or may not have abundant micro-topographic complexity, as illustrated in profile C.
D	AA as viewed along a typical cross-section lacks any obvious bench. The cross-section is best characterized as a single, uniform slope with or without micro-topographic complexity, as illustrated in profile D (includes concrete channels).

Structural Patch Type Worksheet for Riverine wetlands

Circle each type of patch that is observed in the AA and enter the total number of observed patches in Table below. In the case of riverine wetlands, their status as confined or non-confined must first be determined (see page 6) to determine with patches are expected in the system (indicated by a "1" in the table below).

STRUCTURAL PATCH TYPE (circle for presence)	Riverine (Non-confined)	Riverine (Confined)
Minimum Patch Size	**3 m^2**	**3 m^2**
Abundant wrackline or organic debris in channel, on floodplain	1	1
Bank slumps or undercut banks in channels or along shoreline	1	1
Cobble and/or Boulders	1	1
Debris jams	1	1
Filamentous macroalgae or algal mats	1	1
Pannes or pools on floodplain	1	N/A
Plant hummocks and/or sediment mounds	1	1
Point bars and in-channel bars	1	1
Pools or depressions in channels (wet or dry channels)	1	1
Riffles or rapids (wet or dry channels)	1	1
Secondary channels on floodplains or along shorelines	1	N/A
Standing snags (at least 3 m tall)	1	1
Submerged vegetation	1	N/A
Swales on floodplain or along shoreline	1	N/A
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	1	1
Vegetated islands (mostly above high-water)	1	N/A
Total Possible	**16**	**11**
No. Observed Patch Types (enter here and use in Table 14 below)	6	

Score = C

Table 13a: Rating of Hydrologic Connectivity for Non-confined Riverine wetlands.

Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 2.2.
B	Entrenchment ratio is 1.9 to 2.2.
C	Entrenchment ratio is 1.5 to 1.8.
D	Entrenchment ratio is <1.5.

Table 13b: Rating of Hydrologic Connectivity for Confined Riverine wetlands.

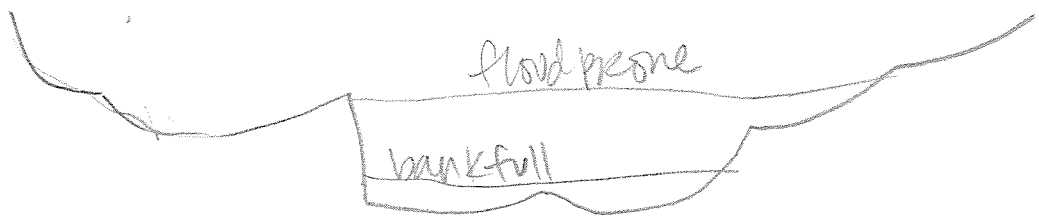
Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 1.8.
B	Entrenchment ratio is 1.6 to 1.8
C	Entrenchment ratio is 1.2 to 1.5.
D	Entrenchment ratio is < 1.2.

Worksheet for AA Topographic Complexity

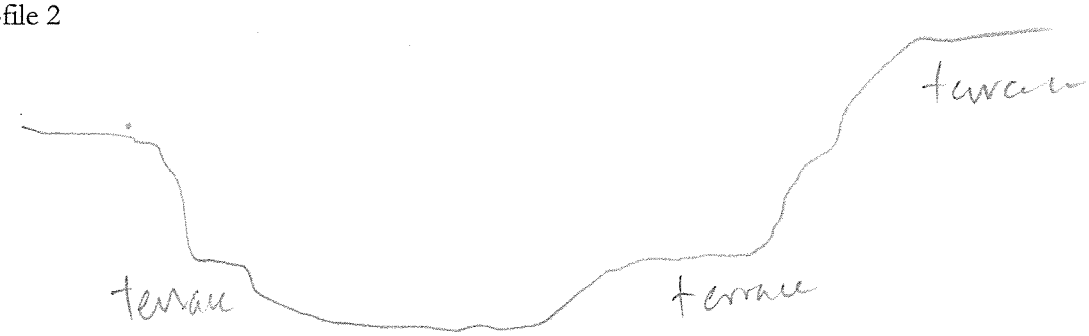
At three locations along the AA, make a sketch of the profile of the stream from the AA boundary down to its deepest area then back out to the other AA boundary. Try to capture the benches and the intervening micro-topographic relief. To maintain consistency, make drawings at each of the stream hydrologic connectivity measurements, always facing downstream. Include the water level, an arrow at the bankfull, and label the benches. Based on these sketches and the profiles in Figure 10, choose a description in Table 16 that best describes the overall topographic complexity of the AA.

Score = B – generally two benches throughout AA little micro topography

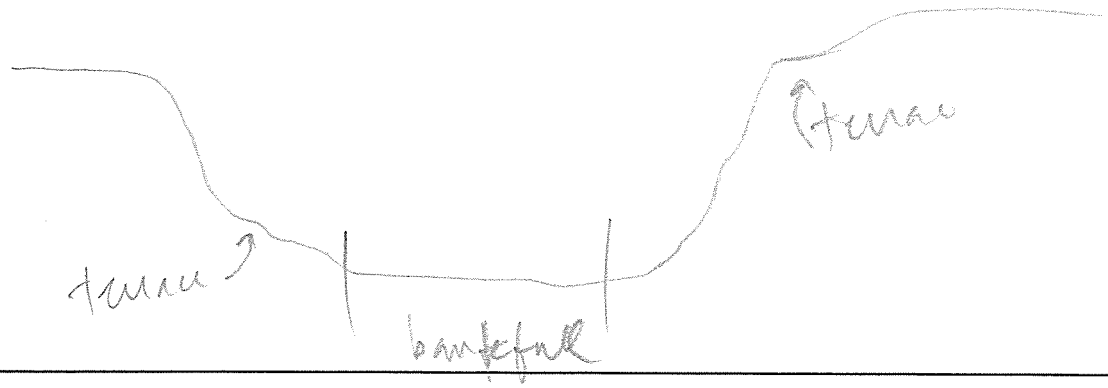
Profile 1



Profile 2



Profile 3



Plant Community Metric Worksheet: Co-dominant species richness for Riverine wetlands
(A dominant species represents ≥10% *relative* cover)

Special Note:

** Combine the counts of co-dominant species from all layers to identify the total species count. Each plant species is only counted once when calculating the Number of Co-dominant Species and Percent Invasion submetric scores, regardless of the numbers of layers in which it occurs.*

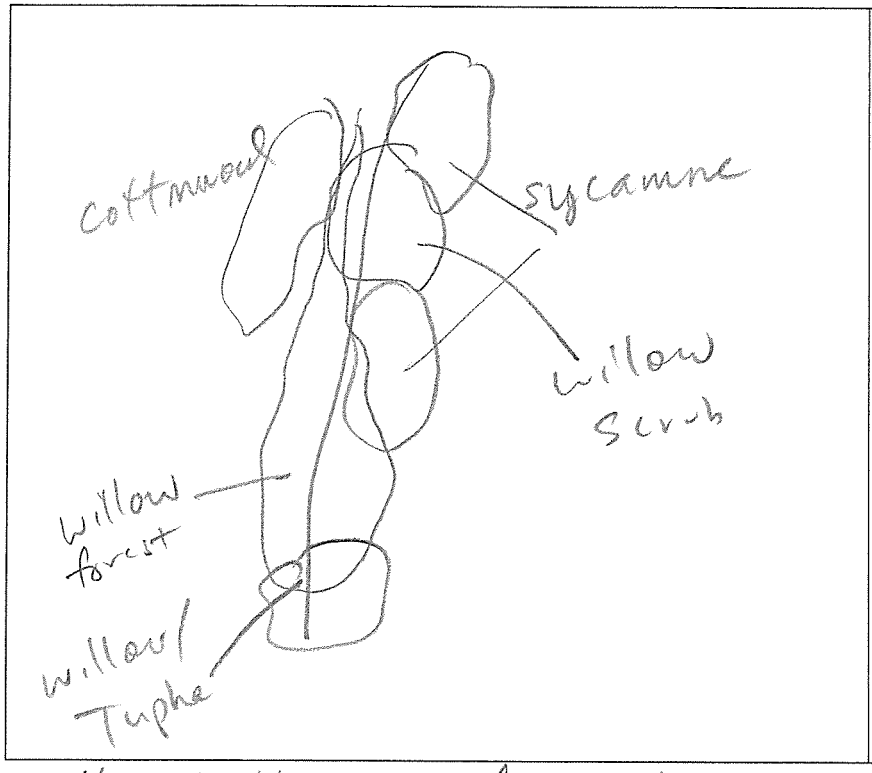
Floating or Canopy-forming (non-confined only)	Invasive?	Short (<0.5 m)	Invasive?
	1	Cyperus eragrostis	
	2	Artemisia douglasiana	
Medium (0.5-1.5 m)	**Invasive?**	**Tall (1.5-3.0 m)**	**Invasive?**
3 - Baccharis salicifolia	4	Salix apodanii	
	5	Platanus racemosa	
	6	Nicotiana glauca	✓
	7	Salix lasiolepis	
Very Tall (>3.0 m)	**Invasive?**	**Total number of co-dominant species for all layers combined (enter here and use in Table 18)**	8
8 - Alnus rhombifolia			
Platanus racemosa			
Salix lasiolepis		**Percent Invasion (enter here and use in Table 18)**	1/8 = 12.5%

Table 18: Ratings for submetrics of Plant Community Metric.

Rating	Number of Plant Layers Present	Number of Co-dominant Species	Percent Invasion
Non-confined Riverine Wetlands			
A	4 – 5	≥ 12	0 – 15%
B	3	9 – 11	16 – 30%
C	1 – 2	6 – 8	31 – 45%
D	0	0 – 5	46 – 100%
Confined Riverine Wetlands			
A	4	≥ 11	0 – 15%
B	3	8 – 10	16 – 30%
C	1 – 2	5 – 7	31 – 45%
D	0	0 – 4	46 – 100%

Horizontal Interspersion Worksheet.

Use the spaces below to make a quick sketch of the AA in plan view, outlining the major plant zones (this should take no longer than 10 minutes). Assign the zones names and record them on the right. Based on the sketch, choose a single profile from Figure 12 that best represents the AA overall.

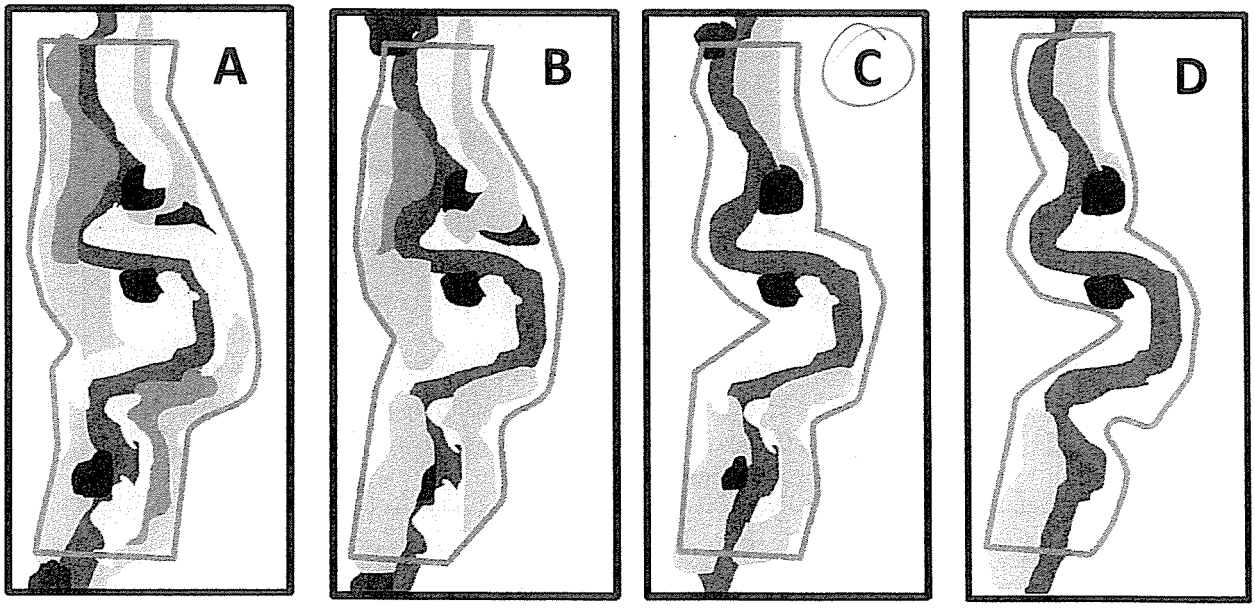


Assigned zones:

1) willow scrub
2) mature willow
3) sycamore
4) willow/Typhe
5) cottonwood
6)

though there are few patches, willows dominate throughout

Figure 12: Schematic diagrams illustrating varying degrees of interspersion of plant zones, open water and bare ground for all riverine wetlands. Each plant zone must comprise at least 5% of the AA. The red box represents the boundary of an AA, each color represents a unique plant zone, the speckled background represents the background "matrix" vegetation zone, and the blue represents the water.



Metric 3: Vertical Biotic Structure

Definition The vertical component of biotic structure assesses the degree of overlap among plant layers. The same plant layers used to assess the Plant Community Composition Metrics are used to assess Vertical Biotic Structure. To be counted in CRAM, a layer must cover at least 5% of the portion of the AA that is suitable for the layer.

Special Note:

**The "A" condition can be obtained only when >50% of the entire AA has three layers that overlap abundantly.*

**It is important to accurately estimate the extent of overlap, particularly when the AA contains only two layers. The aerial imagery can help in determining the extent of overlap between layers.*

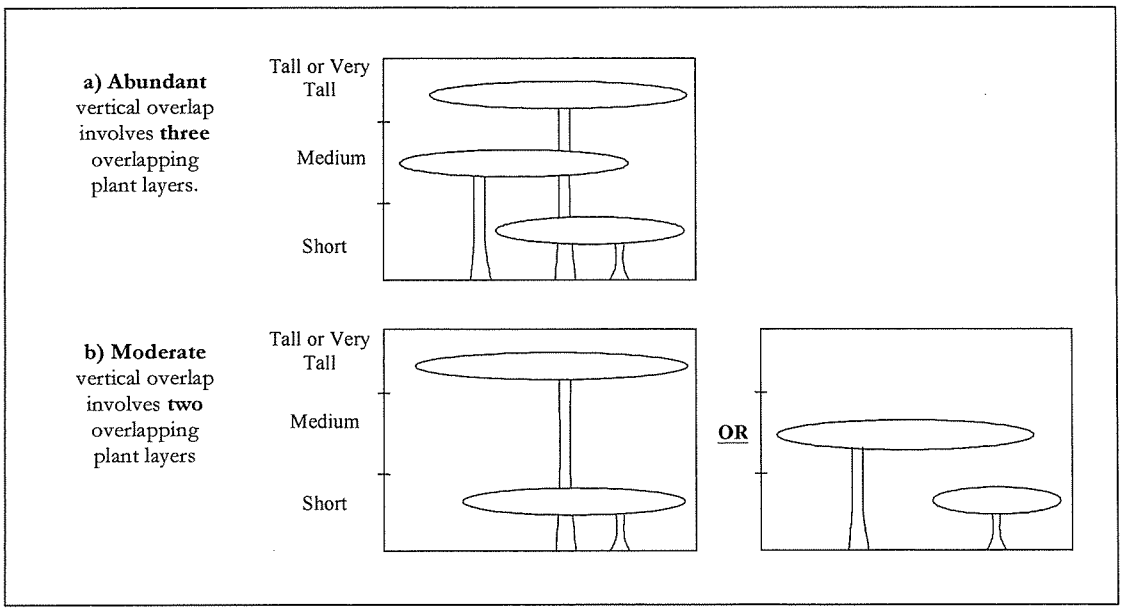


Figure 13: Schematic diagrams of (a) abundant and (b) moderate vertical overlap of plant layers for Riverine AAs.

Table 20: Rating of Vertical Biotic Structure for Riverine AAs

Rating	Alternative States
A	More than 50% of the vegetated area of the AA supports **abundant** overlap of 3 plant layers (see Figure 13a).
B	More than 50% of the area supports at least **moderate** overlap of 2 plant layers (see Figure 13b).
C	25–50% of the vegetated AA supports at least **moderate** overlap of 2 plant layers, **or** 3 plant layers are well represented in the AA but there is little to no overlap.
D	Less than 25% of the vegetated AA supports **moderate** overlap of 2 plant layers, **or** 2 layers are well represented with **little** overlap, **or** AA is sparsely vegetated overall.

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates	X	
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

Worksheet for Wetland disturbances and conversions

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation		
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources	(X)	
Lack of treatment of invasive plants adjacent to AA or buffer	(X)	
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		
general open space		

Basic Information Sheet: Riverine Wetlands

CRAM Site ID: Carollo				
Project Site ID:				
Assessment Area Name: AA 3				
Project Name: Carollo	**Date (m/d/y)**	05	10	13
Assessment Team Members for This AA:				
Dave Hahns				
Dani Wenning				
Average Bankfull Width:				
Approximate Length of AA (10 times bankfull width, min 100 m, max 200 m): 100m				
Upstream Point Latitude: 34.2077° **Longitude:** −118.16838°				
Downstream Point Latitude: 34.20699° **Longitude:** −118.16836°				
Wetland Sub-type: ☒ Confined ☐ Non-confined				
AA Category: ☐ Restoration ☐ Mitigation ☐ Impacted ☐ Ambient ☐ Reference ☐ Training ☐ Other:				
Did the river/stream have flowing water at the time of the assessment? ☒ yes ☐ no				
What is the apparent hydrologic flow regime of the reach you are assessing? The hydrologic flow regime of a stream describes the frequency with which the channel conducts water. *Perennial* streams conduct water all year long, whereas *ephemeral* streams conduct water only during and immediately following precipitation events. *Intermittent* streams are dry for part of the year, but conduct water for periods longer than ephemeral streams, as a function of watershed size and water source. ☒ perennial ☐ intermittent ☐ ephemeral				

Photo Identification Numbers and Description:

	Photo ID No.	Description	Latitude	Longitude	Datum
1		Upstream			
2		Middle Left			
3		Middle Right			
4		Downstream			
5					
6					
7					
8					
9					
10					

Site Location Description:

Comments:

Scoring Sheet: Riverine Wetlands

AA Name:				(m/d/y)			
Attribute 1: Buffer and Landscape Context				**Comments**			
Aquatic Area Abundance Score (D)			Alpha. A	Numeric 12			
Buffer:							
Buffer submetric A: Percent of AA with Buffer	Alpha. A	Numeric 12					
Buffer submetric B: Average Buffer Width	B	9					
Buffer submetric C: Buffer Condition	A	12					
Raw Attribute Score = D+[C x (A x B)^{½}]^{½} (use numerical value to nearest whole integer)				23.16	**Final Attribute Score = (Raw Score/24) x 100**		96.5
Attribute 2: Hydrology							
Water Source			Alpha. B	Numeric 9			
Channel Stability			A	12			
Hydrologic Connectivity			A	12			
Raw Attribute Score = sum of numeric scores				33	**Final Attribute Score = (Raw Score/36) x 100**		91.7
Attribute 3: Physical Structure							
Structural Patch Richness			Alpha. A	Numeric 12			
Topographic Complexity			A	12			
Raw Attribute Score = sum of numeric scores				24	**Final Attribute Score = (Raw Score/24) x 100**		100
Attribute 4: Biotic Structure							
Plant Community Composition (based on sub-metrics A-C)							
Plant Community submetric A: Number of plant layers	Alpha. A	Numeric 12					
Plant Community submetric B: Number of Co-dominant species	A	12					
Plant Community submetric C: Percent Invasion	A	12					
Plant Community Composition (*average of submetrics A-C rounded to nearest whole integer*)				12			
Horizontal Interspersion			B	9			
Vertical Biotic Structure			B	9			
Raw Attribute Score = sum of numeric scores				30	**Final Attribute Score = (Raw Score/36) x 100**		83.3
Overall AA Score (average of four final Attribute Scores)					92.9		

Table 5: Rating for Riparian Continuity for Riverine wetlands.

Rating	For Distance of 500 m Upstream of AA:	For Distance of 500 m Downstream of AA:
A	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).	The combined total length of all non-buffer segments is less than 100 m for wadeable systems ("2-sided" AAs); 50 m for non-wadeable systems ("1-sided" AAs).
B	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; 50 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
	OR	
	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is less than 100 m for "2-sided" AAs; is less than 50 m for "1-sided" AAs.
C	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.	The combined total length of all non-buffer segments is between 100 m and 200 m for "2-sided" AAs; 50 m and 100 m for "1-sided" AAs.
D	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.	any condition
	OR	
	any condition	The combined total length of non-buffer segments is greater than 200 m for "2-sided" AAs; greater than 100 m for "1-sided" AAs.

Worksheet for Riparian Continuity Metric for Riverine Wetlands

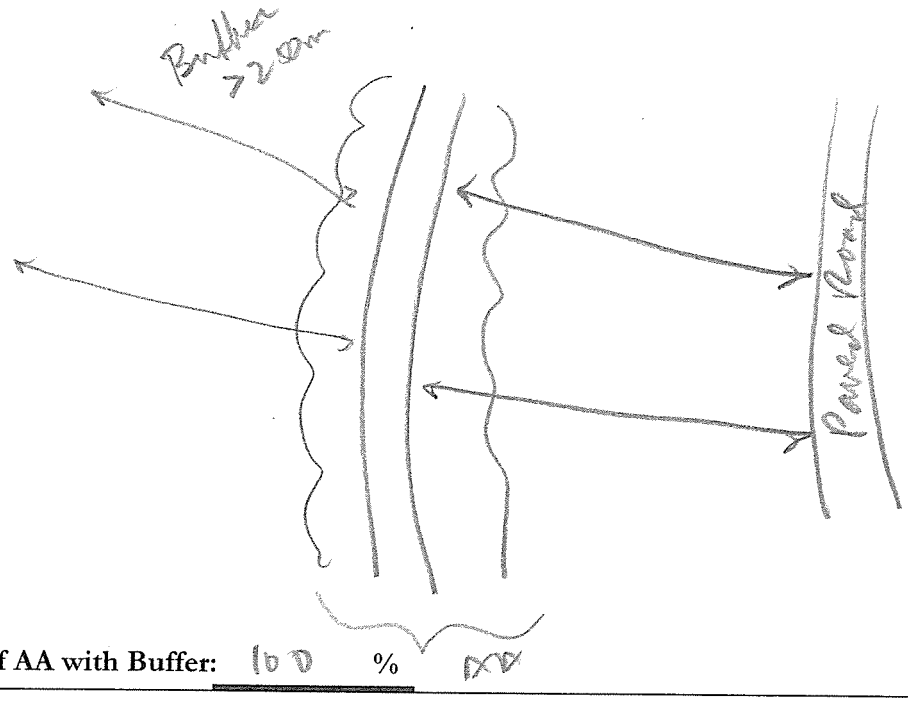
Lengths of Non-buffer Segments For Distance of 500 m Upstream of AA		Lengths of Non-buffer Segments For Distance of 500 m Downstream of AA	
Segment No.	Length (m)	Segment No.	Length (m)
1	1 m	1	5 m
2		2	
3		3	
4		4	
5		5	
Upstream Total Length	1 m	Downstream Total Length	5 m

weir structure

A-frame bridge

Percent of AA with Buffer Worksheet

In the space provided below make a quick sketch of the AA, or perform the assessment directly on the aerial imagery; indicate where buffer is present, estimate the percentage of the AA perimeter providing buffer functions, and record the estimate amount in the space provided.



Percent of AA with Buffer: 100 % 100

Worksheet for calculating average buffer width of AA

Line	Buffer Width (m)
A	250 m
B	250 m
C	250 m
D	250 m
E	15 m
F	21 m
G	24 m
H	19 m
Average Buffer Width	134.8

Rating	Alternative States (not including open-water areas)
A	Buffer is 75 - 100% of AA perimeter.
B	Buffer is 50 – 74% of AA perimeter.
C	Buffer is 25 – 49% of AA perimeter.
D	Buffer is 0 – 24% of AA perimeter.

Table 10: Rating for Buffer Condition.

Rating	Alternative States
A	Buffer for AA is dominated by native vegetation, has undisturbed soils, and is apparently subject to little or no human visitation.
B	Buffer for AA is characterized by an intermediate mix of native and non-native vegetation (25% to 75% non-native), but mostly undisturbed soils and is apparently subject to little or low impact human visitation.
	OR
	Buffer for AA is dominated by native vegetation, but shows some soil disturbance and is apparently subject to little or low impact human visitation.
C	Buffer for AA is characterized by substantial (>75%) amounts of non-native vegetation AND there is at least a moderate degree of soil disturbance/compaction, and/or there is evidence of at least moderate intensity of human visitation.
D	Buffer for AA is characterized by barren ground and/or highly compacted or otherwise disturbed soils, and/or there is evidence of very intense human visitation.

native riparian vegetation surrounds AA.
Buffer to the west includes undisturbed vegetation on canyon slopes
Minimal non-native veg or soil disturbance noted

Table 9: Rating for average buffer width.

Rating	Alternative States
A	Average buffer width is 190 – 250 m.
B	Average buffer width 130 – 189 m.
C	Average buffer width is 65 – 129 m.
D	Average buffer width is 0 – 64 m.

Table 11: Rating for Water Source.

Rating	Alternative States
A	Freshwater sources that affect the dry season condition of the AA, such as its flow characteristics, hydroperiod, or salinity regime, are precipitation, snow melt, groundwater, and/or natural runoff, or natural flow from an adjacent freshwater body, or the AA naturally lacks water in the dry season. There is **no indication** that dry season conditions are substantially controlled by artificial water sources.
B	Freshwater sources that affect the dry season condition of the AA are mostly natural, but also obviously include occasional or small effects of modified hydrology. Indications of such anthropogenic inputs include developed land or irrigated agricultural land that comprises **less than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or that is characterized by the presence of a few small stormdrains or scattered homes with septic systems. No large point sources or dams control the overall hydrology of the AA.
C	Freshwater sources that affect the dry season conditions of the AA are primarily urban runoff, direct irrigation, pumped water, artificially impounded water, water remaining after diversions, regulated releases of water through a dam, or other artificial hydrology. Indications of substantial artificial hydrology include developed or irrigated agricultural land that comprises **more than 20%** of the immediate drainage basin within about 2 km upstream of the AA, or the presence of major point source discharges that obviously control the hydrology of the AA. OR Freshwater sources that affect the dry season conditions of the AA are **substantially controlled** by known diversions of water or other withdrawals directly from the AA, its encompassing wetland, or from its drainage basin.
D	Natural, freshwater sources that affect the dry season conditions of the AA have **been eliminated** based on the following indicators: impoundment of all possible wet season inflows, diversion of all dry-season inflow, predominance of xeric vegetation, etc.

Hydrology is modified by nearby weir/inlet structure, but water appears to flow downstream through AA for most of year.

Worksheet for Assessing Channel Stability for Riverine Wetlands.

Condition	Field Indicators (check all existing conditions)
Indicators of Channel Equilibrium	☒ The channel (or multiple channels in braided systems) has a well-defined bankfull contour that clearly demarcates an obvious active floodplain in the cross-sectional profile of the channel throughout most of the AA. ☒ Perennial riparian vegetation is abundant and well established along the bankfull contour, but not below it. ☐ There is leaf litter, thatch, or wrack in most pools. ☒ The channel contains embedded woody debris of the size and amount consistent with what is naturally available in the riparian area. ☒ There is little or no active undercutting or burial of riparian vegetation. ☐ There are no densely vegetated mid-channel bars and/or point bars that support perennial vegetation. ☒ Channel bars consist of well-sorted bed material. ☐ There are channel pools, the spacing between pools tends to be regular and the bed is not planar through out the AA ☐ The larger bed material supports abundant mosses or periphyton.
Indicators of Active Degradation	☐ The channel is characterized by deeply undercut banks with exposed living roots of trees or shrubs. ☐ There are abundant bank slides or slumps. ☐ The lower banks are uniformly scoured and not vegetated. ☐ Riparian vegetation is declining in stature or vigor, or many riparian trees and shrubs along the banks are leaning or falling into the channel. ☐ An obvious historical floodplain has recently been abandoned, as indicated by the age structure of its riparian vegetation. ☐ The channel bed appears scoured to bedrock or dense clay. ☐ Recently active flow pathways appear to have coalesced into one channel (i.e. a previously braided system is no longer braided). ☐ The channel has one or more knickpoints indicating headward erosion of the bed.
Indicators of Active Aggradation	☐ There is an active floodplain with fresh splays of coarse sediment (sand and larger that is not vegetated) deposited in the current or previous year. ☐ There are partially buried living tree trunks or shrubs along the banks. ☐ The bed is planar overall; it lacks well-defined channel pools, or they are uncommon and irregularly spaced. ☐ There are partially buried, or sediment-choked, culverts. ☐ Perennial terrestrial or riparian vegetation is encroaching into the channel or onto channel bars below the bankfull contour. ☐ There are avulsion channels on the floodplain or adjacent valley floor.
Overall	☐ **Equilibrium** ☐ **Degradation** ☐ **Aggradation**

no indicators of aggradation or degradation noted

Riverine Wetland Entrenchment Ratio Calculation Worksheet

The following 5 steps should be conducted for each of 3 cross-sections located in the AA at the approximate midpoints along straight riffles or glides, away from deep pools or meander bends. An attempt should be made to place them at the top, middle, and bottom of the AA.

Steps	Replicate Cross-sections →	TOP	MID	BOT
Estimate bankfull width.	This is a critical step requiring familiarity with field indicators of the bankfull contour. Estimate or measure the distance between the right and left bankfull contours.	13	31	13
Estimate max. bankfull depth.	Imagine a level line between the right and left bankfull contours; estimate or measure the height of the line above the thalweg (the deepest part of the channel).	2	2.5	2
Estimate flood prone depth.	Double the estimate of maximum bankfull depth from Step 2.	5	5	4
Estimate flood prone width.	Imagine a level line having a height equal to the flood prone depth from Step 3; note where the line intercepts the right and left banks; estimate or measure the length of this line.	34	48	32
Calculate entrenchment ratio.	Divide the flood prone width (Step 4) by the bankfull width (Step 1).	2.61	1.55	2.46
Calculate average entrenchment ratio.	Calculate the average results for Step 5 for all 3 replicate cross-sections. Enter the average result here and use it in Table 13a or 13b.			2.21

Two benches observed, with micro-topography

Table 16: Rating of Topographic Complexity for Riverine Wetlands.

Rating	Alternative States (based on worksheet and diagrams in Figure 10 above)
A	AA as viewed along a typical cross-section has at least two benches at different elevations, above the active channel bottom (not including the thalweg or high riparian terraces not influenced by fluvial processes). Large point bars or in-channel bars above the active channel bed can be considered a bench. Additionally, each of these benches, plus the slopes between the benches, as well as the channel bottom area contain physical patch types or micro-topographic features such as boulders or cobbles, partially buried woody debris, undercut banks, secondary channels and debris jams that contribute to abundant micro-topographic relief as illustrated in profile A.
B	AA has at least two benches above the channel bottom area of the AA, but these benches mostly lack abundant micro-topographic complexity. The AA resembles profile B.
C	AA has a single bench that may or may not have abundant micro-topographic complexity, as illustrated in profile C.
D	AA as viewed along a typical cross-section lacks any obvious bench. The cross-section is best characterized as a single, uniform slope with or without micro-topographic complexity, as illustrated in profile D (includes concrete channels).

Structural Patch Type Worksheet for Riverine wetlands

Circle each type of patch that is observed in the AA and enter the total number of observed patches in Table below. In the case of riverine wetlands, their status as confined or non-confined must first be determined (see page 6) to determine with patches are expected in the system (indicated by a "1" in the table below).

STRUCTURAL PATCH TYPE (circle for presence)	Riverine (Non-confined)	Riverine (Confined)
Minimum Patch Size	**3 m^2**	**3 m^2**
Abundant wrackline or organic debris in channel, on floodplain	1	1
Bank slumps or undercut banks in channels or along shoreline	1	1
Cobble and/or Boulders	1	1
Debris jams	1	1
Filamentous macroalgae or algal mats	1	1
Pannes or pools on floodplain	1	N/A
Plant hummocks and/or sediment mounds	1	1
Point bars and in-channel bars	1	1
Pools or depressions in channels (wet or dry channels)	1	1
Riffles or rapids (wet or dry channels)	1	1
Secondary channels on floodplains or along shorelines	1	N/A
Standing snags (at least 3 m tall)	1	1
Submerged vegetation	1	N/A
Swales on floodplain or along shoreline	1	N/A
Variegated, convoluted, or crenulated foreshore (instead of broadly arcuate or mostly straight)	1	1
Vegetated islands (mostly above high-water)	1	N/A
Total Possible	**16**	**11**
No. Observed Patch Types (enter here and use in Table 14 below)		8

Score = A

Table 13a: Rating of Hydrologic Connectivity for Non-confined Riverine wetlands.

Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 2.2.
B	Entrenchment ratio is 1.9 to 2.2.
C	Entrenchment ratio is 1.5 to 1.8.
D	Entrenchment ratio is <1.5.

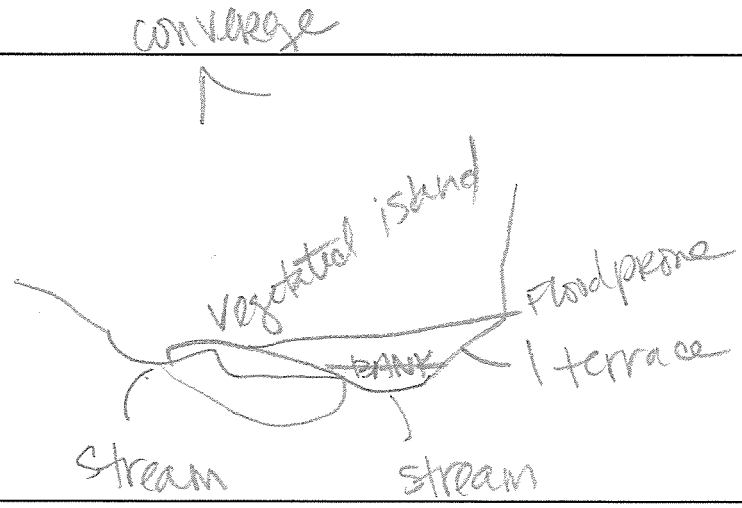
Table 13b: Rating of Hydrologic Connectivity for Confined Riverine wetlands.

Rating	Alternative States (based on the entrenchment ratio calculation worksheet above)
A	Entrenchment ratio is > 1.8.
B	Entrenchment ratio is 1.6 to 1.8
C	Entrenchment ratio is 1.2 to 1.5.
D	Entrenchment ratio is < 1.2.

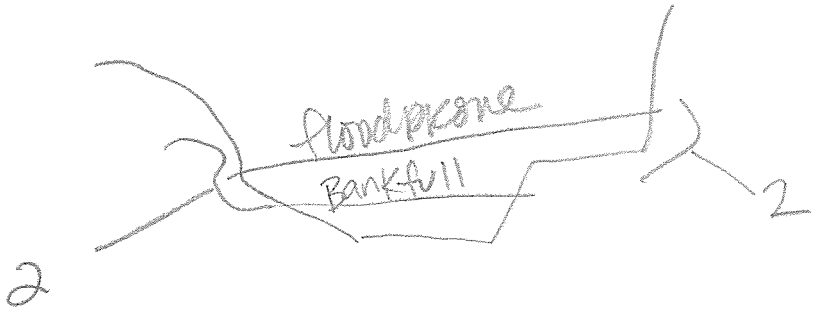
Worksheet for AA Topographic Complexity

At three locations along the AA, make a sketch of the profile of the stream from the AA boundary down to its deepest area then back out to the other AA boundary. Try to capture the benches and the intervening micro-topographic relief. To maintain consistency, make drawings at each of the stream hydrologic connectivity measurements, always facing downstream. Include the water level, an arrow at the bankfull, and label the benches. Based on these sketches and the profiles in Figure 10, choose a description in Table 16 that best describes the overall topographic complexity of the AA.

Profile 1



Profile 2



Profile 3

Plant Community Metric Worksheet: Co-dominant species richness for Riverine wetlands
(A dominant species represents ≥10% *relative* cover)

Special Note:

** Combine the counts of co-dominant species from all layers to identify the total species count. Each plant species is only counted once when calculating the Number of Co-dominant Species and Percent Invasion submetric scores, regardless of the numbers of layers in which it occurs.*

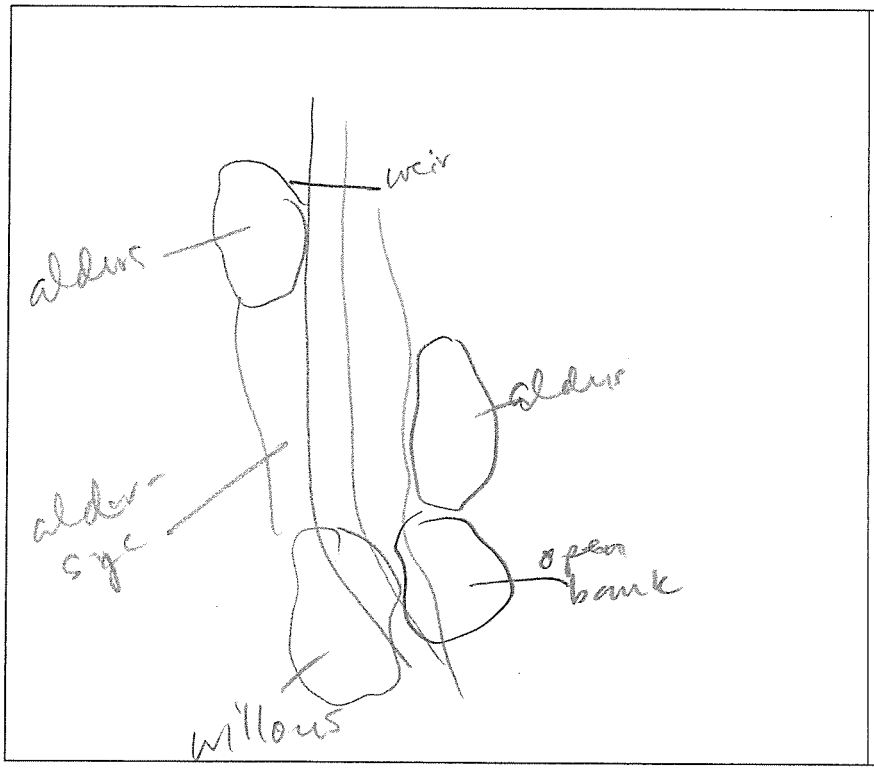
Floating or Canopy-forming (non-confined only)	Invasive?	Short (<0.5 m)	Invasive?
	1	Cyperus	
	2	Alternanthera	
	3	Veronica	
	4	Epilobium	
	5	NNG	
Medium (0.5-1.5 m)	**Invasive?**	**Tall (1.5-3.0 m)**	**Invasive?**
Cyperus	6	Alnus Rhomnifolia	
Alternanthera	7	Saccharis sericifolia	
	8	Salix lasiolepis	
Very Tall (>3.0 m)	**Invasive?**	**Total number of co-dominant species for all layers combined (enter here and use in Table 18)**	11
9 Quercus agrifolia			
10 Platanus racemosa			
Salix lasiolepis		**Percent Invasion (enter here and use in Table 18)**	0%
Alnus Rhomnifolia			

Table 18: Ratings for submetrics of Plant Community Metric.

Rating	Number of Plant Layers Present	Number of Co-dominant Species	Percent Invasion
Non-confined Riverine Wetlands			
A	4 – 5	≥ 12	0 – 15%
B	3	9 – 11	16 – 30%
C	1 – 2	6 – 8	31 – 45%
D	0	0 – 5	46 – 100%
Confined Riverine Wetlands			
A	4	≥ 11	0 – 15%
B	3	8 – 10	16 – 30%
C	1 – 2	5 – 7	31 – 45%
D	0	0 – 4	46 – 100%

Horizontal Interspersion Worksheet.

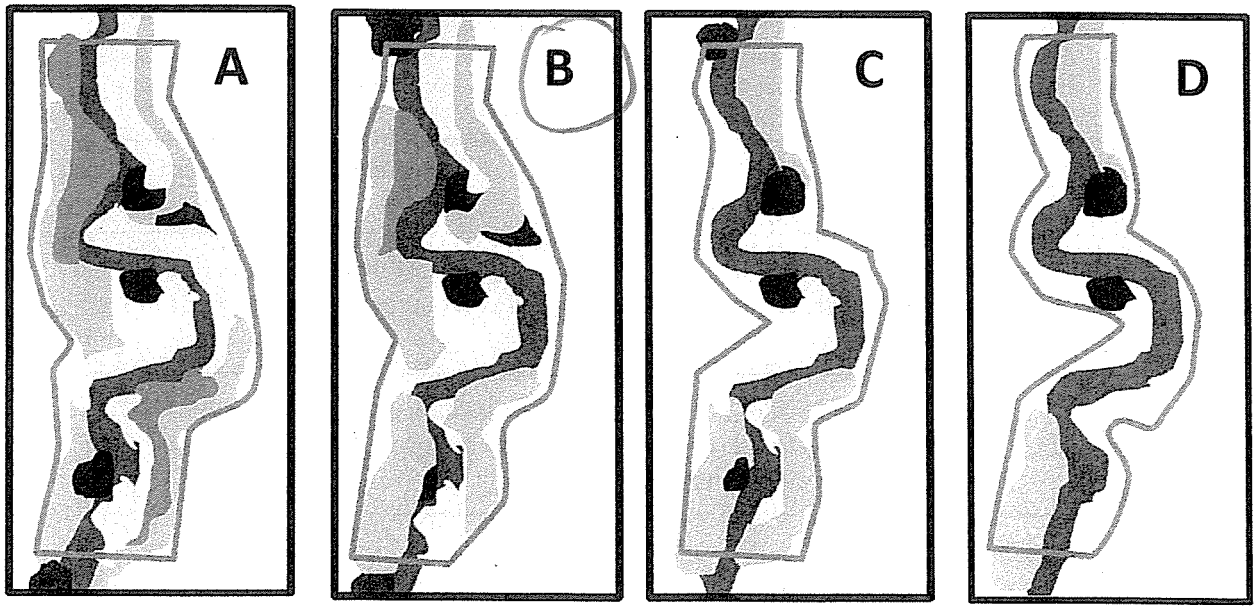
Use the spaces below to make a quick sketch of the AA in plan view, outlining the major plant zones (this should take no longer than 10 minutes). Assign the zones names and record them on the right. Based on the sketch, choose a single profile from Figure 12 that best represents the AA overall.



Assigned zones:

1) Alders
2) Alder-spc
3) willows
4) open, unvegetated bank
5)
6)

Figure 12: Schematic diagrams illustrating varying degrees of interspersion of plant zones, open water and bare ground for all riverine wetlands. Each plant zone must comprise at least 5% of the AA. The red box represents the boundary of an AA, each color represents a unique plant zone, the speckled background represents the background "matrix" vegetation zone, and the blue represents the water.



Metric 3: Vertical Biotic Structure

Definition The vertical component of biotic structure assesses the degree of overlap among plant layers. The same plant layers used to assess the Plant Community Composition Metrics are used to assess Vertical Biotic Structure. To be counted in CRAM, a layer must cover at least 5% of the portion of the AA that is suitable for the layer.

Special Note:

**The "A" condition can be obtained only when >50% of the entire AA has three layers that overlap abundantly.*

**It is important to accurately estimate the extent of overlap, particularly when the AA contains only two layers. The aerial imagery can help in determining the extent of overlap between layers.*

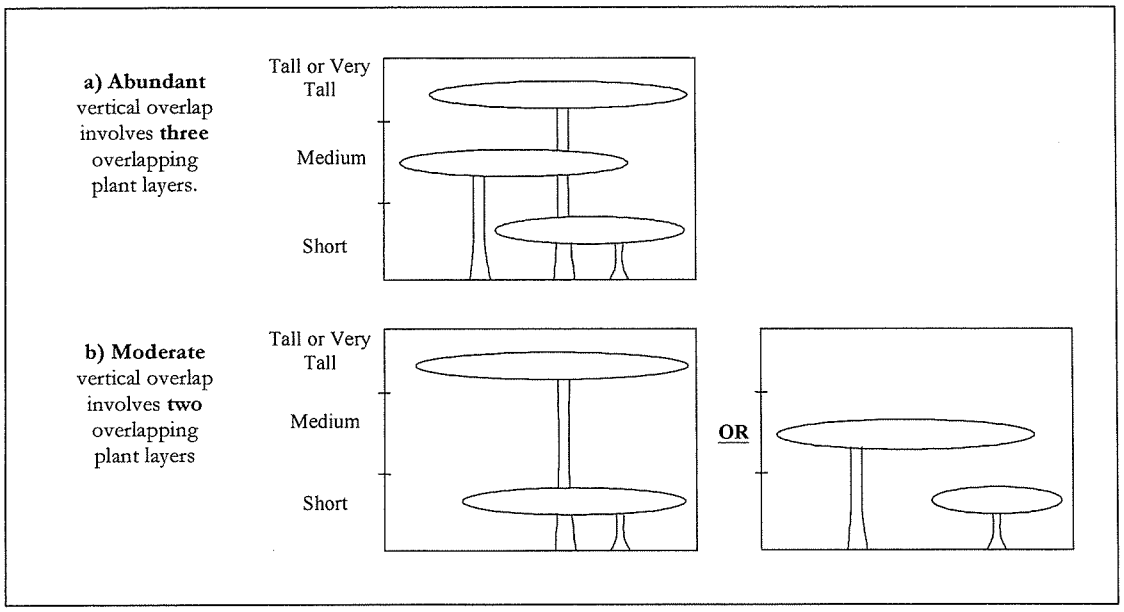


Figure 13: Schematic diagrams of (a) abundant and (b) moderate vertical overlap of plant layers for Riverine AAs.

Table 20: Rating of Vertical Biotic Structure for Riverine AAs

Rating	Alternative States
A	More than 50% of the vegetated area of the AA supports **abundant** overlap of 3 plant layers (see Figure 13a).
B	More than 50% of the area supports at least **moderate** overlap of 2 plant layers (see Figure 13b).
C	25–50% of the vegetated AA supports at least **moderate** overlap of 2 plant layers, **or** 3 plant layers are well represented in the AA but there is little to no overlap.
D	Less than 25% of the vegetated AA supports **moderate** overlap of 2 plant layers, **or** 2 layers are well represented with **little** overlap, **or** AA is sparsely vegetated overall.

Stressor Checklist Worksheet

HYDROLOGY ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Point Source (PS) discharges (POTW, other non-stormwater discharge)		
Non-point Source (Non-PS) discharges (urban runoff, farm drainage)		
Flow diversions or unnatural inflows		
Dams (reservoirs, detention basins, recharge basins)		
Flow obstructions (culverts, paved stream crossings)		
Weir/drop structure, tide gates	X	
Dredged inlet/channel		
Engineered channel (riprap, armored channel bank, bed)		
Dike/levees		
Groundwater extraction		
Ditches (borrow, agricultural drainage, mosquito control, etc.)		
Actively managed hydrology	X	
Comments		

PHYSICAL STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Filling or dumping of sediment or soils **(N/A for restoration areas)**		
Grading/ compaction **(N/A for restoration areas)**		
Plowing/Discing **(N/A for restoration areas)**		
Resource extraction (sediment, gravel, oil and/or gas)		
Vegetation management		
Excessive sediment or organic debris from watershed		
Excessive runoff from watershed		
Nutrient impaired (PS or Non-PS pollution)		
Heavy metal impaired (PS or Non-PS pollution)		
Pesticides or trace organics impaired (PS or Non-PS pollution)		
Bacteria and pathogens impaired (PS or Non-PS pollution)		
Trash or refuse		
Comments		

Worksheet for Wetland disturbances and conversions

Has a major disturbance occurred at this wetland?	Yes	No		
If yes, was it a flood, fire, landslide, or other?	flood	fire	landslide	other
If yes, then how severe is the disturbance?	likely to affect site next 5 or more years	likely to affect site next 3-5 years	likely to affect site next 1-2 years	
Has this wetland been converted from another type? If yes, then what was the previous type?	depressional	vernal pool	vernal pool system	
	non-confined riverine	confined riverine	seasonal estuarine	
	perennial saline estuarine	perennial non-saline estuarine	wet meadow	
	lacustrine	seep or spring	playa	

BIOTIC STRUCTURE ATTRIBUTE (WITHIN 50 M OF AA)	Present	Significant negative effect on AA
Mowing, grazing, excessive herbivory (within AA)		
Excessive human visitation	X	
Predation and habitat destruction by non-native vertebrates (e.g., *Virginia opossum* and domestic predators, such as feral pets)		
Tree cutting/sapling removal		
Removal of woody debris		
Treatment of non-native and nuisance plant species		
Pesticide application or vector control		
Biological resource extraction or stocking (fisheries, aquaculture)		
Excessive organic debris in matrix (for vernal pools)		
Lack of vegetation management to conserve natural resources		
Lack of treatment of invasive plants adjacent to AA or buffer		
Comments		

BUFFER AND LANDSCAPE CONTEXT ATTRIBUTE (WITHIN 500 M OF AA)	Present	Significant negative effect on AA
Urban residential		
Industrial/commercial		
Military training/Air traffic		
Dams (or other major flow regulation or disruption)		
Dryland farming		
Intensive row-crop agriculture		
Orchards/nurseries		
Commercial feedlots		
Dairies		
Ranching (enclosed livestock grazing or horse paddock or feedlot)		
Transportation corridor		
Rangeland (livestock rangeland also managed for native vegetation)		
Sports fields and urban parklands (golf courses, soccer fields, etc.)		
Passive recreation (bird-watching, hiking, etc.)	X	
Active recreation (off-road vehicles, mountain biking, hunting, fishing)		
Physical resource extraction (rock, sediment, oil/gas)		
Biological resource extraction (aquaculture, commercial fisheries)		
Comments		