Appendix B: Aquatic Resource Delineation Report

AQUATIC RESOURCE DELINEATION REPORT

Modjeska Canyon Bridge Replacement Project
Orange County Public Works
Orange County, California

Prepared By:

Dokken Engineering
110 Blue Ravine Road, Suite 200
Folsom, California 95630
(916) 858-0642

Prepared For:

Orange County Public Works
601 North Ross Street
Santa Ana, CA 92705

Executive Summary

Orange County Public Works (County), in cooperation with the California Department of Transportation (Caltrans), is proposing to replace the Modjeska Canyon Road Bridge (Bridge # 55C-0172) over Santiago Creek with a wider concrete slab bridge as the Modjeska Canyon Road Bridges Replacement Project (Project), located in Orange County, California. The Project will replace the existing substandard steel bridge; construction funding is provided by the Highway Bridge Program (HBP) and toll credits.

The proposed Project is located in southeastern Orange County, California, in the unincorporated community of Modjeska Canyon. The Project is within the *El Toro* U.S. Geological Survey (USGS) 7.5-minute quadrangle, Section 29, Township 5 South, Range 7 West of the San Bernardino meridian. The Project site occurs at an elevation of approximately 1,275 feet above mean sea level.

On behalf of the County, Dokken Engineering conducted a delineation to determine the extent of aquatic resources within the approximately 1.90-acre Project study area. The delineation was conducted on September 27, 2019 by Dokken Engineering biologist Andrew Dellas. Delineation procedures followed the technical methods outlined in the Corps of Engineers *Wetlands Delineation Manual* (U.S. Department of the Army, Corps of Engineers, 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (USACE 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2010).

The field investigation confirmed that on-site waters are limited to Santiago Creek and total approximately 0.21 acres (690 linear feet) of potential waters of the United States were mapped as ephemeral stream.

Table of Contents

Acronyms and Abbreviations

amsl	Above mean sea level
BSA	Biological Study Area
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
County	Orange County Public Works
IS/MND	Initial Study/Mitigated Negative Declaration
NEPA	National Environmental Policy Act
NRCS	National Resource Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
Project	Modjeska Canyon Bridge Replacement
RWQCB	Project Regional Water Quality Control Board
USACE	United States Army Corps of Engineers

Chapter 1. Introduction

The purpose of this report is to identify and describe aquatic resources in the Project Study Area. This report facilitates efforts to:

1. Avoid or minimize impacts to aquatic resources during the Project design process.
2. Document aquatic resource boundary determinations for review by regulatory authorities.
3. Provide background information regarding aquatic resources in the Project Study Area.

1.1 History

Constructed in 1935, the existing Modjeska Canyon Bridge is approximately 64 ft. long, a single span steel through girder bridge with transverse floor beams supporting a concrete deck. The through girders essentially work as the bridge barrier and are partially protected by a concrete parapet. The approach railing terminates prior to the bridge barriers or are non-existent, so the bridge girders/barriers are unprotected. The bridge is founded on concrete spread footings. Concrete wingwalls flare away from the bridge at all four corners. Two of these wingwalls are substantial in height and length and are also set on spread footings.

The bridge clear width between parapets is 20 ft. The north approach from Modjeska Canyon Road makes a sharp right curve onto the bridge. Markuson Road T-s into Modjeska Canyon Road from the east, just north of the bridge. The south approach curves slightly to the west immediately south of the bridge. The road approaches are approximately 24 ft. wide. The concrete parapets on the bridge are too narrow to function as sidewalks and are interrupted by steel flanges.

From the intersection of E. Santiago Canyon Road and Modjeska Canyon Road to the bridge there are no speed limit signs, indicating the prima facia speed limit is 55 mph. However, the narrow road and sharp curve near the bridge greatly reduces speed. The safe speed of these curves is approximately 25 mph. The most recent County traffic count in March 2018 determined the average daily traffic (ADT) at approximately 420.

Santiago Creek flows from the east, crossing under the bridge at a shallow angle, resulting in a bridge skew of approximately 22 degrees. The bridge was programmed for replacement based on the low sufficiency rating and Functional Obsolete classification due to the narrow deck.

1.2 Purpose and Need

1.2.1 Purpose

The purpose of the Project is to replace the existing deteriorated steel bridge with a new bridge in conformance with current environmental and design standards, both structurally and hydraulically, and have a life expectancy of 75 years minimum. Portions of the roadway connecting to the bridge will require widening and re-profiling to provide for a smooth transition to the new bridge.

1.2.2 Need

The road is the main access for residents of Modjeska Canyon; therefore, it is critical to keep it in service and avoid potential deficiencies that would take the bridge out of service. Seasonal floods

and wildfires occur in the Santa Ana Mountains that affect this community and quick access from the Canyon is necessary during such events.

The existing 2-lane bridge is classified as Functionally Obsolete due to the very narrow road width. The bridge must be widened to meet current standards and traffic volumes.

1.3 Project Description

The County, in cooperation with the Caltrans, is proposing to replace the Modjeska Bridge (Bridge No. 55C0172) over Santiago Creek. The Modjeska Bridge is located in Modjeska Canyon near the Cleveland National Forest. The existing bridge is a single span and crosses over Santiago Creek. The Project will replace the existing substandard steel bridge; construction funding is provided by the Highway Bridge Program (HBP) and toll credits.

The proposed replacement structure is a single span prestressed, precast concrete I girder bridge. Tall abutment walls, similar to the existing condition, will be set on spread footing foundations. Tall wing walls will be required at all corners. The replacement bridge will have 12-foot wide lanes and will include 8-foot minimum width shoulders, for a minimum total barrier to barrier width of 40 ft. Bridge barriers will be deck mounted concrete barrier Type 836.

There are no nearby pedestrian facilities or future plans to place sidewalks along Modjeska Canyon Road, but portions of Modjeska Canyon Road have sufficient dirt shoulders to provide room for pedestrians. To keep with the rural setting, there will not be sidewalks on the bridge. The bridge is on a 155 ft. horizontal curve. The precast girder construction limits the radius the outside edge of the bridge. Therefore, the shoulders will vary from 8 ft. up to 10.8 ft. The bridge will be wider at the north end to accommodate vehicles turning off the bridge onto Markuson Road to the east (Figure 3. Project Features).

Santiago Creek is an ephemeral stream that flows west under the existing bridge. The location of the stream is well defined and is currently not adjacent to the abutments during low flows. Construction will likely occur when the stream is dry and not require stream diversion. A drainage ditch runs along the southwest approach. The wider bridge may require the ditch to be realigned, and trees at bridge corners will need to be removed. The ditch will be moved slightly west in the immediate vicinity of the bridge and will quickly transition back to its current location south of the bridge.

The narrow road and limited right of way require the replacement structure be placed in the same location as the existing structure. There is a detour approximately 4 miles in length but includes a steep winding road on Modjeska Grade Road. To quickly replace the bridge the road will be closed, and the detour utilized. Contractor staging areas are anticipated to be situated on the closed portion of the existing road approaches and potentially on property just west of the north abutment.

Utilities include a waterline attached to the west side of the bridge and overhead electrical and communication lines just to the north of the north abutment. It is likely the overhead lines will not need to be relocated for construction. The waterline will need to be relocated to the new bridge.

Typical equipment for roadway construction would include heavy construction earthmoving equipment, dump trucks and pavers. Typical bridge construction equipment would include cranes, excavators, rock hammers, generators, and concrete pumps.

Chapter 2. Location

The proposed Project is located in southeastern Orange County, California, in the unincorporated community of Modjeska Canyon. The Project is within the *El Toro* USGS 7.5-minute quadrangle, Section 29, Township 5 South, Range 7 West of the San Bernardino meridian. The Project site occurs at an elevation of approximately 1,275 feet above mean sea level (**Appendix B. Project Location Map**).

Prior to field surveys, the biological study area (BSA) was defined as the proposed Project impact area (**Appendix B. Project Features Map**). The Project impact area is defined as all areas that will be temporarily or permanently impacted by the Project, including proposed right of way, construction easements, cut and fill limits, potential staging areas, and access roads. The total area of the BSA is approximately 1.90 acres.

Chapter 3. Methods

The jurisdictional delineation was conducted by Dokken Engineering biologist, Andrew Dellas on September 27, 2019. The purpose of the survey was to identify and delineate aquatic resources present within the proposed Project area. The field investigation was conducted in accordance with technical methods outlined in the Corps of Engineers *Wetlands Delineation Manual* (U.S. Department of the Army, Corps of Engineers, 1987), *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region* (U.S. Department of the Army, Corps of Engineers, 2008), and *A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States* (USACE 2010). Observed OHWM and wetland features were mapped in the field with a R1 GNSS Receiver and ArcGIS software. An *Arid West Ephemeral and Intermittent Streams OWHM Datasheet* was completed for each OHWM GPS location. OHWM data points were taken where primary indicators of the OWHM were delineated in accordance with the technical methods listed above.

Scientific nomenclature for plants cited in this report is in accordance with The Jepson Manual (Baldwin et al., 2012). The indicator status of plants in this report is in accordance with the National Wetland Plant List (NWPL) (Lichvar et al., 2016).

Chapter 4. Existing Conditions

4.1 Landscape Setting

The Project occurs within in unincorporated Orange County in the California Coastal Range Open Woodland-Shrub-Coniferous Forest-Meadow Province ecological subregion (M262), Southern California Mountain and Valley ecological subsection M262B (USDA 2007), and Jepson Floristic Province "Peninsular Ranges" (Jepson 2020). The elevation within the BSA is approximately 1,275 feet above mean sea level. In the vicinity of the BSA, annual temperatures range from a high of 76 degrees Fahrenheit to a low of 50 degrees Fahrenheit, and the average annual rainfall is approximately 13 inches (U.S. Climate Data 2020). The topography within the BSA is generally flat. Soil within the BSA consists of Riverwash (63.7% of the BSA) and Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19 (36.3% of the BSA) (NRCS 2020). (**Appendix B. Topographic Map**).

4.2 Habitat Communities

Vegetation
The BSA is dominated by urban landscape and riparian woodland. Land use within the BSA is designated as "General Agriculture". Dominant vegetation communities within the BSA include urban/barren, disturbed, annual grassland, stream channel, stormwater conveyance facility, coastal sage scrub, and riparian woodland (**Appendix B. Vegetation Communities within the BSA; C: Representative Photographs; Appendix D. Plant Species Observed**).

Urban/Barren
Urban/Barren habitat is man-made infrastructures, defined by the absence of any vegetation, and is constructed with gravel, compacted soil, and/or asphalt. Urban areas within the BSA are categorized as roadway (Modjeska Canyon Road) and associated pullouts and driveways along the road. No residences are within the BSA, but are adjacent to the BSA within approximately This habitat type is categorized as highly disturbed. Within the BSA, approximately 2.40 acres is classified as urban/barren.

Disturbed
Disturbed habitat occurs as unpaved landscaped areas. Disturbed habitat within the BSA consists of a graveled driveway parking area west of the bridge. Vegetation consists of sparse forbs and grasses, ornamental plantings, and coast live oak (*Quercus agrifolia*). Approximately 0.96 acres of the BSA is classified as disturbed.

Annual Grassland
Annual grassland habitat within the BSA exhibits a composition of non-native grasses including, smilo grass (*Stipa miliacea*), wild oat (*Avena fatua*), red brome (*Bromus madritensis ssp. rubens*), and non-native forbs including, black mustard (*Brassica nigra*), prostrate sandmat (*Euphorbia prostrata*), sow-thistle (*Sonchus oleraceus*), and white sweetclover (*Melilotus albus*). Approximately 0.89 acres of the BSA is classified as annual grassland.

Stream Channel – Santiago Creek
Within the BSA, the Santiago Creek stream channel was delineated using primary indicators of OHWM as described in the USACE OWHM delineation manual. The stream channel is dominated by run and riffle areas with cobble, gravel, and sand substrates. Within the

stream channel habitat, a composition of vegetation accustomed to wet conditions exists including, watercress (*Nasturtium officinale*), field horsetail (*Equisetum arvense*), California mugwort (*Artemisia douglasiana*), tall flatsedge (*Cyperus eragrostis*), and umbrella plant (*Cyperus involucratus*). Delineation results determined that approximately 0.21 acres of Santiago Creek are within the BSA.

Stormwater Conveyance Facility
Within the BSA, a stormwater conveyance facility begins along Modjeska Grade Road, continues through the BSA, and ends as a discharge point above the OHWM of Santiago Creek. The stormwater conveyance facility consists of asphalt paving and confluences with native soils at the western toe of slope for Modjeska Canyon Road. The system is considered a man-made roadside drainage feature designed to convey seasonal rainwater flows through the Project site. The stormwater conveyance facility ranges in width from approximately 1 ft. to 5 ft. Vegetation within the system was composed of ruderal and invasive species consistent with the annual grassland habitat type. Less than 0.01 acres of stormwater conveyance facility are within the BSA.

Coastal Sage Scrub
Coastal sage scrub (CSS) habitats are typified by low to moderate-sized shrubs with mesophytic leaves, flexible branches, semi-woody stems growing from a woody base, and a shallow root system. Coastal scrub within the BSA is generally composed of California sagebrush (*Artemisia californica*) and California buckwheat (*Eriogonum fasciculatum*). No CSS habitats are within the PIA. Within the BSA, approximately 1.15 acres is classified as CSS habitat.

Riparian Woodland
Riparian Woodland is a tall deciduous streamside woodland that is dominated by western sycamore (*Platanus racemosa*) and occasional white alders (*Alnus rhombifolia*). These woodland stands seldom form closed canopies and may even appear as trees scattered in a shrubby thicket. The community is associated with rocky stream beds, such as Santiago Creek, that are subject to high intensity flooding. The intermittent nature of these drainages favors western sycamore as the dominant species, but white alder increases in abundance on more perennial streams.

Within the BSA, the riparian woodland is dominated by western sycamore and white alder, with additional vegetation accustomed to generally wet conditions including Pacific willow (*Salix lasiandra*) and mule fat (*Baccharis salicifolia*). Approximately 1.08 acres of the BSA is classified as riparian woodland.

4.3 Aquatic Resources

4.3.1 Overview
Based on field survey results, and according to the United States Geological Survey (USGS) Redding 7½ minute quadrangle topographic map, the USFWS National Wetland Inventory, and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (Appendix E), the only water feature within the BSA is Santiago Creek. Santiago Creek is an intermittent creek that drains most of the northern Santa Ana Mountains and is a tributary to the Santa Ana River. Within the BSA, Santiago Creek maintains flows during rain events throughout the fall, winter and spring, with complete drying in late spring through early fall. The creek bed has gravelly sand alluvium substrate from 0 to 6 inches and stratified gravelly coarse sand to sandy loam from 6 to 60 inches (NRCS 2020). Within the BSA, a stormwater conveyance facility

begins along Modjeska Grade Road, continues through the BSA, and ends as a discharge point above the OHWM of Santiago Creek

4.3.2 Aquatic Features Survey Results

Stormwater Conveyance Facility

Within the Project Study Area, a stormwater conveyance facility begins along Modjeska Grade Road, continues through the PIA, and ends as a discharge point above the OHWM of Santiago Creek. The system is considered a man-made roadside drainage feature designed to convey seasonal rainwater flows through the Project site. The stormwater conveyance facility ranges in width from approximately 1 ft. to 5 ft. Delineation results determined that approximately <0.01 acres of stormwater conveyance facility are within the Project Study Area. During delineation efforts, no OHWM primary indicators were observed, and the areas of identifiable flow patterns were completely absent of water during survey efforts. Therefore, the stormwater conveyance facility would be considered ephemeral and due to the new NWPR (effective June 2020), the ephemeral stormwater facility would not be considered a WOTUS.

Santiago Creek – Intermittent Stream

Santiago creek is a tributary water of the Santa Ana River, flowing east to west through the BSA. The Santa Ana River is known as a navigable WOTUS. and with direct connectivity, Santiago Creek would also be considered a jurisdictional WOTUS. Field observations and completion of an *Arid West Ephemeral and Intermittent Streams OHWM Datasheet*, determined the extent of the OHWM of Santiago Creek (Appendix I. OHWM Datasheet). Delineation results determined that approximately 0.21 acres (690 linear feet) of Santiago Creek occur within the BSA.

The Aquatic Resources Delineation Map illustrates jurisdictional boundaries within the Project area (**Appendix A. Aquatic Resources Delineation Map**).

Table 1: Water of the U.S within the Survey Area

Site Coordinates (decimal degrees)	Aquatic Resource	Cowardin*	Aquatic Resource Size (acre)	Aquatic Resource Size (linear feet)
33.708686 N -117.636295 W	Santiago Creek (SC-1)	R4SB	0.21	690
		Total	**0.09**	**290**

**Cowardin et.al. 1979*

Chapter 5. References

CDFW. 2020. The California Wildlife Habitat Relationship Classification Scheme. Available at: <http://www.dfg.ca.gov/biogeodata/cwhr/wildlife_habitats.asp#Tree>

Caltrans. 2020. Caltrans Water Quality Planning Tool. Available at: <http://svctenvims.dot.ca.gov/wqpt/wqpt.aspx> (accessed May 23, 2020).

Cowardin et.al. 1979. Classification of Wetlands and Deepwater Habitats of the United States.

Jennings, C.W., R.G. Strand, and T.H. Rogers. 1977. Geologic Map of California: California Division of Mines and Geology. Scale 1:750000.

Jepson Flora Project (eds.) 2020. Jepson eFlora. Available at: <http://ucjeps.berkeley.edu/IJM.html>

NRCS. 2020. Natural Resource Conservation Service Web Soil Survey. Auxiliary Drainage Pump Station Project.

USACE 1987. Corps of Engineers Wetland Delineation Manual. Environmental Laboratory, U.S. Army Corps of Engineers Waterways Experiment Station.

USACE 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region.*

USACE 2010. *A Guide to Ordinary High Water Mark (OHWM) Delineation for Non-Perennial Streams in the Arid West of the United States*

USFWS 2020. National Wetlands Inventory. United States Fish and Wildlife Service. Available at: <https://www.fws.gov/wetlands/data/mapper.HTML>

Appendix A – Aquatic Resources Delineation Map

V:\2614 Modjeska Design Env\Permits\ARDR_2021-04-29.mxd

Coordinate System: NAD 1983 UTM Zone 11
Projection: Tranverse Mercator
Datum: North American 1983

1 inch = 75 feet

0 30 60 90 120 150 Feet

Prepared by:
DOKKEN ENGINEERING
110 Blue Ravine Road, Suite 200
Folsom, CA 95630 Phone (916) 858-0642
Fax (916) 858-0643 *www.dokkenengineering.com*

Prepared for:

Orange County Public Works
601 North Ross Street
Santa Ana, CA

Delineator: Andrew Dellas
Deliniation Date: September 27, 2019
Aerial Photography Source: ESRI Maps Online, 2016

This delination ofwater of the United States is subject to verification by the U.S. Army Corps of Engineers (Corps). Dokken Engineering advies all parties that the delineation is preliminary until the Corps provides a written verification.

Aquatic Resource Delineation Map

BRLO-5955 (094)
Modjeska Canyon Road Bridge Replacement Project
Orange County, California

Appendix B - Supporting Resources

Vicinity Map

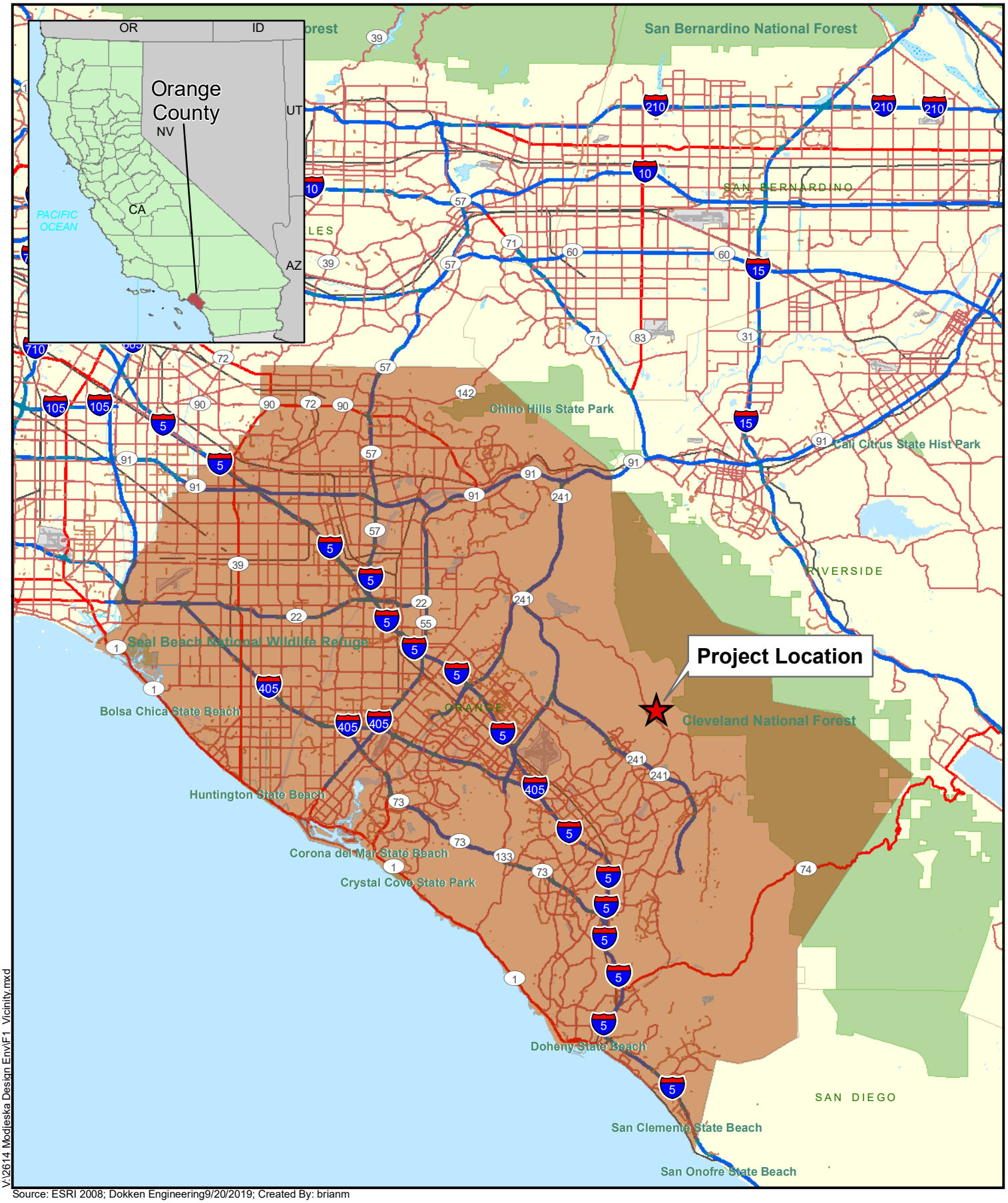
Location Map

Vegetation Communities within the BSA

Topographic Map

NRCS Web Soil Survey Report

FEMA FIRMette

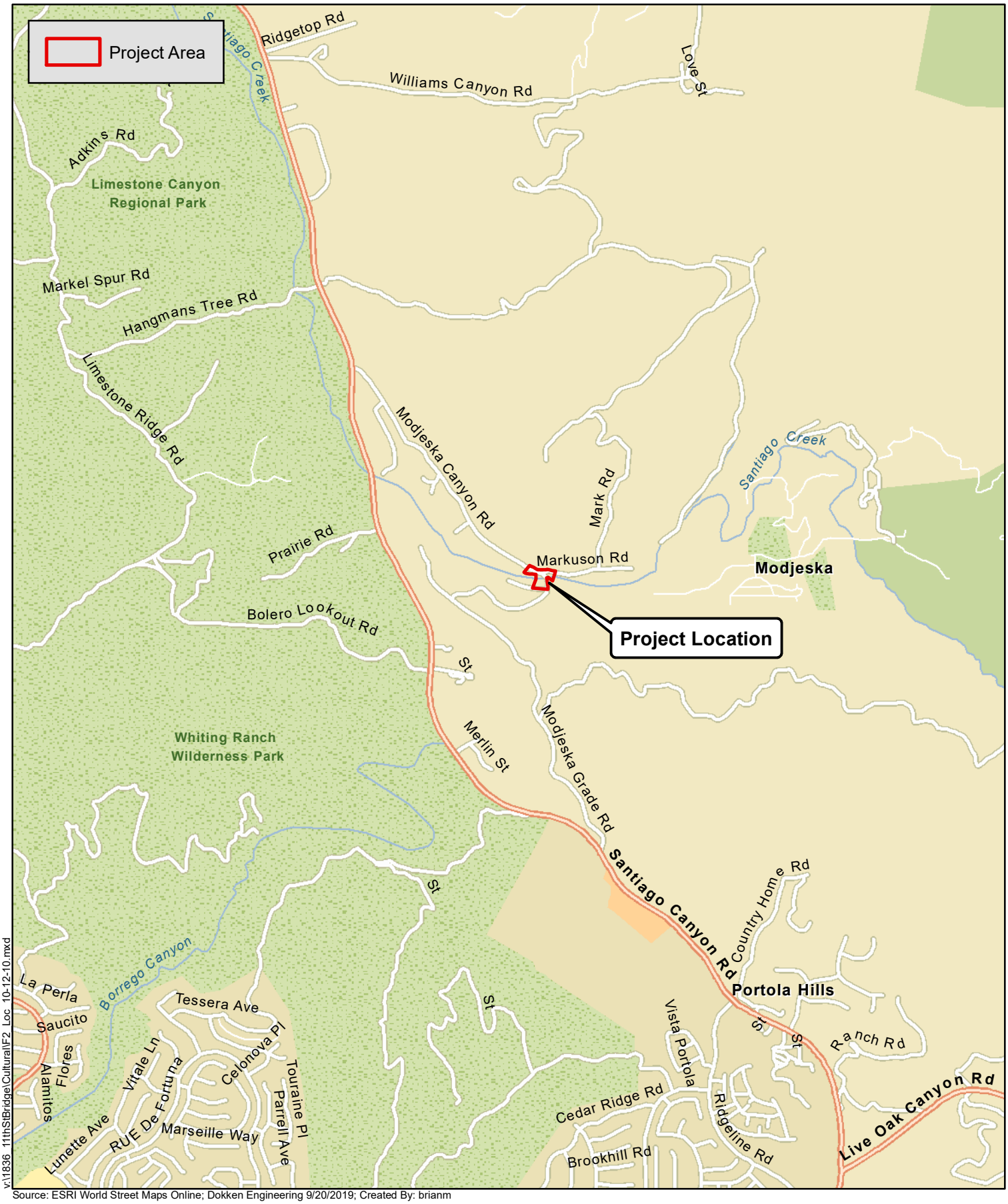


V:\2614 Modjeska Design Env\F1_Vicinity.mxd

Source: ESRI 2008; Dokken Engineering9/20/2019; Created By: brianm

0 5 10 15 20 Miles

FIGURE 1
Project Vicinity
BRLO-5955(094)
Modjeska Canyon Road Bridge Replacement Project
Modjeska Canyon, Orange County, California

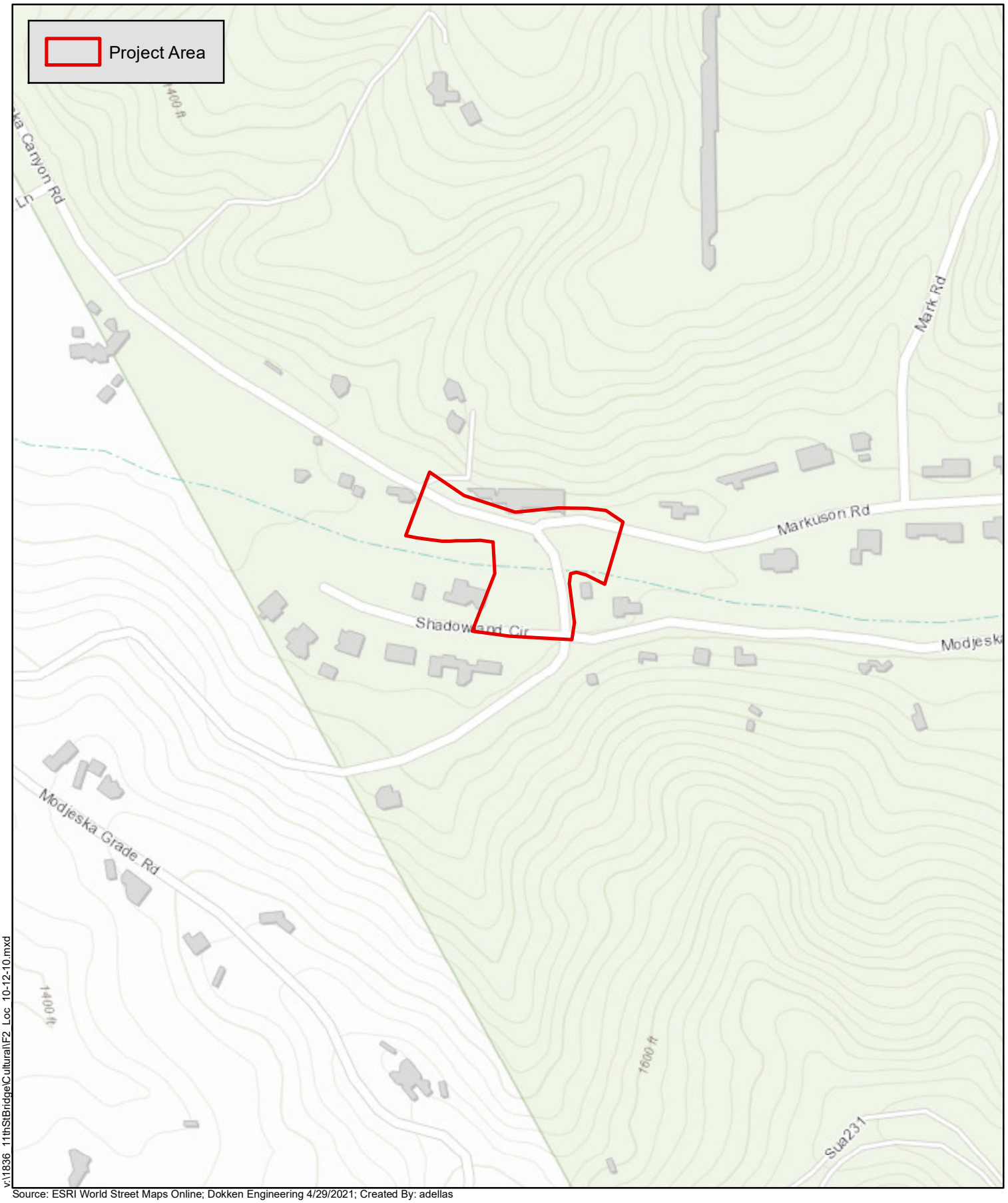


v:\1836 11thStBridge\Cultural\F2 Loc 10-12-10.mxd

Source: ESRI World Street Maps Online; Dokken Engineering 9/20/2019; Created By: brianm

0 0.25 0.5 0.75 1 Miles

FIGURE 2
Project Location
BRLO-5955(094)
Modjeska Canyon Road Bridge Replacement Project
Modjeska Canyon, Orange County, California

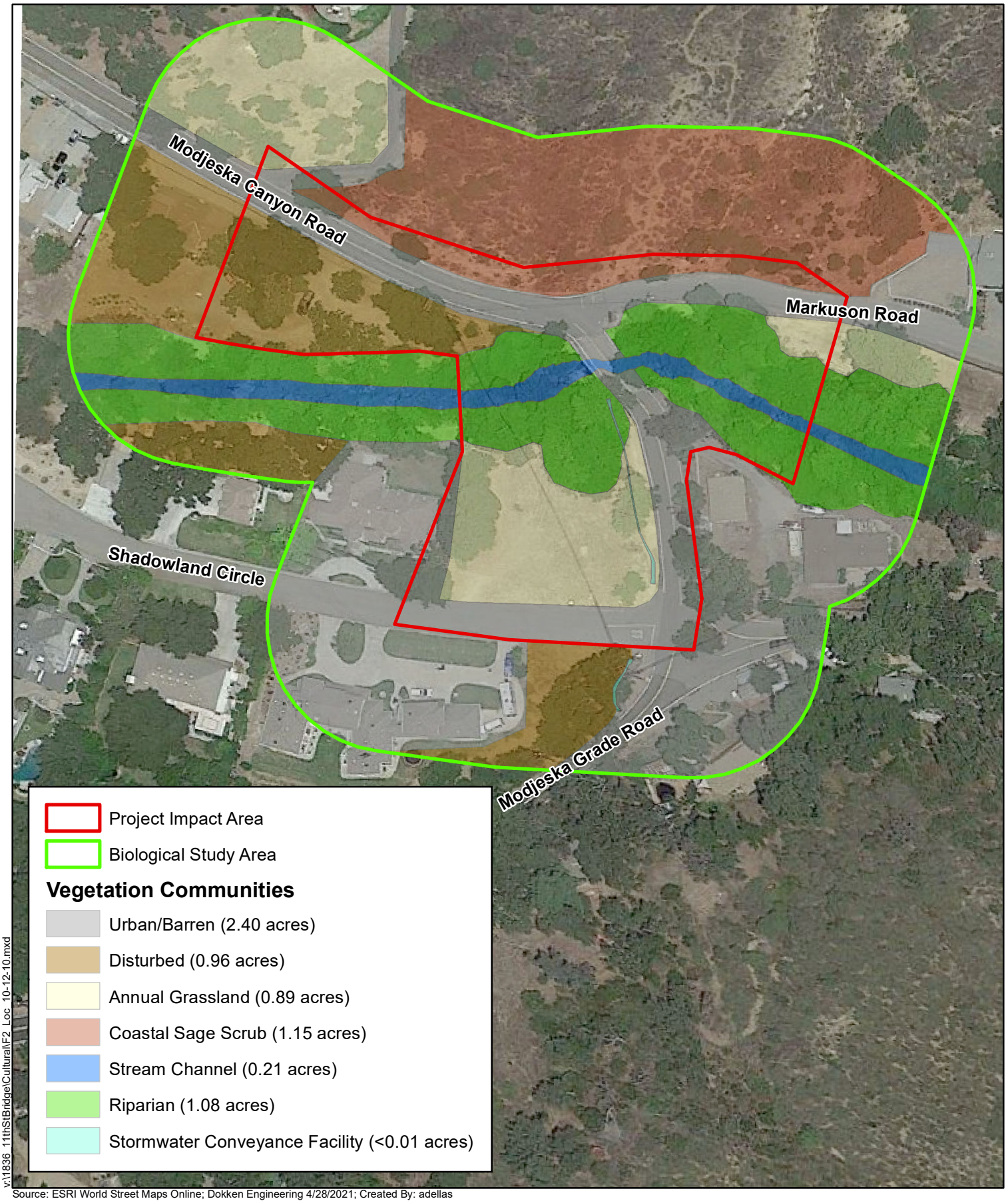


v:\1836_11thStBridge\Cultural\F2_Loc_10-12-10.mxd

Source: ESRI World Street Maps Online; Dokken Engineering 4/29/2021; Created By: adellas

0 200 400 600 800 Feet

FIGURE 3
Topographic Map
BRLO-5955(094)
Modjeska Canyon Road Bridge Replacement Project
Modjeska Canyon, Orange County, California



v:\1836 11thStBridge\Cultural\F2 Loc 10-12-10.mxd

Source: ESRI World Street Maps Online; Dokken Engineering 4/28/2021; Created By: adellas

1 inch = 100 feet

0 50 100 150 200 Feet

FIGURE 4
Vegetation Communities within the BSA
BRLO-5955(094)
Modjeska Canyon Road Bridge Replacement Project
Modjeska Canyon, Orange County, California

National Flood Hazard Layer FIRMette

FEMA

33°42'49.71"N

117°37'52.04"W

Feet

0 250 500 1,000 1,500 2,000

1:6,000

33°42'19.77"N

117°37'14.58"W

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/24/2020 at 5:14:05 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Orange County and Part of Riverside County, California

Modjeska Bridge Replacement

March 11, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:897 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

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

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 13, Sep 16, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Oct 25, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
191	Riverwash	1.2	63.7%
207	Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	0.7	36.3%
Totals for Area of Interest		**1.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Orange County and Part of Riverside County, California

191—Riverwash

Map Unit Composition

Riverwash: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Riverwash

Setting

Landform: Fans
Parent material: Sandy and gravelly alluvium

Typical profile

C1 - 0 to 6 inches: gravelly sand
C2 - 6 to 60 inches: stratified gravelly coarse sand to sandy loam

Properties and qualities

Slope: 0 to 5 percent
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 to 24 inches
Frequency of flooding: Frequent
Available water storage in profile: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydric soil rating: Yes

207—Sorrento loam, 2 to 9 percent slopes, warm MAAT, MLRA 19

Map Unit Setting

National map unit symbol: 2tz0c
Elevation: 0 to 1,340 feet
Mean annual precipitation: 12 to 18 inches
Mean annual air temperature: 62 to 66 degrees F
Frost-free period: 320 to 365 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Sorrento and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sorrento

Setting

Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from sedimentary rock

Typical profile

A - 0 to 12 inches: loam
AB - 12 to 37 inches: silty clay loam
Bk - 37 to 62 inches: silty clay loam
2C - 62 to 72 inches: sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Minor Components

Mocho

Percent of map unit: 7 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Botella

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: LOAMY (1975) (R019XD029CA)
Hydric soil rating: No

Pico

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Garretson

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Anacapa

Percent of map unit: 2 percent
Landform: Alluvial fans
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix C – Representative Photographs

Representative Photograph 1. Santiago Creek facing west from under Modjeska Canyon Road Bridge (September 27, 2019).

Representative Photograph 2. Santiago Creek and adjacent riparian woodland habitat, facing east September 27, 2019).

Representative Photograph 4. Santiago Creek facing east from on top of Modjeska Road Bridge (Santiago Creek is partially dry) (September 27, 2019).

Representative Photograph 5. Representative of grassland habitat within Project limits, facing west, north of Shadowland Circle (September 27, 2019).

Appendix D – Plant Species Observed

PLANT SPECIES OBSERVED

The table below includes a list of plant species observed within the BSAs during biological field surveys. No special-status plant species were observed.

Plant Species Observed within the BSA

Common Name	*Scientific Name*	Cal-IPC Rating	Wetland Indicator
Trees			
California ash	*Fraxinus dipetala*	N	FACU
Coast live oak	*Quercus agrifolia*	N	UPL
Common fig	*Ficus carica*	X [Moderate]	FACU
Fremont cottonwood	*Populus fremontii*	N	FAC
Nuttall's scrub oak	*Quercus dumosa*	N (1B.1)	UPL
Pacific willow	*Salix lasiandra*	N	FACW
Silkoak	*Grevillea robusta*	X	UPL
Western sycamore	*Plantanus racemose*	N	UPL
White alder	*Alnus rhombifolia*	N	FACW
Shrubs			
Poison hemlock	*Conium maculatum*	X [Moderate]	FACW
Poison oak	*Toxicodendron diversilobum*	N	FACU
Redberry buckthorn	*Rhamnus crocea*	N	FAC
Toyon	*Heteromeles arbutifolia*	N	UPL
Grasses			
Bermuda grass	*Cynodon dactylon*	X [Moderate]	FACU
Rabbitfoot grass	*Polypogon monspeliensis*	X [Limited]	FACW
Smilo grass	*Stipa miliacea*	X [Limited]	UPL
Forbs			
Alligator plant	*Kalanchoe daigremontiana*	X	UPL
California mugwort	*Artemisia douglasiana*	N	FAC
Common oleander	*Nerium oleander*	X	UPL
Fringed willowherb	*Epilobium ciliatum*	N	FACW
Italian thistle	*Carduus pycnocephalus*	X [Moderate]	UPL
Jimsonweed	*Datura stramonium*	X	UPL
Rough hedgenettle	*Stachys rigida*	N	FACW
Scarlet monkeyflower	*Erythranthe cardinalis*	N	UPL
Spanish false fleabane	*Pulicaria paludosa*	X	FAC
Spearmint	*Mentha spicata*	X	FACW
Sword fern	*Polystichum imbricans*	N	FACU
Vinca	*Vinca major*	X [Moderate]	UPL
Water smartweed	*Persicaria amphibia*	N	OBL
Watercress	*Nasturtium officinale*	N	OBL
White sweetclover	*Melilotus albus*	X	FACU

Appendix E – Delineation Data Sheets

OHWM Data Sheets

Arid West Ephemeral and Intermittent Streams OHWM Datasheet

Project: Modjeska Canyon Bridge Project
Project Number:
Stream: Santiago Creek
Investigator(s): Andrew Dellas

Date: 9/27/19 **Time:** 9:45 AM
Town: Modjeska Canyon **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:
33.708716°, -117.636335°
Projection: State Plane VI **Datum:**
Coordinates: See above. GPS

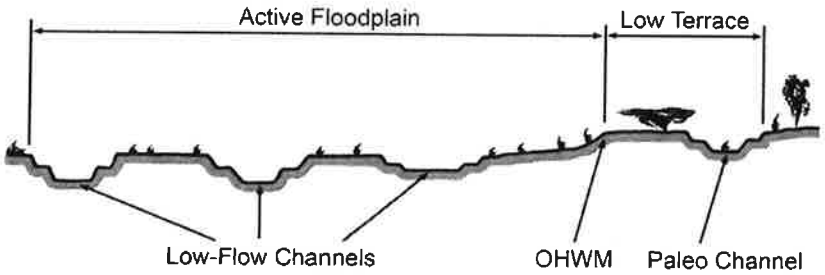
Potential anthropogenic influences on the channel system:
Modjeska Canyon Road Bridge.

Brief site description:
Santiago Creek flows through site in west to east orientation under Modjeska Canyon Road Bridge.

Checklist of resources (if available):

- ☒ Aerial photography
  Dates: 6/8/18 Google Maps
- ☒ 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

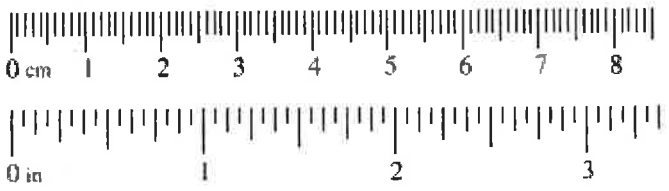


Procedure for identifying and characterizing the floodplain units to assist in identifying the OHWM:

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
   - ☒ GPS
   - ☐ Digitized on computer
   - ☐ Other:

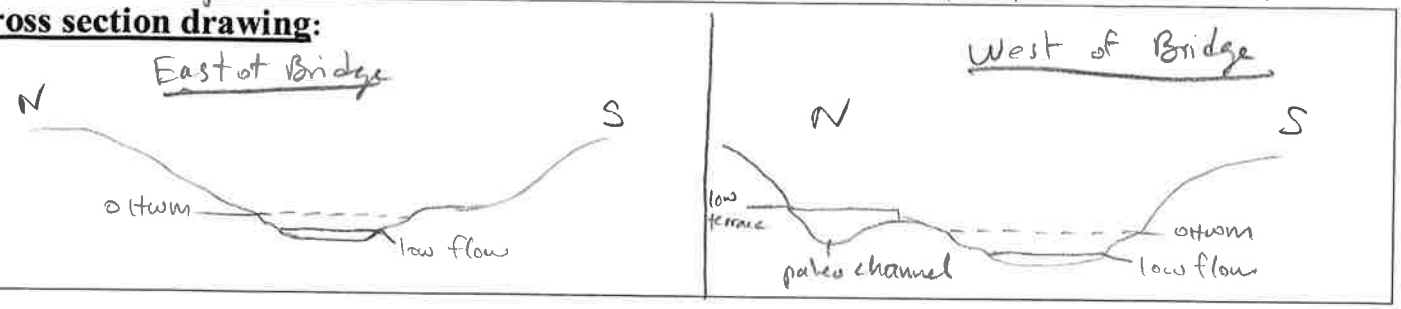
Wentworth Size Classes

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: Modjeska **Cross section ID:** **Date:** 9/27/19 **Time:** 9:45 AM

Cross section drawing:



OHWM

GPS point: OHWM 1 - OHWM

Indicators:

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

Comments:

No to <1% veg. cover below OHWM, early successional herbs between low-flow and OHWM. Cut slope bank with exposed roots upstream and downstream of bridge.

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

GPS point: Low flow

Characteristics of the floodplain unit:

Average sediment texture: pebble/granular/coarse sand

Total veg cover: 0-<1 % Tree: Ø % Shrub: Ø % Herb: 0-<1 %

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: Exposed roots
- ☐ Other:
- ☐ Other:

Comments:

Low flow closely within OHWM. Meandering below OHWM with <1% vegetation cover and demonstrated exposed roots.

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: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

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: _____

Total veg cover: _____% Tree: _____% Shrub: _____% Herb: _____%

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: