APPENDIX C: Cultural and Paleontological Resources Assessment

Cultural Resource Assessment for the Santa Ana River Trail – Phase 6 (SART Phase 6) through Green River Golf Course, Riverside and San Bernardino Counties, California

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USGS 7.5′ Quadrangle: Prado Dam, Blackstar Canyon
Level of Investigation: CEQA
Key Words: Riverside; CEQA; ~ 140.5 acres surveyed

MANAGEMENT SUMMARY

The Riverside County Regional Parks and Open Space District (District) proposes the Santa Ana River Trail - Phase 6 (SART - Phase 6) through Green River Golf Course (Project). The Project consists of two build alternatives: Alternative 1 – West of Golf Course and Alternative 2 – East of Golf Course. In anticipation of both federal and county permitting requirements, Project must comply with the California Environmental Quality Act (CEQA). The District is the Lead Agency for the purposes of CEQA. The Riverside County Transportation Commission (RCTC) is the implementing agency for the purposes of CEQA.

Under contract to Michael Baker International, Inc., Applied EarthWorks, Inc. (Æ) conducted a cultural resource investigation of the approximately 140.5-acre Project area. Æ's assessment included a records search and literature review, a Sacred Lands File (SLF) search with the Native American Heritage Commission (NAHC), and an archaeological and built-environment survey of the Project area. The purpose of the investigation was to determine the potential for the proposed Project to affect cultural resources eligible for or listed on the National Register of Historic Places (NRHP), or the California Register of Historical Resources (CRHR).

The literature and records search by the South Central Coastal Information Center (SCCIC) and the Eastern Information Center (EIC) of the California Historical Resources Information System indicates 65 previous cultural resource investigations and 10 cultural resources are documented within the Project area with a 1-mile-wide buffer (Study Area). Three of these resources, a historic camp, a historic railroad grade, and two buildings with associated refuse scatters, are documented within the Project area. The SLF search with the NAHC was completed with negative results.

Æ Associate Archaeologist Evan Mills, M. A. and Architectural Historian Susan Wood, Ph.D. completed an intensive pedestrian surface reconnaissance survey and built-environment survey of the Project area on July 17, 2019. Locations of the three previously recorded archaeological sites within the Project area were revisited during the current investigation. Two newly discovered built-environment resources were identified and documented during the survey. The Project boundary was expanded after conducting the first survey in July to include a portion of the proposed Santa Ana Trail between Phase 3 and Phase 5; thus, a second survey was conducted on September 20, 2019. No newly identified cultural resources were identified during the second survey.

Significance evaluations indicate none of the cultural resources within the Project area are recommended as eligible for listing on the NRHP or the CRHR. The ground surface throughout the entire Project area has been disturbed substantially by the construction of the Green River Golf Course, historic rail roads, camps, orchards, and homesteading. Of the six soil series mapped across the Project area; none of the soil series include a buried A horizon. However, ground visibility within the western half of the Project area (Alternative 1) was poor, and considering the proximity to the Santa Ana River, archaeological sensitivity for Alternative 1 is

moderate. The archaeological sensitivity of the eastern half of the Project area (Alternative 2) is considered low as a result of the extensive disturbance from the construction of the golf course and the location within the flood plain of the river. Therefore, full-time cultural resource monitoring of the western half of the Project area (Alternative 1) within native soils is recommended.

Field notes documenting the current investigation are on file at Æ's Hemet office. A copy of this report will also be submitted to the EIC and SCCIC.

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1
INTRODUCTION

The Riverside County Regional Parks and Open Space District (District) proposes the Santa Ana River Trail - Phase 6 (SART - Phase 6) through Green River Golf Course (Project). The Project is located north and west of the Santa Ana River largely within the City of Corona, Riverside County, California.

Michael Baker International, Inc. retained Applied EarthWorks, Inc. (Æ) to conduct a cultural resource assessment of the Project area for compliance with the California Environmental Quality Act (CEQA). The District is the Lead Agency for the purposes of CEQA. Riverside County Transportation Commission (RCTC) is the implementing agency under CEQA. Æ Managing Principal, M. Colleen Hamilton, M.A., R.P.A. (#10535) served as Æ's principal investigator and was responsible for overall quality control. Joan George, B.S. served as Æ's project manager. Fieldwork was conducted by Æ Associate Archaeologist Evan Mills, M.A, RPA (#18026), and Æ Architectural Historian Susan Wood, Ph.D., who co-authored this report with contributions from Æ Senior Archaeologist Dennis McDougall.

1.1 PROJECT LOCATION AND DESCRIPTION

The Project is located north and west of the Santa Ana River largely within the City of Corona. The Project generally extends from the Orange County/San Bernardino County line on the west to the southeastern portion of the Chino Hills State Park on the east (Figure 1-1). Specifically, the Project is located within Sections 25, 30, 32, 36, Canon De Santa Land grant, and La Sierra (Yorba) Land grant, Township 3 South, Range 7 and 8 West, San Bernardino Baseline and Meridian, as shown on the Prado Dam and Black Star Canyon, CA 7.5-minute U.S. Geological Survey (USGS) quadrangle maps (Figure 1-2). Elevation across the Project area ranges between approximately 425 feet and 480 feet above mean sea level (amsl).

The Project area primarily includes the Green River Golf Course with a portion of the west side being foothill grasslands, and a portion of the east side being a riparian zone adjacent to the Santa Ana River. The proposed SART - Phase 6 would construct a dual-track Class I multi-use path/natural surface trail, connecting the Santa Ana River Parkway Extension west of the Project, at the Orange County/San Bernardino County line in Orange County (currently in final design), with the existing SART - Phase 5 in Chino Hills State Park on the east within Riverside County. Additionally, an approximate 1,000-foot segment of the SART will be constructed connecting the east end of the SART - Phase 5 (completed as a separate project in March 2019) and west end of SART - Phase 3 (a separate project currently under environmental review), near the State Route (SR) 91 and SR 71 interchange (Figure 1-3). The Project would close the gaps between the recreational facilities (Santa Ana River Parkway Extension and SART - Phase 5 and between SART - Phase 5 and SART - Phase 3) and serve the needs of recreational users, including pedestrians, hikers, bicyclists, and equestrians, as well as provide commuters an opportunity for alternative means and routes of transportation in the Project area.

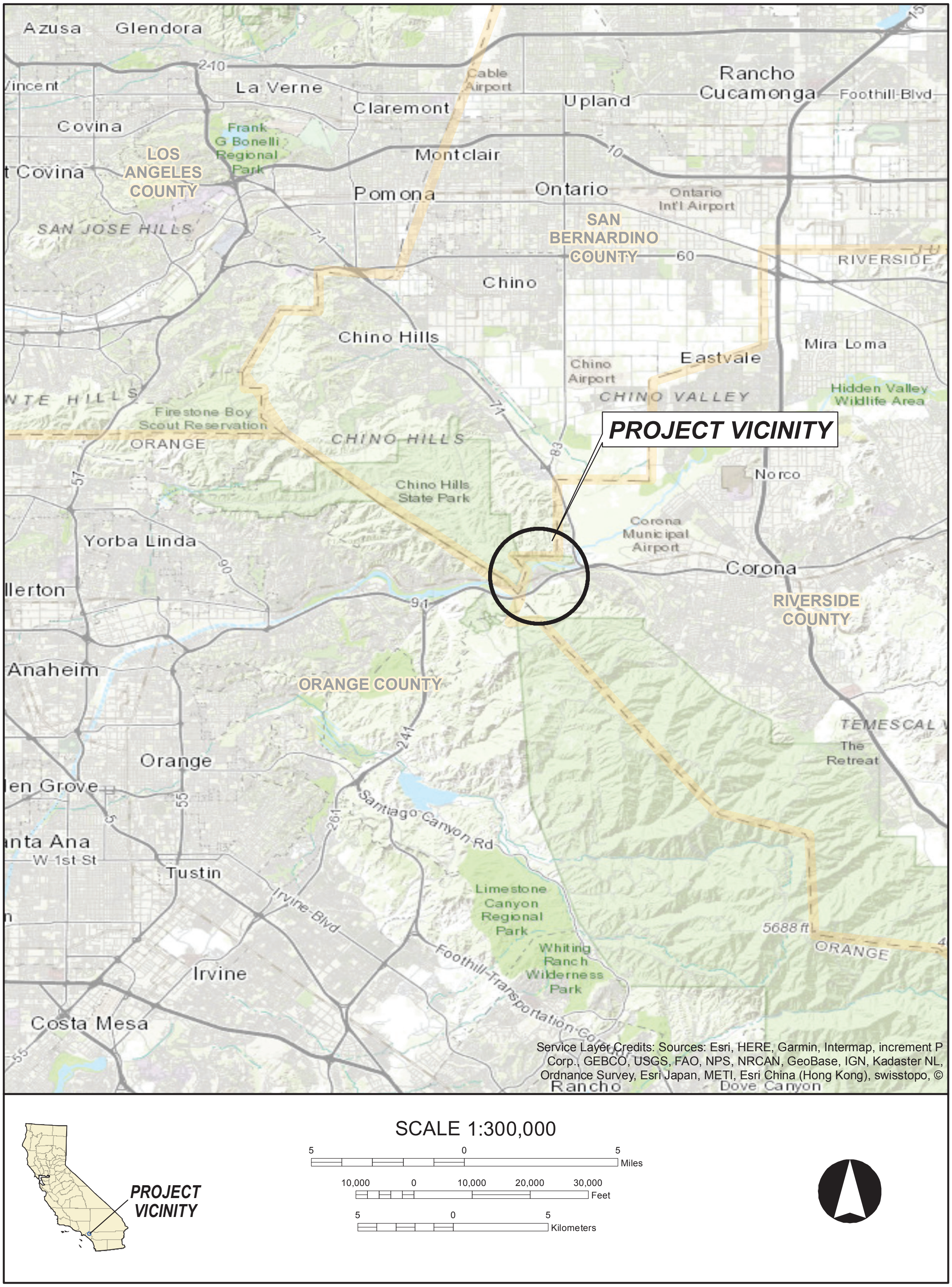

Figure 1-1 Project vicinity in Orange, San Bernardino, and Riverside counties, California.

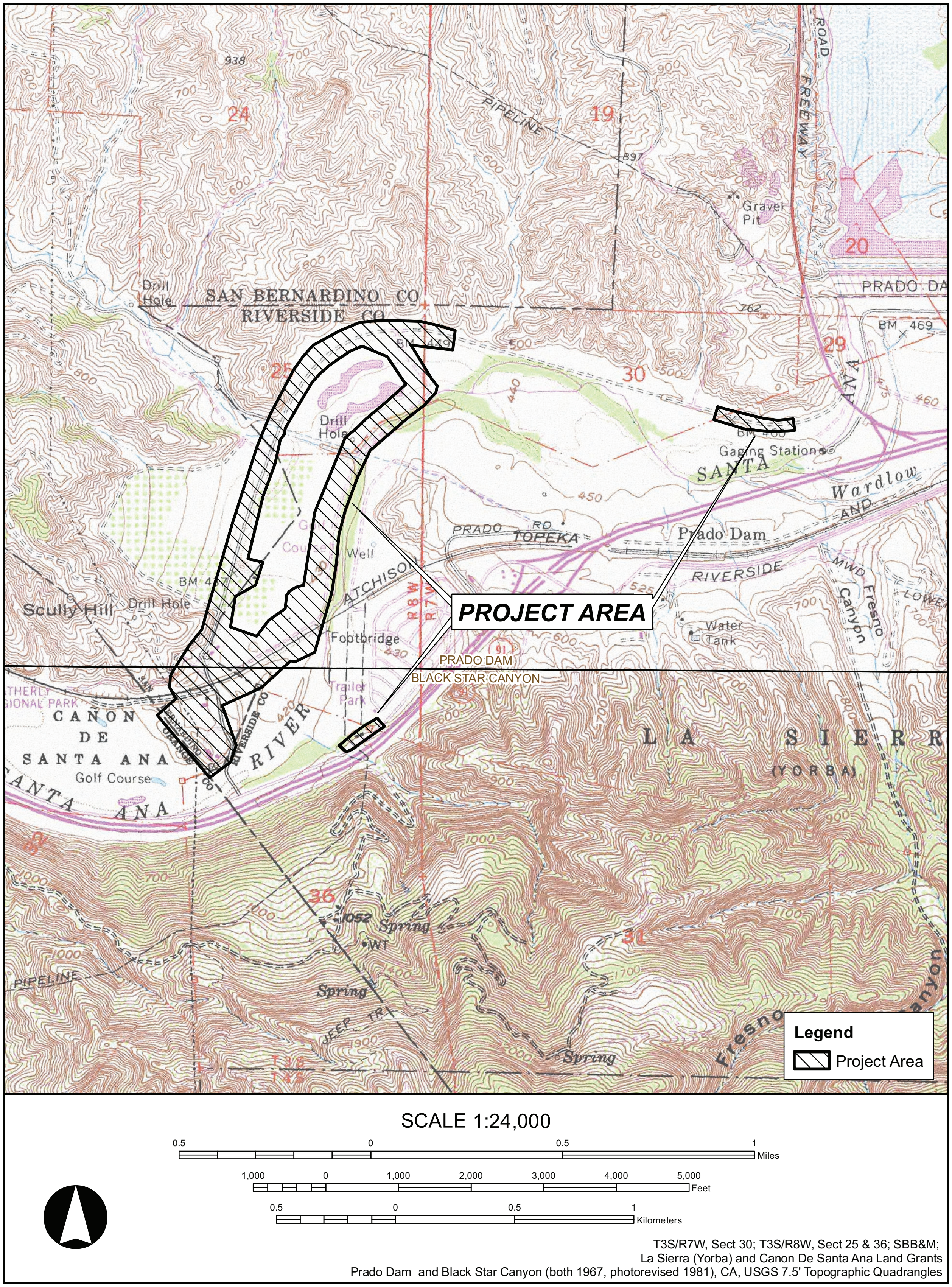

Figure 1-2 Project location map.

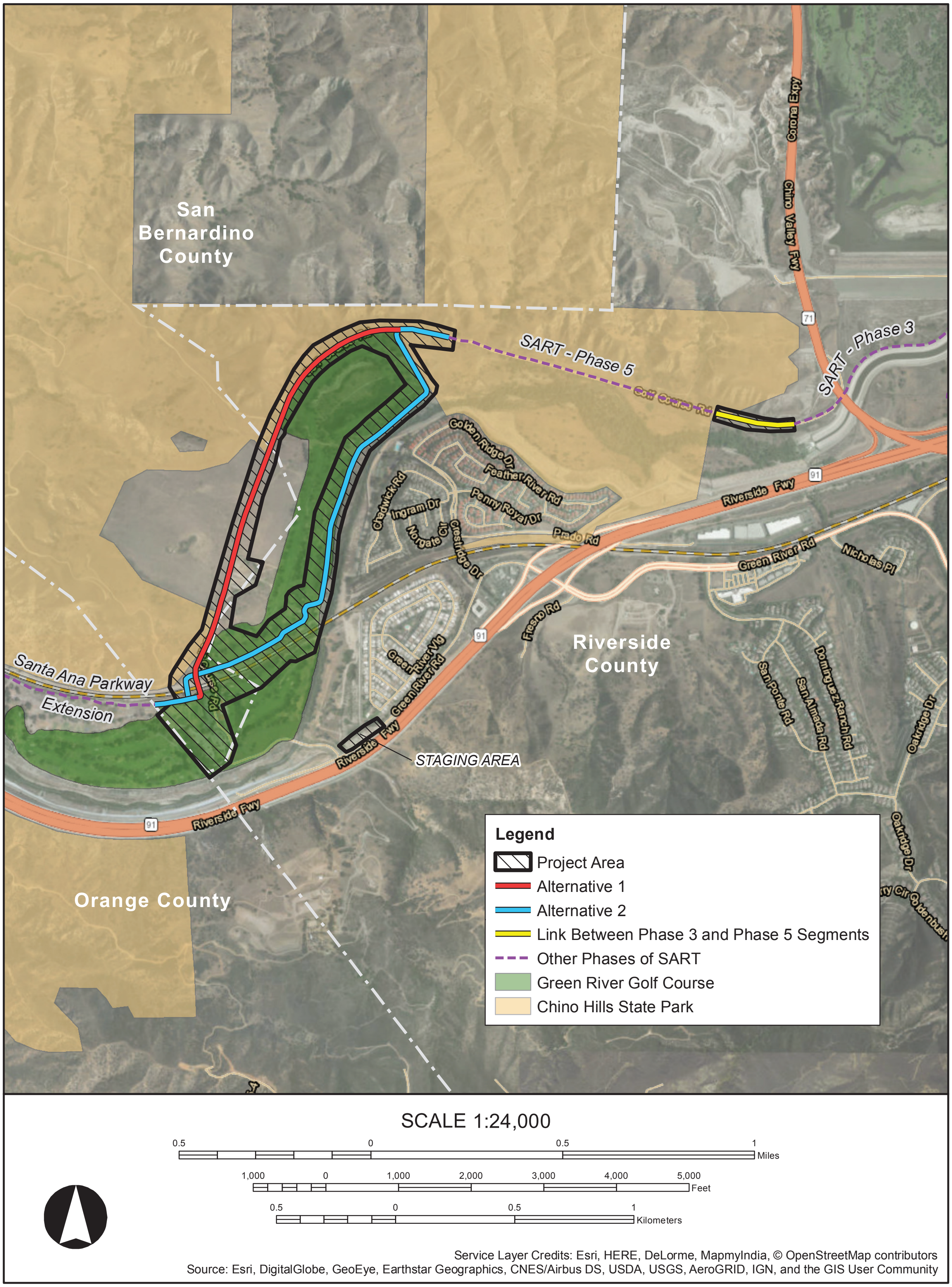

Figure 1-3 Project Area map with Alternatives 1 and 2.

The Project consists of two build alternatives: Alternative 1 – West of Golf Course and Alternative 2 – East of Golf Course (see Figure 1-3). Both build alternatives would have similar trail characteristics. The main difference between the build alternatives is the trail alignment. Alternative 1 would generally extend along the western boundary of the Green River Golf Course and Alternative 2 would generally extend along the eastern boundary of the golf course. Both trail alignments would include the additional SART segment east of the golf course between SART Phase 3 and Phase 5 as well as the staging area located south of the trail alignments.

The Project area includes approximately 140.5 acres of land. Along most of the alignment, excavation for grading and compaction of the trail alignment is planned to extend no more than 5 feet below the existing grade. However, excavations near the driving range and at the bridge locations will extend beyond this limit and reach a maximum excavation depth of approximately 13 feet below the existing ground surface for the driving range and 40 feet below the existing ground surface for the bridges.

1.2 REGULATORY CONTEXT

The Project also requires discretionary approval from the District and is therefore subject to the requirements of CEQA. The CEQA Statute and Guidelines direct lead agencies to determine whether a project will have a significant impact on historical resources. A cultural resource considered "historically significant" is considered a "historical resource," if it is included in a local register of historical resources, is listed in or determined eligible for listing on the California Register of Historical Resources (CRHR), or if it meets the requirements for listing on the CRHR under any one of the following criteria of historical significance (Title 14, California Code of Regulations [CCR], § 15064.5):

1. Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2. Is associated with the lives of persons important in our past;
3. Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,
4. Has yielded, or may be likely to yield, information important in prehistory or history.

Compliance with CEQA's cultural resource provisions typically involves several steps. Briefly, archival research and field surveys are conducted, and identified cultural resources are inventoried and evaluated in prescribed ways. Prehistoric and historical archaeological sites, as well as standing structures, buildings, and objects deemed historically significant and sufficiently intact (i.e., historical resources), must be considered in project planning and development.

A project with an effect that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment (14 CCR § 15064.5[b]). The lead agency is responsible for identifying potentially feasible measures to mitigate significant adverse changes to historical resources (14 CCR § 15064.5[b]4).

1.3 REPORT ORGANIZATION

This report documents the results of a cultural resource investigation of the proposed Project. Chapter 1 has described the Project and its location, and defined the scope of cultural resource investigation, and stated the regulatory context. Chapter 2 summarizes the natural and cultural setting of the Project and surrounding region. Chapter 3 presents the results of the archaeological literature review and records search and the SLF search with the NAHC. Chapter 4 presents the field methods of the archaeological and built-environment surveys. Chapter 5 discusses the results of the field investigations. Evaluation of cultural resources within the Project area are presented in Chapter 7. Chapter 8 provides cultural resource management recommendations, and bibliographic references are cited in Chapter 9. A map of the records search results is included in Appendix A. Results of the SLF search are included in Appendix B. The California Department of Parks and Recreation (DPR) Series 523 recording forms are included as Appendix C.

2
SETTING

This chapter describes the prehistoric, ethnographic, and historical cultural setting of the Project to provide a context for understanding the nature and significance of cultural properties identified within the region. Prehistorically, ethnographically, and historically, the nature and distribution of human activities in the region have been affected by such factors as topography and the availability of water and natural resources.

2.1 ENVIRONMENTAL SETTING

The Project is situated in Riverside and San Bernardino counties along the Santa Ana River drainage and the western fringe of the San Bernardino Valley, east of the Santa Ana Mountains and west of the San Jacinto Mountains, which together compose the northernmost portion of the Peninsular Ranges on the North American Plate. The San Bernardino Valley is associated with erosion in the nearby mountains that occurred prior to their uplift. During the early Pliocene, sedimentary deposits formed in large freshwater lakes in the mountains. Late Pliocene rejuvenation of the mountains caused these lakes to fill with soil. As a result, streams coming down out of the mountains created a floodplain in the valley. During the late Pliocene and early Pleistocene, the sedimentary rocks folded, establishing the San Bernardino Valley by the late middle Pleistocene.

As the climate of the region is largely determined by topographic features, climate, in turn, largely dictates the character of the biotic environment exploited by Native American populations. The climate of the Project area is characterized as Mediterranean, with hot dry summers and cool moist winters. It has a semi-arid precipitation regime; significant changes in temperature and moisture occur based on elevation and exposure, particularly in the nearby mountains.

The soils present within the Project area are dominated by six main soil series, Garretson, Gaviota, Metz, Monserate, San Emigdio, and Soper (Soil Survey Staff 2019a). There are additional classifications within these series, but this discussion will focus on the six main series due to all the other classifications falling within the larger series.

The Garretson series is a member of the fine-loamy, mixed, nonacid, thermic family of Typic Xerorthents (Soil Survey Staff 2019b). A typical pedon consists of an A horizon from 0–29 inches and C horizon from 29 to 72 inches (Soil Survey Staff 2019b). There is no B horizon or buried A (Ab) horizon within the Garretson series. The Gaviota series consists of very shallow or shallow well drained soils that forms in material weathered from hard sandstone or meta-sandstone (Soil Survey Staff 2019c). A typical pedon consists of an A horizon from 0 to 10 inches and there is no buried A horizon listed with this series (Soil Survey Staff 2019c). The Metz series consists of very deep, somewhat excessively drained soils that formed in alluvial material from mixed, but dominantly sedimentary rocks (Soil Survey Staff 2019d). A typical pedon within the Metz series displays an A horizon from 0 to 12 inches and a C horizon from 12 to 118 inches. There is no buried A horizon reported within the Metz series (Soil Survey Staff 2019d). The Monserate series is within the fine-loamy, mixed, thermic family of Typic Durixeralfs (Soil Survey Staff 2019e). A typical pedon consists of an A horizon from 0 to 10 inches, a B horizon from 10 to 28 inches, and a C horizon from 28 to 70 inches. No buried A horizon reported within the Monserate series (Soil Survey Staff 2019e). The San Emigdio series consist of very deep, well drained soils formed in sedimentary alluvium (Soil Survey Staff 2019f). A typical pedon for the San Emigdio series consists of an A horizon from 0 to 8 inches and C horizon from 8 to 60 inches. No buried A horizon is reported within the San Emigdio series (Soil Survey Staff 2019f). The Soper series is moderately deep, well-drained soils that formed in material weathered from conglomerate and sandstone (Soil Survey Staff 2019g). A typical pedon for Soper series consists of an A horizon from 0 to 8 inches, a B horizon from 8 to 29 inches, and a C horizon from 29 to 62, with no reported buried A horizon (Soil Survey Staff 2019g).

None of the official soil series within the Project area are reported to contain buried A horizons which would be potential locations for buried archaeological deposits. The subsurface sensitivity for the Project area is viewed as low based on these soils.

2.2 PREHISTORIC SETTING

Archaeological interpretations of assemblages in the interior regions of Southern California have long been stifled by the lack of a firm chronological framework which would enable comparative analyses of contemporary assemblages and investigation of diachronic change. Lack of a wholly adequate culture history for the interior valleys and mountainous regions of Southern California can be attributed to at least three major factors: (1) the nature and scope of investigations in the region, where research has been concentrated for the most part at single sites or on specific problems; (2) the complex historical sequence of investigations and discoveries, combined with a tendency on the part of many authors to explain similarities in assemblages to cultural diffusion; and (3) the confusion of typological and chronological terminology, which has led to ill-defined units that alternately describe time periods, tool morphology, social groupings, or technological adaptations. A prime example of muddled nomenclature is the “Milling Stone Horizon,” first defined by Wallace (1955). This term has been applied variously to sites dating between 8400 B.P. and the period of Spanish contact. In the report of their work within Prado Basin, Goldberg and Arnold (1988) provide particularly cogent critical reviews of Southern California chronologies and the “Milling Stone Horizon” concept, tracing the development of the typological and chronological confusion inherent in existing culture histories.

In the absence of a prehistoric context specific to the inland valley regions, archaeologists often adapted cultural frameworks and nomenclature developed for coastal (e.g., King 1990; Wallace 1955) and desert regions (e.g., Warren 1984). However, following completion of the Eastside Reservoir Project (ESRP) synthesis of findings in 2001 documenting more than a decade of archaeological research in the greater San Jacinto Valley (Goldberg et al. 2001), a temporal framework for the interior valley regions of cismontane Southern California area was developed which was influenced by previous studies at Perris Reservoir (O’Connell et al. 1974), Lake Elsinore (Grenda 1997), the Prado Basin (Goldberg and Arnold 1988), and the neighboring desert region (Warren 1984).

Although many of the prehistoric components assigned to the Eastside Reservoir temporal framework align closely with the desert region (after Warren 1984) and most recently the Mojave Desert (after Sutton et al. 2007), value-neutral terms, for the most part, were preferred in place of regionally specific classifications (Goldberg et al. 2001:172). Seven distinct periods organized chronologically via time-sensitive artifact cross-dating and refined by radiocarbon and obsidian hydration dates from intact archaeological deposits were proposed (Onken and Horne 2001; Robinson 1998, 2001a). These include: Paleoindian (10,500–9500 B.P.); Early (9500–7000 B.P.), Middle (7000–4000 B.P.), and Late Archaic (4000–1500 B.P.); Saratoga Springs (1500–750 B.P.); Late Prehistoric (750–410 B.P.); and Protohistoric (410–180 B.P.) periods.

It should be noted, however, no archaeological sites dating to the Paleoindian period have been identified within the inland valley regions of cismontane Southern California. Therefore, our discussions below will begin with the Early Archaic. However, the regional lack of archaeological evidence dating to this period may be due to adverse climatic conditions that appear to have prevailed throughout cismontane Southern California during this time. The Paleoindian period is marked by deglacial climatic changes that began by about 13,000 B.P. (Gosse et al. 1995; Mix 1987; Sowers and Bender 1995). In the desert interior, the change from glacial to postglacial ecosystems began by at least 11,700 B.P. (Spaulding 1995) but took millennia to complete. Paleoclimatic and paleoecological data suggest that until about 7500 B.P. the prevailing westerly air flow pattern weakened, while the desert interior received moist monsoonal flow from the southeast (Davis and Sellers 1987; Spaulding and Graumlich 1986). This monsoonal flow was blocked from reaching the inland valleys of cismontane Southern California by the Transverse and Peninsular ranges (Spaulding 2001). This resulted in the interior deserts having considerably higher levels of effective moisture than present. Thus, the desert interior was apparently less arid than cismontane Southern California during this period and possessed an abundance of water sources and relatively productive ecosystems (Van Devender et al. 1987).

Therefore, the desert interior may have been more suitable to prehistoric occupation than the interior valleys of Southern California during this period. Assuming that early human population densities were low and people were dispersed over the landscape primarily in small mobile groups, there may not have been sufficient population pressure to force occupation of environmentally marginal areas that may have characterized much of the inland region. It is more likely that Paleoindian populations in Southern California were centered on the coastal or interior desert regions or around the few large, reliable, drought-resistant water sources present within the inland valley areas, such as those that existed at Lake Elsinore (Grenda 1997), at Mystic Lake along the San Jacinto River drainage in the San Jacinto Valley (Horne and McDougall 2008), and possibly in the Cajalco Basin which now forms Lake Mathews (McDougall et al. 2003).

2.2.1 Early Archaic Period (ca. 9500–7000 B.P.)

The Early Archaic period saw a continuation of the weather patterns described above for the latest Pleistocene/Early Holocene, and the desert interior was apparently much more favorable for human occupation than the cismontane valleys of Southern California. Because of the arid conditions within the interior valleys, prehistoric use of these areas would still have been negligible, and populations would still have favored the coastal or interior desert regions.

Nonetheless, those populations exploiting the interior valleys would still have been tethered to the few reliable, drought-resistant water sources such as Lake Elsinore, Mystic Lake, and possibly the Cajalco Basin.

In coastal Southern California, the early traditions gave way to what Warren (1968) refers to as the "Encinitas Tradition" by about 8000–7000 B.P. (or possibly earlier; see discussion below). Throughout areas of Southern California, this interval has been described frequently as the "Milling Stone Horizon" because of the preponderance of milling tools (i.e., manos and metates) and paucity of projectile points and vertebrate faunal remains in the archaeological assemblages of sites dated to this era (Basgall and True 1985; Kowta 1969; Wallace 1955). Wallace's "Period II: Food Collecting" also would be subsumed under this tradition. True (1958) assigned inland and coastal San Diego County sites dating to this period to the Pauma and La Jolla complexes, respectively. Farther north in coastal Los Angeles and Orange counties, sites dating between ca. 8500 and 2000 B.P. are considered components of the Topanga Complex, which was first defined in the Santa Monica Mountains at the Tank Site (CA-LAN-1) (Heizer and Lemert 1947; Kowta 1986; Treganza and Bierman 1958; Treganza and Malamud 1950) and nearby CA-LAN-2 (Treganza and Bierman 1958). Later manifestations of Milling Stone Horizon sites dating from ca. 3000 to 1000 B.P. in the inland areas of San Bernardino and Riverside counties are assigned to the Sayles Complex (Kowta 1969).

In addition to the preponderance of milling equipment, the artifact inventory of this period includes crude hammerstones, scraper planes, choppers, large drills, crescents, and large flake tools. This assemblage also occasionally includes large (dart-sized) projectile points and knives, and nonutilitarian artifacts, such as beads, pendants, charmstones, discoidals, spherical stones, and cogged stones (Kowta 1969; True 1958; Warren et al. 1961).

Although sites assigned to this stage of cultural development are similar in many respects, their content, structure, and age can vary. These inconsistencies in content, structure, and age of sites assignable to the "Milling Stone Horizon" have been reviewed by Goldberg and Arnold (1988:12–13, 46–50). In their discussion, the presence of a single technology (the milling stone and mano) to define a temporally meaningful analytic unit of cultural development is seen to be problematic and does not explain the variability in site assemblages and dates of this period. They argue that to assign all sites that contain milling stones and manos to the period from 8000 to 2000 B.P. implies a "cultural unity" among the people who deposited these artifacts despite the fact that decades of research have documented significant variability in subsistence emphasis, mortuary practices, and nonutilitarian artifacts (e.g., cogged stones, discoidals, beads).

Because the compression of its various expressions into a homogeneous Milling Stone Horizon concept has obscured the distinctions and differences between regions and accentuated the similarities, Sutton and Gardner (2010) propose use of Warren's (1968) term "Encinitas Tradition" for sites dating between ca. 9400 and 1000 B.P. in Southern California that are generally subsumed within the Milling Stone Horizon. They recommend:

> a return to the use of taxonomic terms, herein called pattern and phase, to describe the internal variation of the Encinitas Tradition. For the northern inland expressions of the Encinitas Tradition, we propose a new pattern, Greven Knoll. The previously described Sayles Complex is recast as the last phase of the Greven Knoll Pattern (Greven Knoll III). We believe that an understanding of the regional variants of Encinitas will foster a better

> understanding of the geographical and temporal manifestations of the Millingstone phenomenon in southern California, as well as the changes through space and time that ultimately resulted in the replacement of Millingstone adaptive strategies by strikingly new ones [Sutton and Gardner 2010:1].

In their article, Sutton and Gardner (2010:2) use the term “pattern” to replace “complex” (e.g., the Toganga Complex) to “denote units of cultural similarity in traits that include technology, settlement patterns, mortuary practice, and the like,” and the term “phase” to “designate subdivisions within a pattern as identified by specific changes in cultural assemblages.”

For coastal Los Angeles and Orange counties, Sutton and Gardner (2010:Table 1) identify the Topanga Pattern, divide that into three phases (Topanga I [8500–5000 B.P.], Topanga II [5000–3500 B.P.], and Topanga III [3500–2000 B.P.]), and identify the material culture traits and other aspects (e.g., settlement and subsistence patterns, mortuary customs) for the pattern and individual phases. Similarly, Sutton and Gardner (2010:Table 1) define traits and aspects for the La Jolla Pattern of coastal San Diego County and its three phases (La Jolla I: 8500–5000 B.P.; La Jolla II: 5000–4000 B.P.; and La Jolla III: 4000–1300 B.P.), the Pauma Pattern in inland San Diego County and its two phases (Pauma I: 7500–3000 B.P.; Pauma II: 3000–1000 B.P.), and the Greven Knoll Pattern and its three phases (Greven Knoll I: 9400–4000 B.P.; Greven Knoll II: 4000–3000 B.P.; and Greven Knoll III [formerly the Sayles Complex]: 3000–1000 B.P.) for the more northern, inland expressions of the Encinitas Tradition. Because the discussions herein concentrate primarily on prehistoric cultural contexts of the inland areas of Southern California, our focus in the following sections will be the Greven Knoll Pattern.

Greven Knoll I (9400–4000 B.P.) is characterized by an abundance of manos and metates, Pinto-series projectile points, charmstones, occasional (rare) cogged stones and discoidals, no mortars or pestles, and a general absence of shell artifacts. Other traits include the lack of economic exploitation of marine shellfish and an importance of hunting terrestrial animals, flexed inhumations, and rarely cremations. Characteristics of Greven Knoll II (4000–3000 B.P.) also include an abundance of ground stone implements (including few mortars and pestles), Elko series points, core tools, “late” discoidals, and a general absence of shell artifacts. Other Greven Knoll II traits are similar to those described for Greven Knoll I, but with an increased importance of hunting and gathering. The material culture traits of Greven Knoll III (3000–1000 B.P.) are like those for Greven Knoll II with the addition of scraper planes, choppers, and hammerstones; yucca and seeds become dietary staples, hunting remains important but bones are being processed (or pulverized) for marrow extraction, and flexed inhumations are often capped by cairns–cremations are still rare (Sutton and Gardner 2010:Table 1).

Archaeological sites dating to the Early Archaic or containing meager evidence suggestive of sporadic use during this time period within the inland valleys of Southern California are rare, supporting the hypothesis of negligible prehistoric use of these areas during this period. Within the greater San Jacinto Valley, two site components are firmly dated to the Early Archaic and conform to Phase I of the Greven Knoll Pattern: a single flexed inhumation at CA-RIV-5786 dating to 7380 ± 300 B.P. (8128 cal B.P.) (Wyss 2001:242), and the lower component (Stratum I) at CA-RIV-5086, a small temporary camp that was relatively dated with obsidian hydration data, stratigraphic information, and two radiocarbon assays of 9190 ± 50 and 9310 ± 60 B.P. of charcoal recovered from the Stratum I paleosol (McDougall 2001a). The site contained a relatively sparse scatter of flaked and ground stone artifacts and faunal remains but no features. The data suggest that CA-RIV-5086 was utilized as a resource extraction locale, possibly situated adjacent to a wetland environment. It also should be noted that the upper component (Stratum II) at CA-RIV-5086 yielded both Pinto and Elko points, along with ground stone implements, flaked stone tools (mostly core and flake tools), debitage (including obsidian sourced to the Coso Volcanic Fields), and few faunal remains (McDougall 2001a). Using the criteria developed by Sutton and Gardner (2010), the presence of both Pinto and Elko points suggests that the cultural components found within Stratum II may be a mix of Greven Knoll I and II components or, conversely, that the use of Pinto points continued into Phase II of the Greven Knoll Pattern.

Three other localities identified within the same general area (CA-RIV4627/H, Locus B; CA-RIV-4629/H, Locus B; and CA-RIV-4930, Locus J) contained possible evidence of Early Archaic use in the form of Coso obsidian rinds exceeding 15 microns (Onken and Horne 2001). Hydration rind measurements from these sites measuring 17.2, 15.6, 16.5, and 17.5 microns, respectively, convert to age ranges of 10,300 years, 8,500 years, 9,500 years, and 10,700 years (Onken and Horne 2001:121–130).

Although much of the data seem to corroborate the notion of sporadic use of the inland valley regions by small, highly mobile bands utilizing portable tool kits during the Early Archaic, the data from CA-RIV-5786 and another site, CA-RIV-6069 (Horne and McDougall 2008), seem to contradict this theory. The single inhumation identified at CA-RIV-5786, which was discovered along Salt Creek in the southern portion of the San Jacinto Valley, was capped with a burial cairn composed of three large, well-shaped basin metates (McDougall 1995). As was noted above, this burial has been firmly dated to 7380 ± 300 B.P. (8128 cal B.P.), well within the postglacial thermal maximum. Given their size and weight, these metates were certainly not part of a portable tool kit. It is more likely that this isolated burial located along the southern fringe of the San Jacinto Valley was associated with a larger residential community nearby that was based at a permanent inland water source. Conceivably, Salt Creek may have been a drought-resistant environment prior to the massive agricultural pursuits and channelization efforts that occurred during the Historic Period that resulted in massive lowering of the local groundwater table.

CA-RIV-6069 is situated on a well-drained distal portion of an alluvial fan emanating north from the Lakeview Mountains in western Riverside County and is largely contained within a mountain-front embayment just above the floor of the San Jacinto Valley and south of Mystic Lake (Horne and McDougall 2008). Numerous springs are present along the mountain front overlooking the embayment (Horne and McDougall 2008:10). The vertical distribution of cultural materials and features documented indicate that two distinct cultural strata representing two periods of cultural occupation are present. Of interest here is the more intensive cultural occupation identified approximately 2.7–3.9 m (8.9–12.8 ft) below the modern ground surface. Uncalibrated radiocarbon assays from this lower component range from 6550 to 8370 B.P., and the majority of radiocarbon samples (8 of 9) recovered from intact cultural features cluster between 7940 and 8370 B.P., or 8975–8530 cal B.P. and 9475–9215 cal B.P., respectively (Horne and McDougall 2008:91–92), placing this site within the nascent range of Phase I of the Greven Knoll Pattern.

CA-RIV-6069 yielded an extensive assemblage of flaked, battered, and ground stone tools (shaped manos and metates); discoidals and stone spheres; terrestrial faunal remains; and bone tools. Additionally, 15 discrete cultural features were identified, including an intact stone-lined pit oven (the "stones" lining the edges of the pit oven consisted of basin metates), ground stone artifact caches, and concentrations of artifacts, fire-altered rock, and unmodified cobble manuports representing remnants of former activity areas. Twelve of these cultural features were encountered within the lower cultural component dating from 8975–8530 cal B.P. to 9475–9215 cal B.P. (Horne and McDougall 2008).

Of interest is that the lower component at CA-RIV-6069 also yielded 36 molded and fired ceramic objects (Horne and Griset 2013:121–140). These ceramic items have been identified as possible fragments of biomorphic figurines, vessels, tubular beads, tapered cylinders, and other objects that were fired at an estimated temperature of below 800 degrees Celsius (°C). Seven of the radiocarbon dates from the lower component are directly associated with ceramic specimens (Horne and McDougall 2008:100). Thus, the data suggest that CA-RIV-6069 contains evidence of one of the earliest, if not the earliest, indigenous ceramic industries yet identified in the Western Hemisphere.

The presence of numerous cultural features, including several artifact caches, and the extreme degree of fragmentation, fire alteration, and reuse/recycling of large highly shaped ground stone implements suggest fairly intensive residential use (either repeated or long term) of CA-RIV-6069 during the Early Archaic. The presence of several artifact caches suggests that site reuse was anticipated. Thus, CA-RIV-6069 may have been a destination point with a predictable resource base that was on a scheduled seasonal collecting round. Resource predictability, and the planning depth and organizational characteristics necessary to take full advantage of it, fosters expectations of site reoccupation and longer-term residential occupations (McDougall 2003:11).

One other site worthy of note containing an Early Archaic component comparable to Phase I of the Greven Knoll Pattern is CA-RIV-2798/H, or the Lake Elsinore Site. CA-RIV-2798/H is at the mouth of the outlet channel of Lake Elsinore, one of the few and certainly the largest of the natural lakes in southern California. Data recovery excavations conducted in 1993 revealed stratified cultural deposits attaining depths of nearly 3 m (10 ft) and containing a fairly large assemblage of flaked stone tools (bifaces, unifaces, projectile points, small flake tools, and crescents); a variety of ground stone implements also were collected (Grenda 1997). Documented features include several fire hearths and hearth clean-out refuse deposits, rock clusters, and ground stone caches. Of the eight radiometric assays available for the site, one assay of 8400 ± 60 B.P. from marine shell, coupled with the crescents, suggests that initial occupation of the Lake Elsinore site may have occurred during the later portion of the Early Holocene (Grenda 1997:279). Two additional radiometric assays (4800 ± 60 B.P. and 4530 ± 80 B.P.), six dart points, and several cultural features indicate that site occupation intensified during the Middle Holocene, but site occupation apparently became more sporadic and less intensive during subsequent periods of the Late Holocene (Grenda 1997:279–284).

In summary, few sites dating to the Early Archaic have been documented within the inland valley areas of Southern California, supporting the theory of negligible use of these localities at this time because of arid conditions. Many of these sites contain only scant evidence of Early Archaic use in the form of obsidian hydration rind measurements, suggesting ephemeral site use by small, highly mobile groups. However, some sites dating to this time period (e.g., CA-RIV-2798/H and the lower cultural component at CA-RIV-6069) do contain evidence of fairly sedentary residential occupation along with evidence that site reuse was anticipated, which suggests a predictable availability of water and other critical resources. Invariably these sites have been found near large drought-resistant inland water sources and may have been destination points on a scheduled seasonal round.

2.2.2 Middle Archaic Period (ca. 7000–4000 B.P.)

The Middle Archaic period saw a reversal of the weather patterns that had prevailed throughout much of cismontane Southern California for several millennia. By about 6000 B.P., local environmental conditions ameliorated as conditions in the deserts deteriorated, reaching their maximum aridity in the postglacial period (Antevs 1952; Hall 1985; Haynes 1967; Mehringer and Warren 1976; Spaulding 1991, 1995). Spaulding (2001) proposes that a westerly air-flow pattern returned to Southern California and the monsoonal weather patterns in the deserts retreated. As a result, the inland areas may have seen increased effective moisture while the interior deserts, no longer receiving moist monsoonal flow and now in the rain shadow of the Transverse and Peninsular Ranges, became quite arid. This suggests that cismontane Southern California may have been a relatively more hospitable environment than the interior deserts during the middle Holocene.

Due to both the amelioration of local environmental conditions and deterioration of conditions in the interior deserts, it was postulated that the inland areas of cismontane Southern California would see an increase in prehistoric use and occupation after about 6000 B.P. compared to the earlier periods (Goldberg et al. 2001). This hypothesis appears to have been validated by the ESRP studies, where at least 19 archaeological localities were dated to the Middle Archaic. These Middle Archaic components include several intensively used residential bases and/or temporary camps containing abundant cultural debris (including temporally diagnostic artifacts; e.g., Pinto and Silver Lake projectile points, crescents), at least nine complex lithic scatters that appear to have functioned as resource extraction and processing sites, and one human burial covered with large rocks and ground stone artifacts. In addition, evidence of ephemeral Middle Archaic use is present at several sites in the form of isolated radiocarbon-dated features and/or sparse scatters of obsidian debitage dated by obsidian hydration methods. The more intensively used residential locations occur along alluvial fan margins, and less intensively used areas tend to be situated on arroyo bottoms or upland benches (Goldberg et al. 2001).

In the desert regions of Southern California, the Pinto period succeeded the Lake Mojave period, beginning at approximately 7000 B.P. (or possibly as early as 8820 B.P.) and lasting to 4000 or 3500 B.P. Relatively recent paleoecological and paleohydrological evidence suggests maximum aridity in the desert regions between ca. 7000 and 5000 B.P., with amelioration beginning at approximately 4500 B.P. and continuing through 4000 B.P. (Spaulding 1991, 1995). As an adaptive response to these changing climatic conditions, the Pinto period is characterized by necessary shifts in prehistoric subsistence practices and adaptations with greater emphasis placed on the exploitation of plants and small animals than in the preceding Lake Mojave period accompanied by a continued focus on artiodactyls (Warren 1980, 1984).

The distinctive characteristics of the "Pinto Basin Complex," as defined by Campbell and Campbell (1935), are projectile points of the Pinto series, described by Amsden (1935) as weakly shouldered, indented-base projectile points that are coarse in manufacture and form. Other diagnostic artifact types of this period include large and small leaf-shaped bifaces, domed and heavy-keeled scrapers, numerous core-cobble tools, and large blocky metates evincing minimal wear as well as small, thin, extensively used milling slabs and shaped and unshaped manos. Throughout most of the California desert region, sites containing elements of the Pinto Basin Complex (e.g., those in the Pinto Basin, Tiefort Basin, Salt Springs, and Death Valley) are small and usually limited to surface deposits, which is suggestive of temporary and perhaps seasonal occupation by small groups of people (Warren 1984:413).

Interestingly, the lower component at one site discovered in the San Jacinto Valley region in the 1990s evinces purely Lake Mojave and Pinto period materials comparable to Phase I of the Greven Knoll Pattern. This site, CA-RIV-5045 (also known as the Diamond Valley Pinto Site), is on a long, benched, rocky ridgeline and extends downslope along the eastern base of the ridgeline onto a colluvial fan at the mouth of a spring-fed drainage. The most intensively used portion of the site (Locus B) is contained within the colluvial fan sediments where two stratigraphically and radiometrically discrete cultural components (an upper and lower) were identified (McDougall 2001b).

CA-RIV-5045 is unique in that Pinto and Lake Mojave materials are found within well-stratified, radiometrically-defined cultural deposits. In addition to the numerous dart projectile points (n = 14) recovered that are indicative of the Pinto period (nine Pinto series, two Silver Lake series, two possible Pinto series, and one triangular dart point), these deposits contain abundant and diverse faunal assemblages, an extensive array of flaked stone tools (including one crescent) and ground stone implements, and intact cultural features (a hearth and ground stone and raw material caches) ascribable to specific periods of occupation. Twelve of the 14 dart projectile points and the single crescent were recovered from the lower component at Locus B where radiometric data indicate cultural occupation between 6210 ± 50 B.P. and 5650 ± 60 B.P. (7210–6990 cal B.P. and 6620–6300 cal B.P., respectively) (McDougall 2001b).

Charcoal collected from a hearth feature identified within the upper component of Locus B at CA-RIV-5045 was radiocarbon dated to 3230 ± 70 B.P. (or 3630–3330 cal B.P.), which places the upper component within the time frame assigned by Sutton and Gardner (2010) to Phase II of the Greven Knoll Pattern. However, a single Pinto series dart point also was collected from undisturbed context within the upper component. Contrary to Sutton and Gardner's criteria for Greven Knoll II culture material traits and similar to the findings at CA-RIV-5086 (see discussion above), this could suggest that that the use of Pinto points (along with Elko Points) persisted into Phase II of the Greven Knoll Pattern.

2.2.3 Late Archaic Period (ca. 4000–1500 B.P.)

The Late Archaic period was one of cultural intensification in Southern California. The beginning of the Late Archaic coincides with the Little Pluvial, a period of increased moisture in the region. Effective moisture continued to increase in the desert interior by approximately 3600 B.P. and lasted throughout most of the Late Archaic, allowing for more extensive occupation of the region. By approximately 2100 B.P., however, drying and warming increased, perhaps causing intensified use of selected resources.

Technologically, the artifact assemblage of the Late Archaic was similar to that of the preceding Middle Archaic; new tools were added either as innovations or as “borrowed” cultural items. Diagnostic projectile points of this period are still fairly large (dart point size) but also include more refined notched (Elko), concave-based (Humboldt), and small stemmed (Gypsum) forms (Warren 1984). Late in the period, Rose Spring arrow points appear in the archaeological record in the deserts, reflecting the spread of bow-and-arrow technology from the Great Basin and the Colorado River region. However, there is no evidence suggesting that the bow and arrow had come into use at this time in the inland valley regions of Southern California.

Within the inland areas, Sutton and Gardner (2010) assign sites dating from ca. 3000 B.P. through the end of the Late Archaic (and through ca. 1000 B.P.) containing an abundance of milling equipment (but few mortars and pestles), Elko points, choppers, hammerstones, scraper planes, and “late” discoidals to Phase III of the Greven Knoll Pattern, which was originally designated the “Sayles Complex” by Kowta (1969) based on excavations conducted in the 1960s at the Sayles Site (CA-SBR-421A) in the Crowder Canyon area near Cajon Pass.

Within the greater San Jacinto Valley, 23 archaeological localities show evidence that their primary use was during the Late Archaic, and eight others yielded evidence of some activity during this period. Late Archaic site types documented within the ESRP study area include residential bases with large and diverse artifact assemblages, abundant faunal remains, and cultural features, as well as temporary camps and task-specific activity areas. In general, sites showing evidence of the most intensive use tend to be on range-front benches adjacent to permanent water sources such as perennial springs or larger streams; less intensively used locales occur either on upland benches or on the margins of active alluvial fans (Goldberg et al. 2001).

One site component identified within the ESRP study area, Locus B at CA-RIV-4629/H (or the Diamond Springs Site), evinces intensive residential occupation during the Late Archaic. Locus B at CA-RIV-4629/H is within a large mountain-front embayment near both an active perennial spring and fossil spring location identified during geomorphological investigations. Here, extensive cultural deposits containing a variety of feature types, abundant ground stone implements (mostly highly-shaped manos and metates), and an extensive assemblage of flaked stone tools (projectile points, bifaces, core-cobble tools, flake tools, and cores) were identified. Dart projectile point types recovered at Locus B include one Silver Lake point (or possibly a reworked Pinto point), one Pinto point, and two Elko series points. Three radiocarbon assays of organic materials collected from discrete cultural features and one bone collagen date from a culturally modified mule deer (*Odocoileus hemionus*) humerus range from 4060 ± 60 B.P. to 2200 ± 50 B.P., placing this component firmly within the Late Archaic (McDougall 2001c).

Two additional dates from Locus B at CA-RIV-4629/H include a radiocarbon date of 4440 ± 60 B.P. from charcoal recovered from feature context, and a bone collagen date of 7060 ± 60 B.P. derived from a pronghorn (*Antilocapra americana*) ulna (McDougall 2001c), suggesting that Locus B may also have been occupied sporadically during the Middle Archaic. When all the chronological data is considered (radiocarbon and bone collagen dates, cross-dating of projectile points), the cultural deposits at Locus B appear to represent several millennia of prehistoric occupation that incorporate all three phases of the Greven Knoll Pattern.

Prehistoric habitation sites within Crowder Canyon contain abundant milling stones (mostly metates and manos but few pestles), core-cobble tools, a relative dearth of projectile points (Pinto and Elko types) and faunal remains, and numerous pit ovens and other heated-rock cooking facilities that suggest the primary reason for occupation of the area was to gather and process vegetal/fibrous resources (Basgall and True 1985; McDougall and Eddy 2019; McDougall and Mills 2019). Absent from the archaeological record of Crowder Canyon sites are ornaments of marine shell and other economic remains of marine shellfish, suggesting that inhabitants of the canyon had little contact with coastal groups. One of the hallmark artifact types within the Crowder Canyon assemblages and an indicator of the Sayles Complex (and Greven Knoll III) is the scraper plane, a tool thought to be used specifically to remove pulp from yucca and agave when preparing fiber for cordage (Kowta 1969). Basgall and True (1985) and McDougall and Eddy (2019) agree that the scraper plane, as well as several other types of heavy core-cobble-based tools, were used for vegetal processing at Crowder Canyon sites without delimiting their use only to yucca and agave.

Prior to recent investigations conducted at several sites within Crowder Canyon (McDougall and Eddy 2019; McDougall and Mills 2019), chronometric data (radiocarbon dating, obsidian hydration) suggested that prehistoric occupation of the canyon occurred primarily between 3000 and 1000 B.P., which Basgall and True (1985:10.2) identified as the principal period of "milling stone" occupancy originating with Kowta's (1969) "Sayles Complex" and culminating with the final major occupation of the Ridge Site (CA-SBR-713). The "milling stone" occupation at Crowder Canyon mirrored those identified in Rancho Cucamonga (Liberty Grove [CA-SBR-901] and Chaffey Hillside [CA-SBR-895]), suggesting "interior Milling Stone manifestations persisted within the interior, nondesert portion of San Bernardino County well into the Christian era" (Basgall and True 1985:10.2).

Currently, however, there is ample evidence indicating rather intensive use of Crowder Canyon prior to ca. 3000 B.P. Four radiocarbon assays of wood charcoal collected from an earthen pit oven excavated recently at CA-SBR-713 yielded age determinations ranging from 3989–3842 cal B.P. to 4148–4113 cal B.P. (McDougall and Eddy 2019). Salvage recovery excavations conducted at a buried locus (Locus 1) of CA-SBR-114/H in 2017 resulted in the excavation of 43 relatively undisturbed prehistoric thermal features (e.g., stone-lined and earthen pit ovens, grills) in primary subsurface contexts. Forty-one calibrated (at 2 sigma) radiocarbon age determinations derived from organic materials (e.g., fuel wood charcoal, burned/charred seeds) from 36 features suggest rather continuous use of the site as a resource processing location from 1360–1285 cal B.P. to 4410–4225 cal. B.P., and it is of interest that 14 of these age determinations are older than 3200 cal B.P. (McDougall and Mills 2019).

Radiocarbon dating of samples of wood charcoal collected from two thermal pit features investigated at a second buried locus (Locus 2) of CA-SBR-114/H in 2017 produced radiocarbon ages (calibrated at 2 sigma) of 8387–8293 cal B.P., 8262–8207 cal B.P., and 8408–8325 cal B.P. Locus 2 also contained a sparse scatter of ground stone tools and lithic debitage derived from locally available materials as well as a discrete scatter of human bone (unburned) that appears to represent a highly eroded inhumation (McDougall and Mills 2019). In sum, although sites associated with Phase III of the Greven Knoll Pattern are firmly established within Crowder Canyon, these recent data indicate that the canyon was also occupied during Greven Knoll II, and Greven Knoll I as well.

Concerning the cultural sequences for Late Archaic coastal sites in Southern California, for the period after about 5000 B.P., Warren (1968) and Wallace (1978) diverge in their chronological sequences for the region. Warren's Encinitas Tradition includes all areas outside the Chumash territory of the Santa Barbara coastal zone and continues until approximately 1250 B.P. Wallace, on the other hand, identifies a transition beginning approximately 5000 B.P., marking the onset of Period III: Diversified Subsistence. In his original 1955 sequence, Wallace said this period, generally referred to as the "Intermediate Horizon," was largely based on changes in the archaeological assemblages of sites from the Santa Barbara coastal region. This horizon is characterized by a greater variety of artifacts, suggesting a greater variety of utilized food resources. Although this interval of human occupation in coastal Southern California is poorly defined and dated because of the paucity of representative sites, many researchers in Southern California have retained Wallace's original Intermediate Horizon as a classification for sites dating between 5000 and 1500 B.P.

The subsistence base of Southern California coastal sites during the Late Archaic broadened. The technological advancement of the mortar and pestle may indicate the use of acorns, an important storable subsistence resource. Hunting also presumably gained importance. An abundance of broad leaf-shaped bifaces and heavy, often stemmed or notched projectile points have been found in association with large numbers of terrestrial and aquatic mammal bones. Other characteristic features of this period include the appearance of bone and antler implements and the occasional use of asphaltum and steatite. Most chronological sequences for Southern California recognize the introduction of the bow and arrow by 1500 B.P., marked by the appearance of small arrow points and grooved arrow shaft straighteners.

Some archaeologists have suggested that the changes in the coastal artifact assemblages dating to Wallace's Intermediate period were the result of an influx or incursion of "Shoshonean" people from interior desert areas to the coastal regions (Rogers 1929; Wallace 1978). However, there has been little agreement among researchers as to the timing of the initial Shoshonean "incursion," and estimates generally range from 1,000 to more than 6,000 years ago (Goldberg and Arnold 1988:50–56). Other archaeologists suggest that cultural transition from the earlier Milling Stone Horizon to the succeeding Intermediate Horizon coastal and inland assemblages reflects progressive economic changes (e.g., trade) rather than population replacement (King 1982; Koerper 1981; Moratto 1984:164).

However, Sutton (2010) recently proposed that the changes seen in archaeological manifestations (including settlement patterns, economic foci, and artifact types) along the coastal areas of Los Angeles County beginning around 3500 B.P. mark the arrival of Takic language groups that migrated from the southern San Joaquin Valley into the Los Angeles Basin at this time. Sutton (2010:1) proposes that this new tradition that replaced the Encinitas Tradition ca. 3500 B.P. be named the Del Rey Tradition, and "represents the arrival, divergence, and development of the Gabrielino in Southern California."

In the eastern desert regions of Southern California, the Gypsum period (ca. 4000 to 1500 B.P.) is generally coeval with Wallace's Intermediate Horizon. A trend toward increasing effective moisture, which began in the late middle Holocene, culminated in a pronounced pluvial episode between approximately 3700 and 3500 B.P. At that time, a number of basins in the Mojave and Owens river drainages supported perennial lakes (Enzel et al. 1992). No comparable events are evident earlier in the paleohydrological record, developed largely since Warren's (1984) work, that date to 5000 to 4500 B.P., the dates that encompass Warren's so-called "Little Pluvial." After the end of pluvial conditions (ca. 3500 B.P.), conditions typified by greater effective moisture appear to have persisted until approximately 3,000 years ago. An episode of aridity exceeding that of the present may have occurred about 2500 B.P., but there is evidence for increased effective moisture again between approximately 2000 and 1400 B.P. (Spaulding 1990, 1995).

Technologically, the artifact assemblage of the Gypsum period is similar to the preceding Pinto period; new tools also were added either as innovations or as "borrowed" cultural items. Included is the bow and arrow, as evidenced by the presence of Rose Spring projectile points late in this period. In addition to diagnostic projectile points, Gypsum period sites include leaf-shaped points, rectangular-based knives, flake scrapers, T-shaped drills and, occasionally, large scraper planes, choppers, and hammerstones (Warren 1984:416). Manos and milling stones are also common. A technological innovation introduced during this period was the mortar and pestle, used for processing acorns and hard seeds, such as those derived from the hollyleaf cherry and mesquite pod. This correlates with a warming and drying trend that began around 2100 B.P., which appears to have resulted in resource intensification. In addition, increased frequencies of grinding tools show increasing importance of plant foods throughout the Late Archaic, with a substantially greater emphasis after 2000 B.P. (Goldberg 2001). Other artifacts include arrow shaft straighteners, incised slate and sandstone tablets and pendants, bone awls, and *Olivella* shell beads and *Haliotis* beads and ornaments indicating that the California desert occupants were in contact with populations from the Southern California coast.

2.2.4 Saratoga Springs Period (ca. 1500–750 B.P.)

Because paleoenvironmental conditions were little changed from the preceding period, cultural trends in the early portion of the Saratoga Springs period were, in large part, a continuation of the developments that began during the end of the Late Archaic period. However, the Medieval Climatic Anomaly (MCA), a period of even more persistent drought, began by 1060 B.P., and conditions became significantly warmer and drier. These climatic changes were experienced throughout the western United States (Jones et al. 1999; Kennett and Kennett 2000), although the inland areas of cismontane Southern California may have been less affected than the desert interior. The MCA continued through the first 200 years of the Late Prehistoric Period until approximately 550 B.P. (Spaulding 2001).

Firm evidence of Saratoga Springs period occupation was documented at seven site components within the ESRP study area, while three other sites exhibit evidence of ephemeral use at this time. Six other localities within this area yielded either obsidian with hydration bands suggesting Saratoga Springs age or Saratoga Springs projectile points (a large triangular form which began to appear in the ESRP study area at this time), but these latter sites lack evidence of sustained use during this period (Goldberg et al. 2001). Those sites exhibiting firm evidence of Saratoga

Springs period occupation are seemingly marked by a reduction in the number of refuse deposits and, to a slightly lesser extent, thermal features (e.g., ovens, grills, hearths). Interestingly, when accounting for sample size, the frequency of artifact and tool stone caches was more than doubled during the Saratoga Springs period from the preceding Late Archaic, while the frequency of human remains reached the highest point of any time in the archaeological record. Midden deposits also appear for the first time during this period (Horne 2001). The focal shift of prehistoric activity from alluvial fan margins to mountain-front benches adjacent to permanent water sources, which was initiated during the Late Archaic, is also evidenced in Saratoga Springs site locations (Goldberg 2001).

It was anticipated that intensive use of the inland areas of cismontane Southern California during the MCA may have been curtailed altogether owing to inhospitable climate and concomitant decline in water and food sources. However, while land-use and procurement strategies experienced profound changes at this time, the response to deteriorating conditions was not abandonment of the inland areas but rather intensification. Apparently, climatic conditions of warming and drying that may have begun ca. 2100 B.P., toward the end of the Late Archaic, had already triggered an intensification process that established productive strategies for dealing with resource stress. With the onset of the MCA, those strategies were further refined and intensified (Goldberg 2001).

Characteristics of ground stone assemblages dating to the MCA demonstrate that plant foods were more important than in any other prehistoric period—plant processing intensified, and acorns apparently became an important staple (Klink 2001). The faunal assemblages also show that resource stress was accommodated with similar strategies by intensifying the use of lagomorphs and by further expanding diet breadth, adding animals (i.e. medium-sized carnivores) to the diet that were rarely consumed during other periods of prehistory (McKim 2001).

Throughout much of the California desert regions to the east, the Saratoga Springs period saw essentially a continuation of the Gypsum period subsistence adaptation. Unlike the preceding period, however, the Saratoga Springs period is marked by strong regional cultural developments, especially in the Southern California desert regions, which were heavily influenced by the Hakataya (Patayan) culture of the lower Colorado River area (Warren 1984:421–422). Specifically, turquoise mining and long-distance trade networks appear to have attracted both the Anasazi and Hakataya peoples into the California deserts from the east and southeast, respectively, as evidenced by the introduction of Buff and Brown Ware pottery and Cottonwood and Desert Side-notched projectile points. The initial date for the first Hakataya influence on the southern Mojave Desert remains unknown; however, it does appear that by about 1000–1100 B.P. the Mojave Sink was heavily influenced, if not occupied by, lower Colorado River peoples.

However, the onset of the MCA ca. 1060 B.P. led to the withdrawal of Native American populations from marginal desert areas to more reliable drought-resistant water sources such as the Colorado River and ancient Lake Cahuilla. The episodic presence of Lake Cahuilla, which was not climatically controlled but dependent upon natural discharges from the Colorado River, experienced at least two high stands (between 1010 and 740 cal B.P. and again between 740 and 580 cal B.P.) during the MCA (Waters 1983). The sporadic presence of ancient Lake Cahuilla provided an attractive resource base and was the impetus for the migrations of surrounding desert and inland groups into an otherwise xeric, inhospitable environment.

Recently, Sutton (2011) proposed that the proto-Cahuilla (Patayan) cultures occupying the Peninsular Range and northern Coachella Valley resulted from an eastward movement of Takic language groups of Yuman ethnicity from the inland valley areas of coastal Orange County and northern San Diego County (i.e., Phase I groups of the San Luis Rey Pattern of the Palomar Tradition). Sutton (2011:6) proposed that the impetus for this migration was the filling of Lake Cahuilla after ca. 1070 B.P. Sutton identifies this eastward movement of people, and the concomitant introduction of new technologies and ideas into the region, as Peninsular I, II, and III phases of the Palomar Tradition (Sutton 2011:1–74).

The Peninsular I phase, dating from ca. 900 to 750 B.P., reflects the initial movement of people into the northern Coachella Valley from the interior valleys as Lake Cahuilla filled; the establishment of major villages along the Lake Cahuilla shoreline; and the adoption of a lacustrine-based subsistence system. The arriving Peninsular I groups would have encountered existing Yuman (Patayan I) groups and either "absorbed or replaced them" (Sutton 2011:21). Material culture traits associated with Peninsular I groups include the introduction of Cottonwood (arrow) points, augmenting the existing bow and arrow technology (e.g., Desert Side-notched points) in the northern Coachella Valley; arrow shaft straighteners; the retention of existing Lower Colorado Buff Ware (LCB) pottery (Tumco Buff and Salton Buff); few stone ornaments and/or stone pipes; the appearance of shell ornaments; use of obsidian from the Coso Volcanic Field, Obsidian Butte, Bagdad, and unknown sources; bedrock milling slicks but few mortars and pestles; and addition of technology related to lacustrine-based adaptations. The principal mortuary practice of Peninsular I groups involved primary pit cremation (Sutton 2011:5, 21).

2.2.5 Late Prehistoric Period (ca. 750–410 B.P.)

The MCA extended into the Late Prehistoric period, ending about 550 B.P. At the end of the MCA, however, and lasting throughout the ensuing Protohistoric period (410–150 B.P.), a period of cooler temperatures and greater precipitation ushered in the Little Ice Age, during which time ecosystem productivity greatly increased along with the availability and predictability of water (Spaulding 2001).

It was during this period that Lake Cahuilla began to recede (Waters 1983). Groups associated with the Peninsular II phase of the Palomar Tradition in the northern Coachella Valley, dating from ca. 750 to 300 B.P., are thought to have been the proto-Cahuilla (Sutton 2011:5). Peninsular II is "proposed to reflect the changes in settlement and subsistence that were instituted to adapt to the fluctuations of Lake Cahuilla, prior to its 'final' desiccation" (Sutton 2011:42). Peninsular II material culture traits include the addition of Tizon Brown pottery, ceramic pipes, and a few ceramic figurines; increased usage of Tumco Buff and Salton Buff pottery in lakeshore sites; use of glass from the Coso Volcanic Field, Obsidian Butte, and some unknown sources; and the addition of stone fish traps along the fluctuating shoreline of Lake Cahuilla. Additionally, the Peninsular Funerary Complex (PFC) appeared during this phase, with secondary cremations placed in "containers" and the associated mourning ceremonies. The Peninsular II phase ended with the final desiccation of Lake Cahuilla about 300 B.P. (Sutton 2011:5, 42).

With the return of more mesic conditions after approximately 550 B.P., resulting in less resource stress, ESRP studies show that people returned to a less intensive semisedentary land-use strategy similar to that identified for the Late Archaic period. Evidence of intensive Late Prehistoric occupation occurs at five residential sites comprising 16 separate components. All of these coincide with sites that were occupied during earlier periods, and all are situated on elevated bedrock benches near active springs and overlook the valley floor (Goldberg 2001).

By segregating those components dating to the MCA from other Late Prehistoric components, the differences between land-use strategies for these periods can be demonstrated. The ESRP studies show that after the MCA there was a quite unexpected reduction in the number and frequency of refuse deposits as well as in fire-altered rock weight and midden development. The number and frequency of artifact and tool stone caches were also reduced, and hearth features were slightly more common. Rock art also first appeared in association with Late Prehistoric components which postdate the MCA. The decrease in the number of artifact and tool stone caches and the first appearance of rock art during this period suggest that residential sites may have been occupied year-round (Horne 2001).

It is possible that the changes in settlement patterns noted above are the result of reduced human populations due to introduced diseases and a corresponding consolidation of those populations into larger, but fewer, villages. Contact with early Euro-American explorers, beginning with the maritime voyages of Cabrillo in A.D. 1542–1543, undoubtedly had an effect on the native cultures. The effect may have been profound. Erlandson and Bartoy (1995), Erlandson et al. (2001), and Preston (2004) convincingly argue that Old World diseases substantially impacted native populations more than 200 years before Spanish occupation began in the 1770s. The appearance of rock art during this period in part may signal that native populations sought spiritual help in combating the diseases introduced by these early nonnative explorers.

2.2.6 Protohistoric Period (ca. 410–180 B.P.)

The ameliorated, productive conditions of the Little Ice Age continued throughout the Protohistoric period. Generally speaking, sedentism intensified with the formation of small but apparently fully sedentary villages. Increased hunting efficiency (through use of the bow and arrow) and widespread exploitation of acorns and other hard nuts and berries (indicated by the abundance of mortars and pestles) provided reliable and storable food resources. This, in turn, promoted greater sedentism. Related to this increase in resource utilization and sedentism are sites with deeper middens, suggesting central-based wandering or permanent habitation. These would have been the villages, or rancherías, noted by the early nonnative explorers (True 1966, 1970).

Within the ESRP study region, the most striking change in material culture in this period was the local manufacture of ceramic vessels and ceramic smoking pipes. Although pottery was known in the Colorado Desert as long ago as 800 B.P., ceramic technology in the ESRP study region first appears approximately 350 B.P. Also during this interval, abundant amounts of obsidian were imported into the region from the Obsidian Butte source exposed by the desiccation of Lake Cahuilla. In addition, Cottonwood Triangular points were supplemented by Desert Side-notched points (Goldberg et al. 2001; Sutton 2011). Late in this period, some European trade goods (i.e., glass trade beads) were added to the previous cultural assemblages (Meighan 1954).

Within the northern Coachella Valley, the Peninsular III phase, dating from ca. 300 to 150 B.P., represents the historic Cahuilla who were encountered by the first European explorers to visit the region. With the final desiccation of Lake Cahuilla, lacustrine-based subsistence strategies were abandoned in favor of terrestrial-based subsistence systems. Critical economic resources (e.g., cultigens) also may have been obtained from Yuman groups along the Colorado River and from Euro-Americans. Additionally, with the demise of the lake, Sutton (2011) proposes that some Peninsular III groups may have moved westward into the northern Peninsular Ranges, the San Jacinto Valley and Perris Plain, and/or into areas such as Anza-Borrego, Coyote Canyon, and the Little San Bernardino Mountains, bringing with them certain aspects of Yuman technology (i.e., Desert Side-notched points) that had not been present prior to that time (Sutton 2011:49). Cultural traits associated with the Peninsular III phase include continued use of Desert Side-notched and Cottonwood arrow points and Tizon Brown pottery; an absence of Tumco Buff and Salton Buff, and addition of Colorado Buff pottery; primary use of Obsidian Butte glass; the addition of new figurine types; and the introduction of Euro-American artifacts (e.g., glass beads and metal tools). Primary pit cremation once again became the preferred mortuary practice, with the retention of mourning ceremonies (Sutton 2011:5).

Based on work in the San Luis Rey River Basin in northern San Diego County, Meighan (1954), True (1970), and True et al. (1974, 1991) defined two Late Prehistoric/Protohistoric Period complexes that are worthy of mention. The San Luis Rey I Complex existed from approximately 600 to 250 B.P. and is typified by grinding implements, Cottonwood triangular projectile points, stone pendants, *Olivella* shell beads, quartz crystals, and bone tools. The San Luis Rey II Complex, lasting from about 250 to 150 B.P., is very similar but with the addition of ceramic vessels (including cremation urns), red and black pictographs, glass beads, metal knives, and steatite arrow straighteners. True and others (1974) believe that the San Luis Rey complexes developed out of the earlier La Jolla/Pauma cultural substratum and are the prehistoric antecedents to the historically known Luiseño (and Juaneño) Indians.

Recently, the San Luis Rey complexes have been subsumed under Phases I and II of the San Luis Rey Pattern of the Palomar Tradition defined by Sutton (2011), who proposes that Phase I of the San Luis Rey Pattern of the Palomar Tradition represents the southward movement or diffusion of “Californian” traits (e.g., the late artifact assemblages typically associated with the coast; see Meighan 1954:220, 224) of Angeles Pattern groups of the Del Rey Tradition from the Los Angeles Basin and into southern Orange County beginning about 1250 B.P. (Sutton 2010, 2011). These traits include bow and arrow technology (defined by the introduction of [Cottonwood] arrow points into the area), new rock art styles, new settlement and subsistence systems, and Takic languages. The adoption of these traits by pre-existing Encinitas Tradition groups (e.g., La Jolla III and Greven Knoll III) in these areas transformed them into San Luis Rey groups (Sutton 2011:4–6, 10).

If Sutton’s (2011) proposal that San Luis Rey Pattern groups from the coastal areas moved inland about 950 years ago to become the Peninsula Pattern groups occupying the northern Coachella Valley and the shorelines of Lake Cahuilla, it is probable that these migrating coastal groups moved through the San Jacinto Valley on their way east. And as noted above, Sutton also proposes that Peninsular III groups migrated back westward into the San Jacinto Valley and Perris Plain following the demise of Lake Cahuilla, bringing with them Yuman material culture traits such as Desert Side-notched arrow points.

It is of interest then that some of the major residential sites within the ESRP boundaries that evince both Late Prehistoric and Protohistoric components contain artifact assemblages that differ dramatically and appear to reflect separate occupations by more coastal-oriented (San Luis Rey Pattern) groups at one site, and more desert-oriented (Peninsular III Pattern) groups at another. This may reflect the initial journeys east by San Luis Rey Pattern groups and the return of Peninsular III groups to the inland valleys later in time.

For instance, CA-RIV-4627/H, a large residential site with extensive cultural deposits dating to the Late Prehistoric and Protohistoric periods, may have been occupied by Peninsular III groups. Both Cottonwood Triangular and Desert Side-notched arrow points are common and ceramic wares are abundant, but no marine shellfish remains were recovered (Robinson 2001b). On the other hand, Locus E of CA-RIV-4930 (the Maze Creek Site) a couple of miles farther west contains cultural deposits dating to the Late Prehistoric and Protohistoric periods that are more indicative of San Luis Rey Pattern groups—all arrow points are of the Cottonwood Triangular type and ceramics are exceedingly rare, but marine shellfish remains are abundant (McDougall 2001d).

2.3 ETHNOGRAPHIC SETTING

Archival and published reports suggest the Project area is situated within the traditional use territory of the Gabrielino Indians who, in turn, were bounded to the west by the Cahuilla, and to the southeast by the Juaneño (*Acjachemen*) and Luiseño. All of these cultural groups belonged to cultural nationalities speaking languages and dialects belonging to the Takic branch of the Cupan subgroup of the larger Northern Uto-Aztecan language stock (Bean 1978:576; Geiger and Meighan 1976:19). In the following sections, specific aspects of Gabrielino, Cahuilla, Juaneño, and Luiseño ethnography and ethnohistory are explored.

2.3.1 Gabrielino

During the protohistoric period, the Los Angeles Basin was inhabited by the Gabrielino people, a Takic language group belonging to the Northern Uto-Aztecan (or Shoshonean) language family that may have entered the Los Angeles Basin as recently as 1500 B.P. from the southern Great Basin or interior California deserts; it is also possible that the Gabrielino peoples migrated into the Los Angeles region in successive waves over a lengthy period of time beginning as early as 4000 B.P. (Kroeber 1925). However, Sutton (2010) recently proposed that the changes seen in archaeological manifestations (including settlement patterns, economic foci, and artifact types) along the coastal areas of Los Angeles County beginning around 3500 B.P. mark the arrival of Takic language groups that migrated from the southern San Joaquin Valley into the Los Angeles Basin at this time. Sutton proposes that this new tradition that replaced the pre-existing Encinitas Tradition (cf., Warren 1968; Sutton and Gardner 2010) ca. 3500 B.P. be named the Del Rey Tradition, and “represents the arrival, divergence, and development of the Gabrielino in Southern California” (Sutton and Gardner 2010:1).

The term Gabrielino refers to the Native American group historically associated with the Mission San Gabriel. The Gabrielino consist of a number of smaller bands, some of whom refer to themselves as “Tongva,” and others who refer to themselves as “Kizh.” Gabrielino speaker Mrs. James Vinyard Rosemeyer told anthropologist C. Hart Merriam that Gabrielino speakers referred to themselves as Tongva, and Merriam recorded the name (King 2011:5). McCawley (1996:9) states that Tongva was the term used by the Gabrielino living near Tejon; however, it also referred to a ranchería in the San Gabriel area. Today, some Gabrielino have chosen to be known as Tongva (McCawley 1996:10). Yet another name that has been reported for the Gabrielino is *Kizh* or *Kij*, perhaps derived from the word meaning "houses" (McCawley 1996:10; Stickel 2016). The latter term may refer specifically to Gabrielino living in the Whittier Narrows (McCawley 1996:10). A cursory review of the Gabrielino territory and their culture, prepared for the Metropolitan Water District's Headquarters Project in Los Angeles (Goldberg et al. 1999), is presented below. For a detailed review of the Gabrielino, the reader is referred to William McCawley's book *The First Angelinos* (1996).

It is believed that the total Gabrielino territory covered more than 1,500 square miles and included the watersheds of the Los Angeles River, San Gabriel River, Santa Ana River, and Rio Hondo. This region encompassed the coast from Malibu to Aliso Creek, parts of the Santa Monica Mountains, the San Fernando Valley, and the San Gabriel Valley. The Gabrielino also occupied the islands of Santa Catalina, San Clemente, and San Nicolas. Within this large territory were more than 50 residential communities with populations that ranged from approximately 50 to 150 individuals. Each community consisted of one or more lineages which maintained a permanent geographic territory that included a permanent settlement and a variety of hunting and gathering areas, as well as ritual sites. A typical Gabrielino settlement contained a variety of structures used for religious, residential, and recreational purposes. In the larger communities, a sacred enclosure surrounded by the houses of the chief and other members of the elite community was generally located near the center of the community. Surrounding these structures were the smaller homes occupied by the rest of community. Other features common at residential sites were sweathouses, and level clearings used as playing fields and dance grounds, as well as cemeteries (McCawley 1996:32–33).

Gabrielino territory offered a rich and diverse resource. Subsistence items described in ethnohistorical sources include large numbers of native grass seeds, six or more types of acorns, pinyon pine nuts, seeds and berries from various shrubs, fresh greens and shoots, mule deer, pronghorn, mountain sheep, rabbits and rodents, quail and waterfowl, snakes, lizards, insects, and freshwater fish, plus a wide variety of marine fish, shellfish, and sea mammals in coastal zones. This wealth of resources, coupled with an effective technology and a well-developed trade and ritual system, resulted in a society that was among one of the most materially wealthy and culturally sophisticated cultural groups in California (McCawley 1996:141). The management of food resources by the chief was the heart of the Gabrielino economy; a portion of each day's hunting, fishing, or gathered food resources was given to the chief who was responsible for managing the community's food reserves. Each family also kept a food supply for use in lean times.

The material culture of the Gabrielino is elaborate in many ways. An excellent descriptive source is Blackburn's (1963) compendium of Gabrielino material culture, which is intended for an archaeological audience and exhaustively summarizes Padre Geronimo Boscana's accounts of the Juaneño farther south in the vicinity of San Juan Capistrano (Boscana 1978), Hugo Reid's 1852 letters to the *Los Angeles Star* (Reid and Heizer 1968), and Harrington's early twentieth-century interviews (Harrington 1986), among a number of other sources. Shell ornaments and beads, baskets, bone tools, flint weapons and drills, fishhooks, mortars and pestles, wooden bowls and paddles, shell spoons, wooden war clubs, and a variety of steatite items (cooking vessels, comals, ornaments, etc.) are among the many artifact types common in descriptions of Gabrielino culture (Blackburn 1963). Highly developed artisanship is particularly evident in the many technomic implements inlaid with shell (using asphaltum) and in the steatite items from production centers on Catalina Island.

Trade was an important element of the Gabrielino economy. The principal trade commodity produced by the Gabrielino were steatite vessels from production centers on Catalina Island. Trade in steatite items was conducted throughout the local territory and involved external relations with cultural groups beyond Gabrielino borders, including the Cahuilla, Serrano, Luiseño, Chumash, and Mojave. Additionally, *Olivella* shell callus beads, manufactured on the northern Channel Islands by the Chumash and their predecessors, were reportedly used quite frequently as a currency by the Gabrielino and other Southern California groups, particularly in situations when bartering methods were inappropriate or ineffective.

In general, the Gabrielino cultivated alliances with other groups, including a Chumash-Salinan-Gabrielino alliance (Bean 1976:104), and also maintained cult or ritual centers (such as the village *Povongna*, presumed to be located in the vicinity of Long Beach) where trade fairs, mourning ceremonies, and other sorts of social and economic interaction linked villages of many environmental zones into exchange and social partnerships. Strong (1929:98) indicated that there was a "loose ceremonial union" among the Cahuilla, Luiseño, Serrano, and Gabrielino, manifested in gifts of shell money sent by all to leaders of clans in which a death had occurred. Blackburn (1976:240) notes that ceremonialism in general provided a context for far-ranging social interaction, especially between the Gabrielino and several neighboring groups, and resulted in strong unity against external enemies. However, Bean and Smith (1976:546) conclude that the Gabrielino peoples quarreled constantly among themselves and that intervillage conflict was frequent and deadly, although rarely extended. Marriage ties usually dictated affiliations during conflicts.

2.3.2 Cahuilla

A wealth of information exists regarding traditional and historic Cahuilla society and culture (Bean 1960, 1972, 1978; Bean and Bourgeault 1989; Bean and Lawton 1967; Bean and Saubel 1963, 1972; Bean and Vane 2001, 2003; Bean et al. 1981, 1991, 1995; Strong 1929). The following discussions are summarized primarily from descriptions of the Cahuilla culture provided by Lowell Bean (1978).

Ethnographically, Cahuilla territory spanned from the summit of the San Bernardino Mountains in the north to Borrego Springs and the Chocolate Mountains in the south, a portion of the Colorado Desert west of Orocopia Mountain to the east, the San Jacinto Plain as far as Riverside, and the eastern slopes of Palomar Mountain to the west (Bean 1978:575). Bean (1978:583) has estimated the total population of the three Cahuilla divisions—the Mountain, Pass, and Desert Divisions—at between 6,000 and 10,000 people at Spanish contact in the late eighteenth century. The Cahuilla occupied a topographically complex region that includes mountain ranges with elevations of 11,000 feet, to low desert at 273 feet below sea level, interspersed by passes, canyons, foothills, and valleys. Seasonal extremes in temperature, precipitation, and wind characterize the region.

The term Cahuilla is of uncertain origin; the language belongs to the Cupan subgroup of the Takic family of Northern Uto-Aztecan stock. Recently, Sutton (2011) proposed that the proto-Cahuilla cultures occupying the Peninsular Range and northern Coachella Valley resulted from an eastward movement of Takic language groups of Yuman ethnicity from the inland valley areas of coastal Orange County and northern San Diego County (i.e., Phase I groups of the San Luis Rey Pattern of the Palomar Tradition). Sutton (2011:6) proposed that the impetus for this migration was the filling of Lake Cahuilla after ca. 1070 B.P. Sutton identifies this eastward movement of people, and the concomitant introduction of new technologies and ideas into the region, as Peninsular I, II, and III phases of the Palomar Tradition (Sutton 2011:1–74).

The Cahuilla were grouped into clans or sibs that were organized on the basis of patrilineal descent (Bean 1978:580). Individuals related to a common male ancestor by descent through the male line belonged to the same clan, whether they were males or females. All Cahuilla clans, whether of the Mountain Cahuilla, Pass Cahuilla, or Desert Cahuilla divisions of this native language-culture group, belonged to one of two moiety divisions—Wildcat or Coyote. This moiety system regulated marriage, such that clans that belonged to the Coyote moiety division had to seek a spouse belonging to a clan belonging to the Wildcat moiety division.

For the Cahuilla, individual clans were led by a chief or *net*, who acted as both a political and ceremonial leader. The *net* had charge of the sacred house (dance house) and sacred bundle, *maswut*. This sacred bundle consisted of matting, originally of seagrass, which was wrapped around ritual paraphernalia and items sacred to the clan. This bundle was a sacred expression of the identity of the clan. It was kept in a special enclosure at the back of the sacred house, which also served as a dance house, and originally as a residence of the *net*. Among many clans, the *net* was assisted by a *Paha*, a ritual assistant or "master of ceremonies," also found among other Takic groups. This pattern of political and ritual "offices" is generally similar to that of the Serrano, Cupeño, and Luiseño. The individual lineages, however, lacked their own sacred bundle, sacred house, and *net*. Sometimes the individual lineages might live together to gather at a particular location, but sometimes they lived at separate named localities. Even if they lived separately, however, they were dependent on the *net*, or clan ritual and religious leader. As Strong (1929) pointed out, the *Pūalem*, the shamans or wizards of the Cahuilla, played an important role in Cahuilla culture but were not officers or political or ritual leaders of the individual clans. Their enterprise was individual rather than group-corporate (Bean 1972, 1978).

The Cahuilla were hunters, collectors, and harvesters. A diverse habitat provided an immense variety of floral resources, which the Cahuilla used for food, medicine, and manufacture of tools and shelter (Bean 1978:578). Acorns, screw beans, mesquite, pinon, cactus fruits, seeds, wild berries, tubers, roots, and greens were valuable food resources. Corn, beans, squash and melons from the Colorado River tribes were raised in garden plots by the Cahuilla. Hunting and butchering of meat were carried out by the men, while women did the cooking and the acorn and seed processing. Acorns and hard berries were pounded in stone mortars, while hard seeds were ground on stone metates. Softer foods, like honey mesquite, were pounded in wooden mortars. Various basket and pottery forms were used to process and cook plant foods. Stone lined pit ovens were used to cook yucca, agave, and tule-potatoes. Large granaries were constructed for storing acorns, and pottery ollas were used to store seeds. At ancient Lake Cahuilla in the Coachella Valley, periods of high lake stands brought Cahuilla from the mountain areas down to the valley floor to exploit the freshwater aquatic resources such as fish, shellfish, waterfowl, and shoreline vegetation (Wilke 1978:8, from Blake 1856:98).

Cahuilla pottery was manufactured by the coil method and paddle-and-anvil technique and was often painted or incised. Their pottery forms included cooking pots, ollas, bowls, dishes, and tobacco pipes. Basketry was produced by a stitched coil method, and forms included flat plates or trays for winnowing seeds, both shallow and deep baskets, conical baskets, and round flat bottom baskets, which were often decorated with cosmological motifs (Bean 1978:579). Arrow-shaft straighteners were made of soapstone and incised with designs that reflected ownership. Bows were made of willow or mesquite and were strung with mescal fiber or sinew. Ceremonial items included charmstones, bull-roars, clappers, rattles, feathered headdresses, wands, and eagle feather skirts and capes. Clothing included sandals made of mescal fiber, rabbit skin or other hide blankets, and skirts made of tule, or the soft inner bark of mesquite or cottonwood.

Tribal cosmology and history were recorded in Cahuilla songs, and “songs accompanied games, secular dances, shamanic activities, and hunting and food-gathering activities” (Bean 1978:580). Musical expression was primarily vocal, although instruments often accompanied the song and included one or more of the following: elder flutes, split-stick clappers, whistles, pan-pipes, bone flageolets, or rattles made of deer hooves, turtle shell, gourds, seashells, or dried cocoons. Games were also an important part of Cahuilla society, and wagers were often placed on the outcome of the game, such as a guessing game played by men, called *peon* (Bean 1978:580).

Cahuilla shelters were more often made of brush, although some were wattled and plastered with adobe mud. In prehistoric times, these shelters are believed to have been dome-shaped; during post-contact times they tended to be rectangular. The entryway into the shelter was usually covered with hides or woven mats, and one or more holes were left open at the roof peak for smoke to escape. Most of the Cahuilla’s domestic activities were performed outside within the shade of large, expansive ramadas. Within each village, the chief’s house was the largest and was usually next to the ceremonial house. Each village also had a men’s sweat house and several granaries (Bean 1978:578; Bean and Vane 2001:VI.D-1).

Some Cahuillas specialized as traders, with goods being transferred as far west as Catalina Island, and east to the Gila River (Bean 1978:582). Trade items included shell beads, steatite ornaments, asphaltum, food products, hides, furs, obsidian, turquoise, and salt. Within the Cahuilla territory, local craftsmen exchanged their wares among the group for services and goods.

The Cahuilla understand the universe in terms of power, and power, believed to be sentient and to have will, was assumed to be the principal causative agent for all phenomena, whether good or bad (Bean 1978:582). The presence of power was used to explain all unusual talents, events, or differences in the universe. Shamans, always male, were both revered and feared (Bean 1978:581). They could eat fire, cure illness, cause rain, increase food resources, keep away evil spirits, and some could even change shape into animals, or could kill a person instantly with supernatural power. A shaman’s status was often reaffirmed through public demonstration of his abilities. As power figures, they acted together with the *net* as community leaders. Another person of power was a diviner or dreamer, either male or female, who could foretell future events, find lost objects, and locate game and new food resources. A medicine doctor, often a woman, was not connected with supernatural power, but possessed great knowledge in the use of medicinal herbs and medical conditions.

The Cahuilla's creator-god, *múkat*, established the order of the world and how the dead should be cremated (Bean 1978:583). The elderly, through the story of *múkat*, attained privilege, power, and honor through wisdom and age. Elders, it was taught, are the repositories of knowledge and lore, which was especially important among the Cahuilla, who lived in a diverse and often harsh environment. The elderly were respected as teachers of the values and skills needed for a successful adult life.

Cahuilla were taught to share possessions, food, and capital within an enforced system of reciprocity (Bean 1978:583). Failure to reciprocate could be punishable by public ridicule. Lineages and clans shared harvesting and hunting areas in a reciprocal manner when there was a surplus of game or food. Following the teachings of *múkat*, Cahuilla children were taught to do things slowly, orderly, and deliberately, and to be aware of any possible ramifications for their actions.

Cahuilla rituals included the mourning ceremony, the eagle ceremony, birth, naming, adolescence, marriage, status changes, and performances to improve subsistence resources (Bean 1978:582). At the center of many of these rituals was the performance of songs that recorded the cosmology and history of Cahuilla tradition. Some song cycles could be very long and complex requiring several days to perform. These ceremonial songs were sung and taught to younger assistants by a ceremonial song leader. Dancers often accompanied the singers to enact mythical events. Marriages were arranged by the parents, and spouses were chosen that were unrelated by at least five generations, or sometimes crossed cultural boundaries between the Cahuilla and neighboring groups. Husbands were expected to be skilled in economic pursuit, while women were expected to work hard to produce food and bear children. Food and gifts were presented to the wife's family at the time of marriage, and afterwards she took residence within the husband's kin group. The birth of a child signified an economic and social alliance between the two families, and the reciprocal exchange of gifts and food. At death, a person's soul went to the land of the dead, to the east of the Cahuilla territory, where all others before went. Spirits could still pass messages to the living, "advising, sanctioning, and aiding those still on earth" (Bean 1978:582).

2.3.3 Juaneño (*Acjachemen*)

The term Juaneño refers to the indigenous peoples occupying the areas of coastal Orange and northern San Diego counties at the time of Spanish contact. The Spanish named these locally native groups after the nearby Mission San Juan Capistrano which was founded in 1776 to colonize the area. Belonging to the Takic language-speaking groups of the Cupan subgroup of the larger Northern Uto-Aztecan language family, the Juaneño are closely related linguistically to their southern neighbors, the Luiseño (a name applied by the Spanish to the indigenous people living in the area colonized by the Mission San Luis Rey), and were considered to speak a dialect of Luiseño. However, according to Strong (1929:275), "The native groups around the mission of San Juan Capistrano had such a distinct dialect that they have been designated in all the more recent literature as the Juaneño." Both Kroeber (1925) and Harrington (1933) also separated Juaneño and Luiseño on the basis of linguistic differences; however, later studies by R.C. White

(1963:91) "indicate that they are ethnologically and linguistically one ethnic nationality" (Bean and Shipek 1978:550). As such, descriptions of the Juaneño are often subsumed under the Luiseño culture by researchers when discussing the ethnographies of indigenous peoples of Southern California (c.f., Bean and Shipek 1978). Today, however, in an effort to decolonize their history, many contemporary Juaneño who identify as descendants of the indigenous society living in the local San Juan and San Mateo Creek drainage areas prefer the adopted indigenous term *Acjachemen* as their autonym.

Juaneño territory extends from Las Pulgas Creek in northern San Diego County up into the San Joaquin Hills along Orange County's central coast, and inland from the Pacific Ocean to the crest of the southern continuation of the Santa Ana Mountains. Aliso Creek formed the northern boundary. Most of the indigenous population occupied the outlets of San Juan Creek (and its major tributary, Trabuco Canyon) and San Mateo Creek (combined with Arroyo San Onofre, which drains into the ocean at the same location). The highest concentration of villages was along the lower stretches of San Juan Creek.

The Juaneño resided in permanent, well-defined villages and seasonal camps. Village populations ranged from between 35 and 300 inhabitants, consisting of a single lineage in the smaller villages, and of a dominant clan joined by other families in the larger settlements. The locations of residential structures in a village were not regulated; however, the ceremonial enclosure (*vanquish*) and the clan leader's home were most often centrally located. Each clan had its own territory for gathering economic resources and was politically independent. Ties to other clans and villages were maintained through economic, religious, and social networks (Wikipedia 2019).

Clan leadership consisted of the *Nota* (clan chief), who conducted community rites and regulated ceremonial activities in conjunction with a council of elders (*puuplem*), which consisted of lineage heads and ceremonial specialists. This governing body decided upon community matters, which were then carried out by the *Nota* and his underlings. Religious knowledge was secret, and the prevalent religion, *Chinigchinich*, placed village chiefs in the position of religious leaders and gave them broad power over their people (Wikipedia 2019)

It has been suggested that, based on their geographical location and distribution, the Juaneño may be descendants of the initial San Luis Rey Phase I groups of the Palomar Tradition, which represents the southward movement or diffusion of "Californian" traits (e.g., the late artifact assemblages typically associated with the coast; see Meighan 1954:220, 224) from the Los Angeles Basin and into southern Orange County beginning about 1250 B.P. (Sutton 2011). These traits include bow and arrow technology (defined by the introduction of [Cottonwood] arrow points into the area), new rock art styles, new settlement and subsistence systems, and Takic languages. The adoption of these traits by pre-existing Encinitas Tradition groups (e.g., La Jolla III and Greven Knoll III) in these areas transformed them into San Luis Rey groups (Sutton 2011:4–6, 10).

2.3.4 Luiseño

The term Luiseño originated as a descriptive name for the native peoples associated with Mission San Luis Rey and belonging to the Takic language-speaking groups of the Cupan subgroup of the larger Northern Uto-Aztecan language family. Luiseño territory included every ecological zone from the coastline to the mountains. In ethnographic times Luiseño territory encompassed a stretch of the California coast and included most of the drainage of the San Luis Rey and Santa Margarita rivers. Inland, Luiseño territory extended south from Santiago Peak, including the Elsinore and Temecula valleys, and farther south to Mount Palomar and the Lake Henshaw area, then west to the coast at Agua Hedionda Creek. From Agua Hedionda Creek their coastal territory extended north to Las Pulgas Canyon (Strong 1929:275, Map 7). Elders of the Pechanga Band of Luiseño Indians add that the Temecula/Pechanga people had usage/gathering rights to an area extending from Rawson Canyon on the east, over to Lake Mathews on the northwest, down to Temescal Canyon to Temecula, eastward to Aguanga, and then along the crest of the Cahuilla Range back to Rawson Canyon. However, the Luiseño *cultural landscape* also extended far beyond Luiseño territory to include mountains such as Cucamonga Peak and Mount Baldy to the north, landmarks like Mesa Grande to the south, the San Jacinto and Santa Rosa mountains to the east, and southern Channel Islands to the west.

It has been suggested that, based on their geographical location and distribution, the Luiseño are descendants of the initial San Luis Rey Phase I groups of the Palomar Tradition, which represents the southward movement or diffusion of "Californian" traits (e.g., the late artifact assemblages typically associated with the coast; see Meighan 1954:220, 224) from the Los Angeles Basin and into southern Orange County and northern San Diego County beginning about 1250 B.P. (Sutton 2011). These traits include bow and arrow technology (defined by the introduction of [Cottonwood] arrow points into the area), new rock art styles, new settlement and subsistence systems, and Takic languages. The adoption of these traits by pre-existing Encinitas Tradition groups (cf., Sutton and Gardner 2010; Warren 1968) in these areas transformed them into San Luis Rey groups (Sutton 2011:4–6, 10).

Luiseño social structure was severely disrupted by the mission system as early as the 1770s. The traces of any Luiseño moiety system that may have existed are indistinct but suggest a division into easterners (inland groups) and westerners (coastal groups) (Bean and Shipek 1978:550). Their population density is thought to have been greater than that of the Cahuilla, probably because they occupied a more favorable environment. Each village was occupied by a "clan tribelet—a group of people patrilineally related who owned an area in common and who were politically and economically autonomous from neighboring groups" (Bean and Shipek 1978:555). The clan tribelets, by the time anthropologists studied them, were composed of one major lineage who had a ceremonial head, a ceremonial house or enclosure (*wamkish*), a ceremonial bundle, and the remnants of other lineages. Settlements, occupied by one or more familial groups, were sometimes politically autonomous, but sometimes several villages were allied under one chief (or *noot*). The hereditary chiefs had religious, economic, and military power, and were role models for their people. They were assisted in their duties by one or more assistants. The chiefs and their families were the elites of the society, along with the very wealthy. The acquisition of wealth was important, but the acquisition of extreme wealth was prevented by the custom of burning or burying the possessions of the deceased.

The Luiseño were, for the most part, hunters, collectors, and harvesters. Their subsistence patterns can be attributed mostly to their environments. Clans were apt to own land in valley, foothill, and mountain areas, providing them with the resources of many different ecological niches. Villages were usually located in coves or canyons that offered some shelter from the sun and wind, featured a reliable water supply, and that was defensible. Settlement areas were surrounded by named places associated with food products, raw materials, or sacred beings. Hunting and gathering places were owned by individuals, families, the chief, or by the collective community (Bean and Shipek 1978:551). Eagle nests and certain clusters or groves of tobacco, cactus, oaks, or other sources of food and medicine were guarded and owned by individuals. Collecting outside of one's area could only be done with permission of the owner, and failure to do so could result in physical combat or sorcery against one another. Most food resources were gathered within close proximity to the village, but during certain seasons the family group would move to the coast for marine resources or into the mountains for acorns and deer.

Game animals included deer, cottontail rabbit, jackrabbit, woodrat, mice, ground squirrels, antelope, quail, doves, ducks, and other birds. Tree squirrels, most reptiles, and predators were avoided as food resources, except possibly during lean times. As in most of California, acorns were a major staple, but the roots, leaves, seeds, and fruit of many other plants also were used. Insects were also available as food resources. Roots and shoots of various types were gathered from marshes and wetlands. Seeds from various grasses and scrub plants also played an important role in the aboriginal diet and were available for harvest from summer through fall. Certain mushrooms and tree fungi supplemented the diet and were considered delicacies. Teas were made from a variety of floral resources and were used for medicinal cures as well as for beverages. Tobacco and datura were sacred plants used for rituals and medicine. Fire was used as a crop-management technique and for communal rabbit drives (Bean and Shipek 1978:552).

To gather these food resources and to prepare them for eating, the Luiseño had an extensive inventory of equipment. The throwing stick and bow and arrow were the most important hunting tools for killing game, but snares, traps, slings, decoys, disguises, and hunting blinds also were part of the hunting technology. Many villages had access to creeks and rivers, and nets, traps, spears, hooks and lines, and poisons were used to catch fish. Gathering required few tools: poles for shaking pine nuts and acorns from the trees, cactus pickers, chia hooks, seed beaters, digging sticks and weights for digging sticks, and pry bars (Bean and Shipek 1978:552–553).

Food was usually stored in large storage baskets. Pottery ollas and baskets treated with asphaltum also were used to store and carry water and seeds. Wood, clay, and steatite were used to make jars, bowls, and trays. Skin and woven grass were used to make bags. Food processing required hammers and anvils for cracking nuts; mortars and pestles for grinding acorns and other hard nuts and berries; manos and metates for grinding seeds and berries; winnowing baskets; strainers; leaching baskets and bowls; cutting implements made of stone, bone, and wood. Basket mortars, made by using asphaltum to attach an open-bottomed basket to a mortar, were important for food processing. Food was served in wooden and gourd dishes and cups and in basket bowls that were sometimes tarred. Wood, shell, and horn were used for spoons (Bean and Shipek 1978:553).

Most Luiseño houses were conical and partially subterranean; however, during the nineteenth century some Luiseño had rectangular houses. The dwellings were made of locally available material, such as reeds, brush, or bark. Occupants entered using a door at the side of the shelter, which was sometimes accessed through a short tunnel. Smoke from a central fireplace rose through a central hole in the roof. Domestic chores, such as cooking, eating, and social interaction often occurred under a brush-covered ramada that stood near the house. Earth-covered sweat houses for purification and curing rituals, ceremonial houses with fenced areas, and granaries for food storage were found in most villages (Bean and Shipek 1978:553; Bean and Vane 2001:VI. D-5).

The various life cycles of the Luiseño, including birth, puberty, marriage, and death were celebrated in ritual. At birth, the child was confirmed to the group and the patrilineage (Bean and Shipek 1978:556). Girls and boys were initiated in puberty rituals, which taught them about supernatural beings, the rules of behavior, and explained how their actions would be governed through adulthood. The boys' ceremony included the drinking of *toloache*, which induced visions, followed by dancing and the teaching of songs and rituals. The girls' ceremony included instruction for maintaining a household and preparation for marriage, rock paintings, and a "roasting ceremony" that included placing the young girl in a bed of warm sand to prepare her for childbearing. Girls were married shortly after their puberty ceremony. Marriages were arranged by the parents to ensure that the two were not closely related, and to form alliances between groups. Marriage ceremonies included a bride-price, after which the couple resided with the husband's lineage. Death rituals were surrounded by purification, from washing one's clothes to smoking and incense. The mourning ritual was attended by close relatives as well as related clans. An image-burning ceremony was held to commemorate the death of an individual, and was considered the last of the rites, ending formal mourning after a period of time. During the ceremony an image of the person was burned to signify their passing, followed by a feast and presentation of gifts to guests. To commemorate the death of a chief, an eagle was killed (Bean and Shipek 1978:556).

Among the Luiseño, rituals played a role in governing hunting, harvest, warfare, and all other major activities of village life. Many rituals were connected with the *Chinigchinich* cult among the Luiseño. A great deal is known about this religion because Father Boscana of Mission San Juan Capistrano recorded what he knew of it in 1828 (Boscana 1978). The *Chinigchinich* religion may have originated as recently as the late eighteenth century. This religion originated among the Gabrielino to the north in the appearance of a second deity at the village of *Puvu*, the birthplace of *Wiyot*, one of the first creators who established the order of the world in Luiseño cosmology. It then spread southward to the Luiseño, and then to some of the Hokan language groups of present-day San Diego County. *Chinigchinich* was an avenging god, whose animal helpers, such as eagles, hawks, ravens, and rattlesnakes, kept watch to see that people obeyed *Chinigchinich*'s rules and instructions for proper living, and avenged transgressions. Shamans and boys undergoing puberty rites drank infusions of toloache made from the datura plant in order to gain supernatural power. Sand paintings were a significant component of the *Chinigchinich* religion, and although utilized by several Southern California groups, they are best documented among the Luiseño. They were made at boys' and girls' initiations, at the death of cult members, and were constructed to include various elements used in the ritual to which it pertained. Once the ritual was completed, the sand painting was destroyed (Bean and Shipek 1978:556).

2.4 HISTORICAL SETTNG

The history of the Project vicinity and surrounding region provides a context for understanding local settlement from the time that Spanish explorers first laid claim to the territory, to the development of the modern urban landscape. Context is the basis for the identification of the historic site types constructed, and the evaluation of their significance as historic properties.

Today, as it was in the past, the Santa Ana River Canyon is important in Southern California for its geographical position as an important travel corridor and resource procurement including water and still-open land. From the era of Spanish exploration and colonization in California to the present, the history of the area relates to themes involving the development of the West, transportation, water conveyance and control, farming and ranching, and outdoor leisure pursuits in the twentieth century to today. These themes are discussed below as they related to the Project area.

2.4.1 California History

Euro-American historical development of California began in 1769 with the Spanish occupation of Alta California and the founding of the *San Diego de Alcala* mission in San Diego when written records began to be compiled. The following historic context was taken primarily from Clark and Smallwood (2015).

Exploration of the California coast in the sixteenth and seventeenth centuries was the basis for the Spanish claim to the region. In the eighteenth century, Spain recognized that to strengthen its claim, it would have to settle Alta California to preclude encroachment by Russians and British merchants. In the latter half of the eighteenth century, Spain and the Franciscan Order of the Catholic Church founded a series of presidios, or military camps, and missions along the California coast, beginning at San Diego in 1769. In 1796, Father Juan Santiago explored the Temescal Valley, east of the Santa Ana Mountains in Riverside County and west of today's Lake Mathews, in an attempt to find a location for an inland *asistencia* for the mission at San Juan Capistrano. *Asistencias* and mission ranchos were established to further the influence of the Catholic Church and the Missions by using vast lands in the interior for cattle ranching, operated by Mexican and Indian rancheros, and thereby creating a self-sustaining resource base to support the Mission population.

Following independence in 1821, Mexico opened the ports of San Diego and Monterey to foreign trade (Crouch et al. 1982:200). American ships docked at California ports to purchase tallow and hides. The vast landholdings (ranchos) of the Catholic Church were to be returned to indigenous populations, but, in reality, were divided and granted to soldiers, political supporters, and wealthy elites by the various Mexican governors who ruled Alta California. The nearest of these to the Project area were the Rancho Cañón de Santa Ana, Rancho La Sierra (Yorba), and Rancho El Rincon. Soon Americans began to arrive in California, a limited number becoming citizens and owners of large ranchos.

With the signing of the Treaty of Guadalupe-Hidalgo on February 2, 1848, California had formally become an American territory, and two years later, on September 9, 1850, California became the thirty-first state in the Union. Between those two years came a large influx of Americans seeking their fortunes; one catalyst for this influx was James Marshall's 1848 discovery of gold at Sutter's Mill (Starr 2005). The population and wealth in the early statehood years were concentrated in the northern part of the state, although the burgeoning pueblo of Los Angeles because a supply port for the goldfields. Ranching was the main occupation in the southern counties but the flood and drought of the 1860s brought that era to a close. The completion of the transcontinental railroad shortly thereafter (in 1869) opened California to American settlement.

In the 1860s Southern California was promoted as an ideal agricultural area, with fertile soil and a mild climate. Books on California painted beautiful pictures that appealed to both Americans and Europeans. There were three land booms tied to railroad construction: (1) after the transcontinental railroad was completed, enabling easy travel to California; (2) late 1870s after the Southern Pacific was completed; and, (3) 1886–1888, when the Santa Fe transcontinental line was completed. Competition between the lines incited a rate war, and both tourists and potential settlers took advantage of the low fares to come to California (Lech 2004:222).

2.4.2 Local History: The Santa Ana River Canyon

In the Spanish-era, the Santa Ana River Canyon was utilized as a travel corridor between the coast and the inland regions of California, following Native American routes through the area. The Rancho-era brought more settlers into the area, and the history of this period into early California statehood had significant impacts on the region that left imprints that stills exist today. The most lasting early imprint on the Project area was the land grants issued to the Yorba family. The accumulation of these land grants for the larger Yorba family was to support cattle ranching which was the single most important industry during this period and required large land holdings for success. In 1810, California Governor Jose Joaquin de Arillaga granted Jose Antonio Yorba (and his nephew Pablo Peralta) the land for Rancho Santiago de Santa Ana in present day Orange County. Originally from Spain, Yorba had been a corporal under Gaspar de Portola in Spain’s 1769 expedition to explore and settle Alta California. Yorbas’s ranch encompassed what is today, Santa Ana, Orange, Villa Park, Anaheim Hills, El Modena, Tustin, Costa Mesa, and parts of Irvine. Despite the largess of these holdings, expanding cattle herds required that Yorba’s sons seek pastureland farther east, and in 1834, Bernardo Yorba, Jose’s son, was granted the lands known as Rancho Cañón de Santa Ana that included present-day Yorba Linda. The Yorbas continued to grow their herds, and increased their pasture requiring Bernardo and his brother Tomas to push farther east into an area they called La Sierra or La Sierra de Santa Ana. When Tomas Yorba died in 1845, Bernardo applied to be granted the La Sierra lands, but Tomas’s widow, Maria Vincenta Sepulveda had also applied for a land grant of the area. In June 1846, Governor Pio Pico granted the lands of Rancho La Sierra to both parties, splitting the area into two parcels. Sepulveda was awarded the eastern portion (17,774 acres) and the portion that encompasses most of the Project area is within the western portion (17,769 acres) granted to Yorba.

In 1848, after California was awarded to the United States government following the war with Mexico, the Treaty of Guadalupe Hidalgo contained assurances the Californios land grants would be honored. After American succession in the early 1850s, Bernardo Yorba applied for ownership to all three ranchos. His patent for Rancho Cañón de Santa Ana was granted in 1866, La Sierra in 1875, and Rincon in 1879. In 1850, Rancho La Sierra, the former rancho that encompasses most of the Project area, was part of Los Angeles County. By the time the land claim was finally settled, the property was part of San Bernardino County. In 1893, Rancho La Sierra became part of the newly formed Riverside County that had been carved from lands from both San Diego and San Bernardino counties (Lech 2004:46–47). Today this area is still geographically complicated, lying at the convergence of the three counties of Orange, San Bernardino, and Riverside counties.

In 1858, in the midst of the land patent insecurity under American rule, Bernardo Yorba died leaving behind a large and prosperous rancho to his numerous children who were able to sustain the costly years of litigation with the Board of Land Commissioners that forced sale of many other former rancho lands. In 1877, after the land patent was finally confirmed, a partition amongst Yorba's heirs of Rancho La Sierra was approved by the 17th Judicial District of California. The area that encompasses the Project area was awarded to Yorba's daughter, Maria Jesus Y. de Scully (Figure 2-1) (State of California 1877; Lech 2004:46–47).

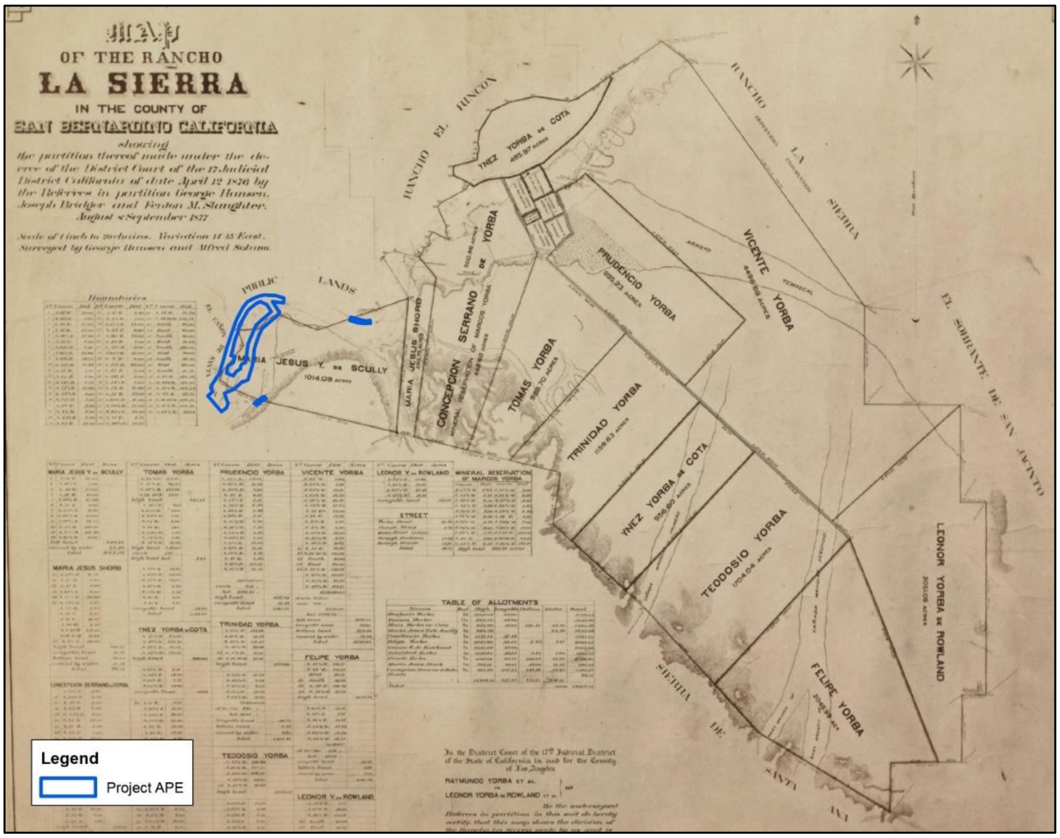

Figure 2-1 **Project area superimposed over the partition map of Rancho La Sierra (1877) showing Maria Jesus Y. de Scully's allotment (The Huntington Library 1877).**

Maria Jesus Yorba married Thomas J. Scully, her second husband, and they had six children (Davila 1893; United States Federal Census 1870). Scully, who spoke several languages including French and Spanish, had first immigrated to Canada where he earned a teaching credential. In 1851, he migrated to Los Angeles, and was the first English-speaking teacher to work in the local school system. Bernardo Yorba convinced Scully to come to work for him as a teacher on his rancho, and it was there that he met and married Yorba's daughter Maria (Desborough 1981). It is unclear how long they continued to live on Bernardo Yorba's rancho, but records indicate that after her inheritance, the Scully family established a ranch and home that was in the Project area on what is now the property primarily operated as the Green River Golf Course (Desborough 1981; State of California 1877; USGS 1902, 2018; UCSB 1931).

The Scully Ranch site was described in 1858 in a study prepared for the U.S. Army Corps of Engineers in anticipation of improvements to the flood control system of the Santa Ana River Canyon. The report noted that the ranch had included orange groves located in a cul-de-sac on the north side of the Santa Ana River and north of the what is now the Green River Golf Course. The report additionally described that the main house (a two-story structure that was no longer extant) had been located on a knoll surrounded by orchards, between the south side of the railroad right-of-way and the river (Langenwalter and Brock 1985:8-110–8-111). A long-time area resident, Christina Desborough, in her memoirs explained the house was remote and only accessible by fording the river or crossing a footbridge, and that few people had seen the property (Figure 2-2) (Desborough 1981; Langenwalter and Brock 1985:8-110–8-111). Today the hill behind the site as well as a local trail, still bears the name Scully, and the approximate area where the ranch complex was located is colloquially called Scully Point (Figure 2-3) (Desborough 1981; Langenwalter and Brock1985:8-110–111; USGS 2018).

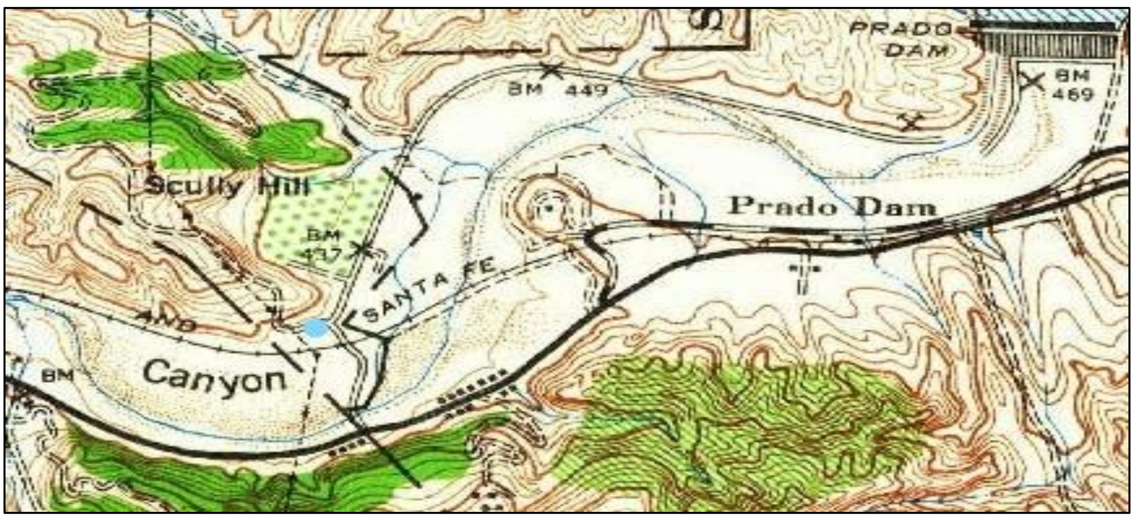

Figure 2-2 1942 Map of the Santa Ana Canyon. Approximate location of the Scully Ranch is noted by a blue dot. You can see nearby Scully Hill, ostensibly named for the Scully Rancho, where an orchard was still present at the time the map was made in the early 1940s (USGS 1942).

San Bernardino would eventually eclipse Colton as a railroad hub, after the Santa Fe Railroad purchased the Southern Pacific line from Mojave to Needles. The Santa Fe then purchased the line over the Cajon Pass and laid rail into San Bernardino in 1884 (Hampson et al. 1988:40; Sterner and Bischoff 2001:8–9, 20–24). In 1887, the Santa Fe Railroad completed the California Southern Line through Santa Ana River Canyon. The line ran from Corona, through Prado, following the north bank of the Santa Ana River into the canyon, and through the Scully Ranch. Records indicate that the Scully Ranch was a railway stop along this line through 1938 (Figures 2-4 and 2-5) (Ferguson 2017; USGS 1933).

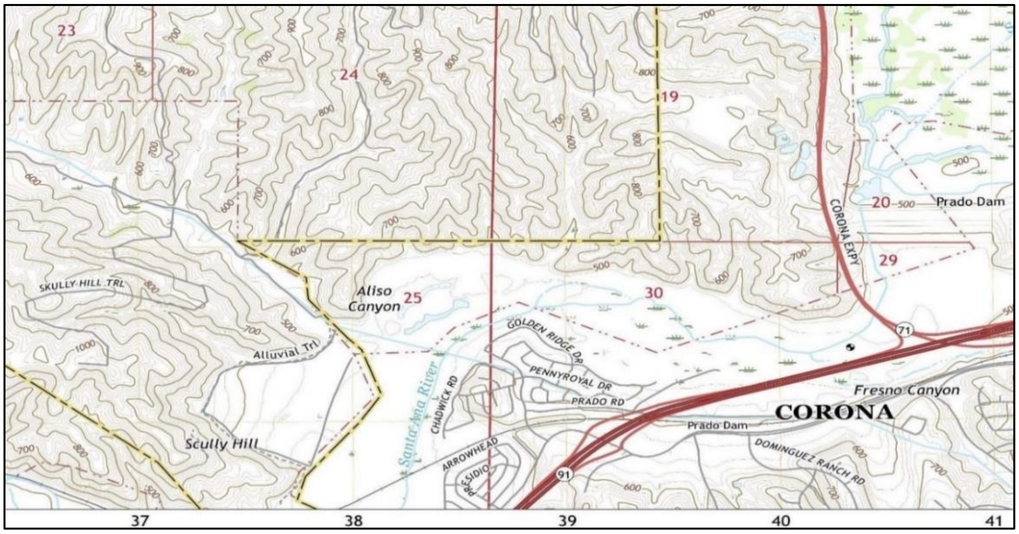

Figure 2-3 **2018 USGS Topo Map showing Scully Hill and Scully Hill Trail in the general Project area (USGS 2018).**

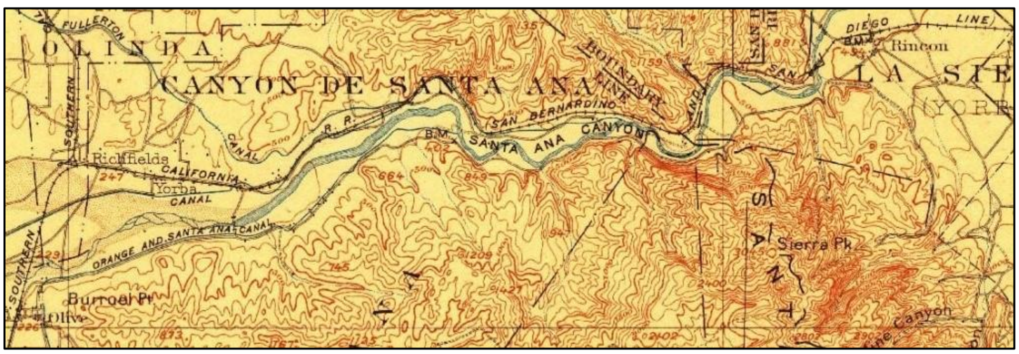

Figure 2-4 **1902 USGS map showing the Southern California Railroad line through the Project area (USGS 1902).**

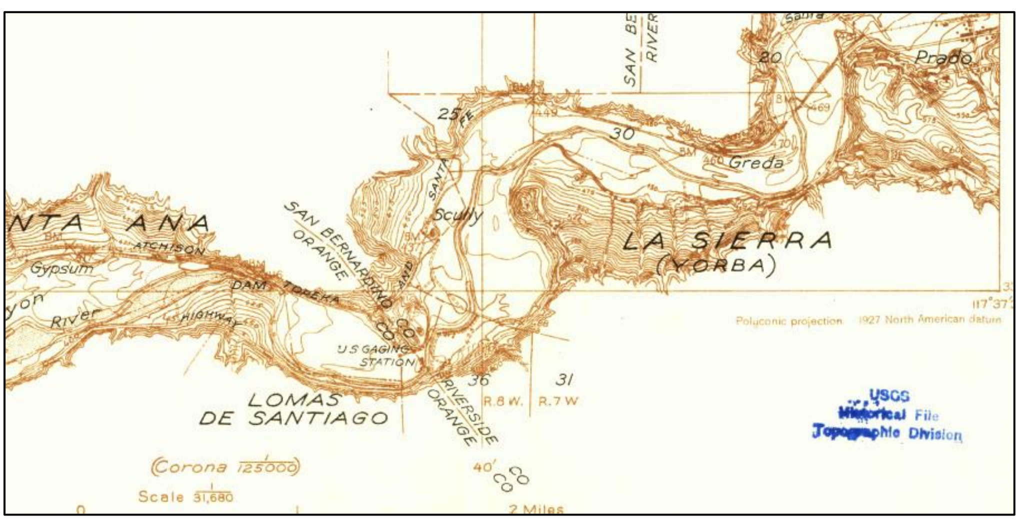

Figure 2-5 **1933 Map of the Santa Ana Canyon showing the now ATSF Railroad stops in the vicinity of the Project area. From upstream at Prado, to Greda, Scully, and Gypsum farther downstream (Ferguson 2017; USGS 1933).**

As a result of the railroad, several new towns in the Project area emerged, although many faded just as quickly. Unlike the earliest settlements in the Prado Basin, for example, the settlement of Chino emerged and thrived. New arrivals began buying up portions of the old ranchos or began homesteading on whatever land was available. In the 1890s, against the backdrop of traditional dry-farming "ranch" holdings based on stock grazing and grain and hay cultivation, citrus and other orchard production were promoted as heralding a new era of small-scale "family farming" in Southern California. The price conditions of specialty markets for these crops were touted as favorable enough to tide the small producer over the shoals of irrigation capitalization and orchard maturation. Yet the prospective "family farmer" had to bring considerable capital to such an enterprise. During this period, the Scully Ranch was already well under operation under the management of Thomas Scully, Jr. who had inherited the ranch after the death of his father in 1895. Scully, Jr. appears to have joined the new and booming local citrus farming industry (Desborough 1981; United States Federal Census 1900).

Along with land for grazing and farming, water was a prime resource of the Santa Ana River Canyon, and irrigation downstream had a profound impact upon the canyon and the river itself. The Anaheim Water Company was formed as early as 1859 and soon thereafter had begun to irrigate lands downstream of the canyon; water was diverted for the growing population centers in Orange County. The company acquired water rights owned by the German colony of Anaheim, which had been established in 1857. In 1877, the Santa Ana Valley Irrigation Company (SAVIC) was formed and began diverting water from the river near Horseshoe Bend. This company was formed as the result of the breakup of the Rancho Santiago de Santa Ana, with Alfred Beck Chapman and Andrew Glassell receiving large portions of the rancho. The SAVIC expanded one of the rancho's irrigation ditches, providing water to the city of Orange (Sterner and Bischoff 2001:19–28).

In 1884, the Anaheim Water Company merged with the Cajon Irrigation Company and was re-organized as the Anaheim Union Water Company (AUWC) (Hatheway and Zimmerman 1989:23, 24). Another owner of sizable tracts of land in the canyon was the Santa Ana River Development Company (SARDC). It was this company that owned the land on which large portions of the Green River Camp/Alta Vista, part of which previously existed within the Project area, would be established.

The importance and complications of water, water rights and control in Southern California led inevitably to conflicts that required local, state, and federal intervention to resolve. The first definitive study of water use and facilities was completed in 1888 by the State of California Department of Engineering. An irrigation map drawn for this study showed the primary water-conveyance systems built by local families in the Santa Ana Canyon region. The fact that the State prepared such a document emphasizes the importance of local water resources in the 1880s and evidenced to local and state officials the need to establish the legal rights and rights of control over water source conveyances. Water rights issues became a matter for tri-county planning, and efforts to control the Santa Ana River began with the formation of the Water Conservation Association in 1909 and involved representatives from all three counties who had a stake in the canyon. These coordinated efforts resulted in some federal government assistance; the Association subsequently built numerous dikes and ditches to control flooding.

The Orange County connection had begun in the basin when the Santa Ana Irrigation and Anaheim Union Water companies purchased the local Durkee Ranch in 1899. By the 1920s, Orange County controlled the majority of the river frontage and riparian rights in the Prado vicinity. By 1925, after severe flooding in 1916, Orange County decided the greater efforts were needed to manage flood control and water storage. A new study concluded that the most effective measure of flood control and water storage would be a large reservoir at the upper end of the Santa Ana Canyon. Other agency reports came to similar conclusions, and only delays due to the Great Depression slowed down the process. After litigation over land and water, and the initiation of the project under New Deal legislation, and following severe flooding in 1938, the Prado Dam was built. At the time of its completion in 1941, the earthen and rock-fill Prado Dam was unprecedented in the annals of hydraulic engineering in Southern California. During more than 20 years of cooperative effort from project inception to completion, a county agency (Orange) purchased more than 4,500 acres in neighboring counties, removed a town, a railroad, and a highway, and conducted a series of engineering studies which led to the actual construction of this water conveyance and flood control system. By the mid-century, the investment had prevented millions in flood damages, but it also impacted urbanization in the region. The construction of the dam ultimately resulted in the abandonment of the land in the canyon except for recreation, agriculture, or local and water management purposes (Greenwood and Foster 1990:56–60).

While population density did decrease after the Prado Dam was built in 1939–1941, it had never been very high due to the difficulties of travel through the canyon. Before the 1920s, most of the interest in the canyon was for irrigation downstream and for some intrepid motorists and vacationers willing to navigate the still-dirt, windy road (Sterner and Bischoff 2001:21–22). Although California passed the State Highways Act in 1909, there were few large-scale road construction projects in this portion of the basin. Bonds were issued as a part of the State Highways Act, and for the most part, each county was responsible for building and maintaining its own roads. Soon after passage of the act, Riverside County passed a road bond issue, appointing a county highway commission to establish a county road plan. During 1913 and 1914, the Santa Ana Canyon Road was covered in oil macadam, having previously been nothing more than a graded dirt road (Sterner and Bischoff 2001:21–24; U.S. Bureau of Public Roads 1920). In 1918, the Santa Ana Canyon Road—at least the section between the Riverside-Orange County line and Sulphur Slide (located a few miles down the canyon, immediately downstream of Gypsum Canyon)—was paved for the first time. In 1816, Thomas Scully Jr. contested plans for the paved county road through the canyon that would cross his property (Riverside Daily Press 1916). Initially, Scully Jr. had refused Riverside County's offer to purchase the land for the right-of-way that would allow them to complete construction and paving of the highway through the canyon on a more direct and less steep route. Subsequently, the county took the case to court, attempting to have the property condemned. The case was settled in Superior Court, and in exchange for a monetary settlement and an agreement to build a right-of-way and culvert to the Scully Ranch, the court was granted the land for the road (Riverside Daily Press 1916). By 1920, the local road system connected Orange County to Riverside through the Santa Ana Canyon, and by the end of the 1920s, the county highway through the canyon was widened (Sterner and Bischoff 2001:22). By the 1930s, road improvements in the canyon were making the area more accessible for travel and recreation. In 1935, the county highway, Santa Ana Canyon Road, was acquired by the State of California. The highway was subsequently widened, and due to the proposed construction of the Prado Dam, the highway was realigned in spots to be above flood water levels. At this time, it most likely was signed as State Highway 18. At the same time, the Atchison, Topeka and Santa Fe (ATSF) Railway line was also rerouted to accommodate the construction of the Prado Dam (Figure 2-6).

Figure 2-6 1939 Aerial Photograph of the Project area after the severe flooding episode of 1938. Note the new alignment of the ATSF line to its current route and the updated alignment of the newly signed, State Highway 18 (UCSB 1939).

Although it is poorly documented, the highway through the canyon had major changes in the following decade of the 1940s. Due to the increasing importance of the canyon as a travel corridor, Caltrans decided to upgrade the highway, and by the end of the decade, this effort was well underway, and the route was identified as State Route 91 (SR 91). In the decade of the 1950s, expansion of SR 91 was begun and by 1971, an eight-lane freeway had replaced the old highway. In 1995, carpool lanes were added in both directions to accommodate the increased level of use of the canyon as a link between Orange County and the Inland Empire (Sterner and Bischoff 2001:29–35).

Even when travel through the Santa Ana Canyon was more difficult and time consuming, the area was a popular outdoor spot for people seeking respite from the more urban areas of Orange County and the Inland Empire. Sometime in the years between 1910–1920, when access to most of the canyon was via dirt roads, a hamlet called Alta Vista or Green River Camp developed first with seasonal cabins expanding to a more permanent settlement that catered to travelers. The community was present in 1939, when the area was surveyed for the 1941 Prado Quadrangle map, and included 22 residences on the south side of the river, away from the highway, and 14 near the road, and 2 more on the north side of the river (Sterner and Bischoff 2001:1). The archival record for this hamlet is sparse and often conflicting. Records indicate it may have been a planned community laid out by the Irvine and Anaheim Land and Water Company in 1920. Another source claims the community was an unsuccessful resort laid out by land promoters in 1910. However, the community does not show up on a 1925 map. The town does show up on a 1951 Forest Service map, on the south side of the river, and next to the highway. While a few cabins were noted as still extant in the mid-1960s, the bulk of the site was destroyed during the building of the Green River Golf Course in the mid to late 1950s and 1960s, and what remained was mostly removed during construction of SR 91 (Gibson et al. 2014:21; Sterner and Bischoff 2001:19).

By the post-World War II, mid-twentieth-century era, a trip to the Santa Ana Canyon may not have provided nature seekers with untouched wilderness. However, in comparison to the bustling and fast-growing urban centers, it did still offer a parklike setting within which to relax. In the post-war era when a return to outdoor pursuits was part of the cultural zeitgeist, what would be more appropriate than a new golf course along the river. In 1957, The Green River Golf Course was conceived and built as a public course accessible to all; today it still retains its middle-class roots, as noted in a 2013 Orange County Register article as “Green River Golf’s blue-collar beauty” (Figure 2-7) (Langhorne 2013; Parra 1976:166).

Figure 2-7 Aerial View of Green River Golf Course in current, 18-hole configuration (Google Earth 2019).

Bickler and Joslyn, the owners and builders of the original course were golfers and were both solidly middle-class; Bickler was an entertainment specialist/caterer and Josyln a farmer with a successful orchard. They lived locally during the post-war population explosion in Orange County; an era when outdoor entertainment pursuits were booming. At the suggestion of family, and during this time of optimism and prosperity in Southern California, the men decided to pursue their dream of building a public golf course. They formed Bicklyn, Inc., and sought affordable land for the site. They were able to secure a reasonably priced 50-year lease from the Santa Ana River Development Company due to the risk of flooding in the Santa Ana River

Canyon. The business was an immediate success. Aside from outdoor sports, the Green River Golf Course offered camaraderie at the men's golf club, and eventually an active senior's club, both of which survive to this day (Bill Oliver, personal communication 2019; Parra 1976:166). The current Project, the segment of the Santa Ana River Trail through the Green River Golf Club, continues this tradition as a connecting corridor between Orange County and the Inland Empire, but also as a site of respite along the river, and away from the city. It is still, primarily a blue-collar golf course.

3
SOURCES CONSULTED

3.1 CULTURAL RESOURCE LITERATURE AND RECORDS SEARCH

On May 31, 2019, prior to the field survey of the Project area, Æ engaged the Eastern Information Center (EIC), housed at the University of California, Riverside, and the South Central Coastal Information Center (SCCIC), housed at California State University, Fullerton, to complete an archaeological literature and records search. The objective of this records search was to determine whether any prehistoric or historical cultural resources had been recorded previously within the Project area plus a 1-mile-wide buffer (Study Area). The records search indicated 70 cultural resource studies have been conducted previously; 11 of these involved portions of the Project area (Table 3-1). Approximately 90 percent of the Project area has been surveyed as a result of these studies.

Table 3-1
Previous Cultural Resource Studies in the Study Area

Author(s)	Date	SCCIC/EIC Reference #	Title
Cottrell, Marie G.	1978	OR-00245	Report of Archaeological Resource Assessment Conducted in Coal Canyon
Leonard, Nelson N. III and Mathew C. Hall	1975	OR-00270	Description and Evaluation of Cultural Resources Within the US Army Corps of Engineers' Santa Ana River Project
Schroth, Adella	1979	OR-00305	The History of Archaeological Research on Irvine Ranch Property: the Evolution of a Company Tradition
Greenwood, Roberta S.	1980	OR-00594	Cultural Resource Overview for the Serrano Substation to the Mira Loma Substation Transmission Route Alternatives Corridor Right-of-way
McCarthy, Daniel F.	1983	OR-00695	An Archaeological Assessment of Sky Island Estates, Santa Ana Canyon Area of Orange and Riverside Counties, California
Anonymous	1983	OR-00759	Cultural Resources Survey Report on an Approximate 600 Acre Portion of the Bryant Ranch
Lagenwalter, Paul E. and James Brock	1985	OR-00801	Phase II Archaeological Studies Prado Basin and the Lower Santa Ana River
Rosenthal, Jane	1987	OR-00860	Cultural / Scientific Resources Report for the Proposed Long Term Jail Sites Orange County
Brock, James P.	1988	OR-00929	A Cultural Resource Assessment of 200Acres in Coal Canyon
Brock, James P.	1990	OR-01037	A Cultural Resource Assessment for the Cypress Canyon Community, City of Anaheim
Desautels, Roger J. and Nancy A. Whitney	1977	OR-01066	Scientific Resources Report on the Archaeological and Paleontological Assessment of the Bryant Ranch Property Located in the Northwest Portion of the County of Orange

Table 3-1
Previous Cultural Resource Studies in the Study Area

Author(s)	Date	SCCIC/EIC Reference #	Title
Martz, Patricia	1975	OR-01729	Archaeology of the Proposed Alignment of the Santa Ana regional Interceptor, Riverside, San Bernardino, and Orange Counties, California
Strozier, Hardy	1978	OR-02225	The Irvine Company Planning Process and California Archaeology-A Review and Critique
Laska, Robin E.	2001	OR-02257	Cultural Resource Assessment of the Proposed Relocation and/or Protection of the Santa and River Interceptor, Orange and San Bernardino Counties, California
DiGregorio, Lee	1980	OR-02326	Cleveland National Forest Archaeological Report; Sierra Peak Telephone Line
Chasteen, Carrie	2013	OR-02383	Supplemental Historic property Survey Report: Propose Capacity, Operational, and Safety Improvements along State Route 91 and Interstate 15
Bupp, Susan L.	2013	OR-02383A	Supplemental Archaeological Survey Report for SR-91 Corridor improvement Project, City of Corona, Riverside County, California, California Department of Transportation District 8
Chasteen, Carie	2013	OR-02383B	Supplemental Finding of No Adverse Effect report for SR-91 Corridor Improvement Project, City of Corona, Riverside County, California, California Department of Transportation District 8
N/A	1976	OR-02534	Annual Report to The Irvine Company from Archaeological Research, Inc.
Pletka, Scott, Shannon Younger, and Judith Marvin	2003	OR-02883	Cultural Resource Survey and Assessment Mountain park Anaheim, Orange County, California
Underbrink, Susan	2006	OR-03028	Archaeological Survey Report for the Eastbound SR-91 Lane Addition Project From SR-241 to SR-71, County of Orange and County of Riverside CA
Chasteen, Carrie	2013	OR-03037	Supplemental Historic Property Survey Report: Propose Capacity, Operational, and Safety Improvements along State Route 91 and Interstate 15
McLean, Deborah K. and Susan Underbrink	2007	OR-03601	Historic Property Survey Report: To Add an Additional General-Purpose Lane and Widen All Lanes and Shoulders to Standard Widths on Eastbound State Route 91
Fulton, Raina, Hayley Lovan, John Killeen, Stephen Dibble, Mark Chatman, Roland Tabije, Kyle Dahl, Jodi Clfford, Nedenia Kennedy, and Pricilla Perry	2009	OR-04092	Santa Ana River Interceptor Line (SARI) Protection/Relocation, Orange and Riverside Counties. FINAL Supplemental Environmental Impact Statement/Environmental Impact Report
Denniston, Liz	2013	OR-04461	Archaeological Survey Report for Southern California Edison's Replacement of One Deteriorated Power Pole Structure (TD698292) on an Unknown 12Kv Circuit in Chino Hills State Park, Near Chino Hills, Orange County, California

Table 3-1
Previous Cultural Resource Studies in the Study Area

Author(s)	Date	SCCIC/EIC Reference #	Title
Gibson, Heather, Marc A. Beherec, Partick McGinnis, and Mark Roeder	2014	OR-04603*	Cultural Resources Assessment, Santa Ana River Parkway Project, County of Orange, California
King, Thomas F.	1972	SB-00129	Archaeological Surveys of the Proposed Needles #1, Chemehuevi #1 and Vidal #1 Geological Test Sites
McGuire, Pamela J. and Nancy Evans	1982	SB-01451*	Inventory of Features, Cultural Resources, Chino Hills State Park
Lerch, Michael K.	1986	SB-02548	Archaeological Survey of the Valentine Property Sand and Gravel Mine Near Prado Dam, San Bernardino County, California
Chambers Group, Inc.	1992	SB-02867	Cultural Resources Survey for the Central Pool Augmentation and Water Quality Project
Hammond, Stephen R.	1986	SB-03694	Historic Property Survey Report for Proposed Improvements to SR-71 Between I-10 & SR-91-07/08 LA, SBD, RIV-71-Various. 89PP
Peak, Melinda	2001	SB-03730	Cultural Resources Assessment of the Proposed Relocation and/or Protection of the Santa Ana River Interceptor, Orange & San Bernardino Counties, CA. 9PP
Gust, Sherri and Molly Valasik	2011	SB-07083	Paleontological and Cultural Resources of Chino Hills for the General Plan Update, City of Chino Hills, California
Gibson, Heather, Marc A. Beherec, Patrick McGinnis, and Mark Roeder	2014	SB-08272*	Cultural Resources Assessment, Santa Ana River Parkway Project, County of Orange, California
Langenwalter II, Paul E. and James Brock	1985	RI-00061*	Phase II Archaeological Studies Prado Basin and the Lower Santa Ana River
Tadlock, Jean	1977	RI-00064	Archaeological Element of and Environmental Impact Report Western Village Project, Riverside County, California, Leighton Project 77201-1
Leonard, III, N, Nelson	1975	RI-00167*	Environmental Impact Evaluation: Archaeology of Residential Community Adjacent to Green River Golf Course, Corona, Riverside County, California
Martz, Patricia and Richard A. Weaver	1975	RI-00169*	Environmental Evaluation: Archaeology of the Proposed Alignments of the Santa Ana Regional Interceptor, Riverside, San Bernardino, and Orange Counties, California
Lipp, Donald	1977	RI-00261	Environmental Impact Assessment: Archaeological Survey of Sharer Ranch, Riverside County, California
Breece, William and Beth Padon	1982	RI-01354	Archaeological Testing at CA-RIV-1801, Green River Meadow Project, Riverside County, California
Desautels, Roger J.	1979	RI-01355	Archaeological Survey Report on: An 85 Acre Segment of the Cadillac Fairview's "Green River" Project. Located in Santa Ana Canyon, Riverside County, California
McCarthy, Daniel F.	1983	RI-01735	An Archaeological Assessment of Sky Island Estates, Santa Ana Canyon Area of Orange and Riverside Counties. California

Table 3-1
Previous Cultural Resource Studies in the Study Area

Author(s)	Date	SCCIC/EIC Reference #	Title
Salpas, Jean	1984	RI-01888	An Archaeological Assessment of Proposed Class II Sanitary Landfill Site No. 11, Riverside County California
Gallegos, Dennis and Richard Carrico	1985	RI-01914*	Cultural Resources Survey for the Proposed Siera Del Oro Project, Corona, California
Rosenthal, E. Jane and Steven J. Schwarz	1981	RI-01954	A Cultural Resource Survey of the Proposed Santa Ana River Hiking/Biking Trail I in the Prado Flood Control Basin
Greenwood, Roberta and J. Foster	1990	RI-02881	Context Evaluation of Historical Sites in the Prado Basin
Swanson, M and R. Hatheway	1989	RI-02889	The Dairy Industry of the Prado Basin
Swanson, Mark T. and Roger G. Hatheway	1989	RI-02902	The Prado Dam and Reservoir, Riverside and San Bernardino Counties, California
The Keith Companies	1988	RI-03322	State Route 91 Improvements Project: Historic Properties Survey Report
Sterner, Matthew A. and Matt C. Bischoff	2001	RI-03469	National Register of Historic Places-Eligibility Testing at Alta Vista/Green River Camp (CA-RIV-6532H), Riverside County, California
Jones, Carleton S	1992	RI-03604	The Development of Cultural Complexity Among the Luiseno: A Thesis Presented to the Department of Anthropology, California State University, Long Beach in Partial Fulfillment of the Requirements for the Degree, Master of Arts
Meighan, Clement W.	1984	RI-03904	Archaeological Survey Report (Location: 07-LA-71-RO. 62/4.79, 08-SBd-71-0.00/8.42, 08-Riv-72-0.00/R3.03, 0880-263700)
Barker, Leo R. and Anne E. Houston	1990	RI-04762	Death Valley to Deadwood; Kennecott to Cripple Creek. Proceeding of the Historic Mining Conference, January 23-27, 1989, Death Valley National Monument
Underbrink, Susan	2006	RI-06257	Archaeological Survey Report for the Eastbound SR-91 Lane Addition Project From SR-241 to SR-71, County of Orange and County of Riverside, CA, 12-ORA-91-PM 15.9/18.9 (KP 25.629/32.034) EA 0G0400, 8-RIV-91-PM 0/2.847 (KP 0/4.58) EA 0E8000
McLean, Deborah	2007	RI-07425	Historic Property Survey Report (First Supplemental Historic Property Survey Report: 08/12-Riv/ORA-91-PM 15.9-19.9/0.0-2.9 KP25.6-32.0/0.0/4.7 Eastbound Lane Addition EA: 0E800/0G040)
Underbrink, Susan	2006	RI-07494	Historic Property Survey Report (Archaeological Survey Report for the Eastbound SR-91 Lane Addition Project from SR-241 to SR-71, County of Orange, and County of Riverside California)
Sanka, Jennifer M. and Marnie Aislin-Kay	2008	RI-08171	Cultural Resources Assessment Public Safety Enterprise Communication Project Riverside, Orange, San Bernardino, and San Diego Counties, FM 04174400010
Maxwell, Pamela	1993	RI-08238	Los Angeles District project to clear vegetation to regain efficient use of water gauging station, and repair existing concrete channel bottom, on the Santa Ana River, Riverside County, California-Cultural Resources

Table 3-1
Previous Cultural Resource Studies in the Study Area

Author(s)	Date	SCCIC/EIC Reference #	Title
Sanka, Jennifer M.	2010	RI-08397	Cultural Resources Assessment Public Safety Enterprise Communication Project: Green River Communication Site, Riverside County, California
Goldberg, Susan	2010	RI-08605	Archaeological Survey Report for State Route 91/71 Interchange Project, Riverside County, California (08-Riv-91- P.M. R0.6/ R2.6; 08-Riv-71- P.M. 1.6/3.0) EA 0F541
Goodwin, Riordan	2012	RI-08897*	Cultural Resource Assessment: Santa Ana River Trail Improvements Project
Bupp, Susan L.	2013	RI-08988*	Supplemental Archaeological Survey Report for SR-91Corridor Improvement Project, City of Corona, Riverside County, California, California Department of Transportation, District 8
Chasteen, Carrie	2013	RI-08989*	Supplemental Finding of No Adverse Effect Report For SR-91 Corridor Improvement Project, City of Corona, Riverside County, California, California Department of Transportation, District 8
LSA Associates Inc.	2000	RI-09420	Cultural Resources Assessment Green River Ranch Specific Plan Corona, Riverside County, California, LSA Project No. CCR932
Hogan, Michael	2016	RI-09593*	Final Report on Archaeological and Paleontological Resources Monitoring Santa Ana Canyon - Below Prado: Inland Empire Brine Line Protection Project Near the City of Corona, Riverside County, California CRM TECH Contract #2903
Goodwin, Riordan	2016	RI-09741	Cultural Resources Assessment Corona 720 Project LSA Project No. GRY1501
Ramirez, Robert and Kevin Hunt	2015	RI-09754	Phase I Cultural Resources Assessment for the Revised County, California Case # RCL00113R1
Mason, Roger D. and Wayne H. Bonner	1998	RI-09981	Cultural Resources Records Search and Literature Review Report for a Pacific Bell Mobile Service and Telecommunications Facility: CM 332-03, Near the City of Corona, California
Eginton, Coral	2017	RI-104459	Section 106 Phase I Cultural Resources Assessment and Paleontological Review Santa Ana River Trail Norco, Corona, and Unincorporated Riverside County, California

*Included portions of the Project area

These previous studies resulted in the identification of a total of 10 previously recorded cultural resources in the Study Area (Table 3-2 and Appendix A). Six of the resources are archaeological and four are built-environment resources. The archaeological sites consist of three prehistoric sites (lithic scatter, bedrock milling site, and a campsite with milling stones) and three historical archaeological sites (two sites with refuse and remnant structures and a site with water retention basins).

Four built-environment resources were also identified within the Study Area. The built-environment resources consist of two roads, the Green River Camp, and a structure. Three of the 10 previously documented sites are located within the Project area. These resources are described in more detailed below.

Additional sources consulted by Æ during the archaeological literature and records search include the National Register of Historic Places (NRHP), the Office of Historic Preservation (OHP) Archaeological Determinations of Eligibility File, the OHP Directory of Properties in the Historic Property Data File, and the City's Historic Landmark List. No historic properties or landmarks are recorded or listed within, or immediately adjacent to, the Project area.

Table 3-2
Cultural Resources in the Study Area

Primary	Trinomial	Description	Within Project Area	Within ¼ mile of Project Area	Within ½ mile of Project Area	More than ½ mile from Project Area
Prehistoric Archaeological Sites						
30-001073	CA-ORA-1073	Lithic Scatter				X
36-005287	CA-SBR-5287	Bedrock milling feature				X
33-001801	CA-RIV-1801	Campsite with milling stones			X	
Historic Archaeological Sites						
33-005782	CA-RIV-5522H	Historic refuse and structures	X			
33-024551	CA-RIV-12171	Water retention basins				X
33-003693	CA-RIV-3693	Historic refuse and structures	X			
Built Environment						
36-007010	CA-SBR-7010H	Historic Road Grade		X		
33-010819	CA-RIV-6532H	Historic Green River Camp	X			
33-019802	-	Historic Green River Road				X
33-024552	-	Historic structure - culvert				X

3.1.1 CA-RIV-5522H (33-005782)

This site consists of a section of former railroad grade, a bridge abutment, and five concrete piers for a former Santa Fe Railroad bridge. The site was originally documented by Greenwood and Associates (1995) and updated with new features and constituents discovered as a result of construction monitoring in 2016 (Hogan 2016). Features and artifacts discovered as a result of the monitoring consist of a rail assembly structure, railroad bridge support beams, faunal remains, and railroad-related refuse (railroad spikes, concrete, wood) (Hogan 2016). This resource has not been formally evaluated for eligibility in the NRHP/CRHR.

3.1.2 CA-RIV-3693 (33-003693)

This site consists of two dilapidated historic farm structures with a heavy scatter of historical artifacts dating to the 1930s or earlier. The site was documented by Archaeological Advisory Group (1989). The list of artifacts is extensive; however, all artifacts are associated with farm and residential activities. This resource has not been formally evaluated for eligibility in the NRHP/CRHR.

3.1.3 CA-RIV-6532H (33-010819)

This resource consists of the historic 1920s–1950s Alta Vista/Green River Camp. The camp features and constituents consisted primarily of structural remains (foundations and pads) and extensive domestic refuse. The site was originally documented by M. Sterner (2000) and updated after a testing and evaluation investigation by Statistical Research, Inc. in 2008. The testing and evaluation in 2008 concluded the site is not eligible for listing in the NRHP (Goodwin 2008). The site is reported in the most recent update to have been largely destroyed by the construction of the Green River Golf Course (Goodwin 2008).

3.2 HISTORICAL MAP REVIEW

Æ consulted the 1901 Southern California (1:250,000) USGS topographic quadrangle map, the 1902 Corona (1:250,000) USGS topographic quadrangle map, the 1933 Prado (1:31,680) USGS topographic quadrangle map, the 1942 Corona 15-minute USGS topographic quadrangle map, and the 1949 Santa Ana (1:250,000) USGS topographic quadrangle map to assess historical land-uses in the Study Area (USGS 1901, 1902, 1933, 1942, 1949). One road/railroad grade appears on two of the above listed maps (1901 Southern California and 1943 Corona) and is represented by the previously recorded site CA-RIV-5522H. No other structures, roads, or other features of interest are shown within, or in the vicinity of, the Project area or on any of the other historical maps.

3.3 SACRED LANDS FILE SEARCH

On May 30, 2019, Æ contacted the NAHC for a review of their SLF, to determine if any known Native American cultural properties (e.g., traditional use or gathering areas, places of religious or sacred activity) are present within or adjacent to the Project area. The NAHC responded on June 18, 2019, stating that the SLF search was completed with negative results. The NAHC provided a list of Native American individuals and organizations to be contacted to elicit information and/or concerns regarding cultural resource issues related to the proposed Project. Æ provided the results of the NAHC SLF search and Native American contact list to RCTC to assist with their government-to-government consultation requirements under Assembly Bill 52 (AB 52). The NAHC file search is included as Appendix B.

4
CULTURAL RESOURCES SURVEY METHODS

Æ archaeologist Evan Mills and architectural historian/historical archaeologist Susan Wood completed archaeological and built-environment surveys of the 140.5-acre Project area on July 17, 2019, and September 20, 2019. The purpose of the survey was to identify any new cultural resources within the Project area and review the condition of previously recorded resources. The archaeological survey involved driving the entire Project area in a golf cart provided by the Green River Golf Course and inspecting all areas accessible. In areas where pedestrian survey was possible (areas with minimal disturbance from the golf course and with ground visibility), the archaeologists surveyed on foot in transects spaced 15 meters apart. The built-environment survey involved driving the entire Project area and the entire golf course in a golf cart. The purpose of the built-environment survey was to document all built components (clubhouse, bathrooms, outbuildings, bridges) of the Green River Golf Course, the portion of the existing railroad within the Project area, and assess the condition of the previously recorded built-environment/historic archaeology resources within the Project area.

When encountered, all newly discovered cultural resources identified within the Project area were recorded on DPR forms. These forms document all pertinent aspects, constituents, and locational information of each resource. Site locations were plotted to submeter accuracy using a handheld Trimble Geo7X Global Positioning System (GPS) unit; site maps of each resource were generated in a Geographic Information System (GIS) using this same GPS unit. Digital photographs of each resource and its constituents were taken as well.

Surveyors also visited all previously recorded cultural resources mapped within the Project area. These resources were revisited to confirm location, and re-identify any cultural features or constituents situated within the Project area, discover any new cultural features or constituents within the Project area that had not been recorded previously, and evaluate the current physical conditions of all resources. During these surveys, if a resource location was found to be mapped incorrectly on the pre-existing site record, its physical condition or integrity had been altered since the initial recording efforts, or new cultural constituents or features were discovered, the DPR form for the resource was updated appropriately to reflect these changes (Appendix C).

5
CULTURAL RESOURCE SURVEY RESULTS

Due to the highly disturbed nature of the Project area, very little of the Project area was suitable for intensive pedestrian survey. The only portion of the Project area that appeared to be undisturbed and visible was the southwest corner of the Project area (see Figure 1-3 and Figure 5-1). This area was intensively surveyed while the rest of the Project area was surveyed from the golf cart. Upon inspection of the southwest corner, it was discovered the area had been recently planted with native vegetation (possibly a habitat rehabilitation) and was also extensively disturbed. Irrigation lines, modern refuse, and bulldozer scars from a recent fire were all present within the southwest corner of the Project area.

Figure 5-1 Overview of southwest corner of Project area (facing northeast).

The western half of the Project area (Alternative 1) is centered on a dirt road and former railroad grade (CA-RIV-5522H), with the golf course on the east side and native lands to the west of the road (see Figure 1-3). Both sides of the dirt road are extremely densely vegetated with weeds in excess of 5 feet tall, making it too densely overgrown to traverse (Figure 5-2). Consequently, ground visibility in the western half of the Project area (Alternative 1) is very poor (0–5 percent). Beyond the overgrown vegetation, other disturbances noted within the western half of the Project area (Alternative 1) consist of the existing golf course to the east, with manicured lawns, fairways, and maintained greens, and other design features (i.e., constructed hills, flattened greens, sand traps). No areas of native undisturbed ground were observed within the western half of the Project area (Alternative 1). No cultural materials were observed within the western half of the Project area beyond the golf course itself (Alternative 1). Archaeological sensitivity for the western half of the Project area (Alternative 1) is moderate considering the proximity to water (Santa Ana River) and the lack of visibility on the ground.

Figure 5-2 Overview of west side of Project area (facing northeast).

The eastern half of the Project area (Alternative 2) is entirely within the boundaries of the Green River Golf Course (see Figure 1-3). Vegetation within the golf course property is primarily grass and cottonwood trees (Figure 5-3). The golf course is a designed landscape with altered topography, extensive landscaping, and an extensive underground irrigation system. No areas within the eastern half of the Project area (Alternative 2) are undisturbed. The eastern side of this portion of the Project area borders the Santa Ana River with native, riparian vegetation regimes and a constructed berm or levee to protect the golf course from potential flooding. No cultural materials were observed within the eastern half of the Project area (Alternative 2). The archaeological sensitivity of the eastern half of the Project area (Alternative 2) is considered low as a result of the extensive disturbance from the construction of the golf course and the location within the flood plain of the river.

The southern portion (south of the railroad tracks) of the Project area is currently the Green River Golf Course Clubhouse and Parking Lot (Figure 5-4). This entire area is either grass, buildings, or pavement. No cultural materials were observed within the southern portion of the Project area. The archaeological sensitivity of the southern portion of the Project area is considered low as a result of previous extensive disturbance and archival research.

Figure 5-3 Overview of east half of Project area (facing southwest).

Figure 5-4 Overview of southern Project area (facing south).

The staging area is located southeast of the Project area (see Figure 1-3). This area is currently a parking lot with construction trailers and is completely disturbed (Figure 5-5). No cultural materials were observed within the staging area. The entire area is built up (graded) and the archaeological sensitivity is considered low as a result of previous extensive disturbance and archival research.

Figure 5-5 Overview of construction laydown yard (facing east).

The portion of the Project area that will close the gaps between the two recreational facilities (SART - Phase 5 and between SART - Phase 5 and SART - Phase 3) is located northeast of the Project area (see Figure 1-3). This segment was surveyed on September 20, 2019. This portion of the Project area is also centered on the dirt road and former railroad grade (CA-RIV-5522H) and is an extension of the current Project area to the west, with SART - Phase 5 between the two. Both sides of the road are extensively overgrown with non-native vegetation (Figure 5-6). The vegetation on the south side of the road is immediately adjacent to the riparian zone of the Santa Ana River. The vegetation on the north side of the road consists of annual weeds and grasses. A new segment of CA-RIV-5522H was documented immediately north of the current road/trail (Figure 5-7). The archaeological sensitivity in this portion of the Project area is low; however, there is potential to uncover portions of the old grade considering a new segment of the grade was documented during this current investigation. The resource is not eligible for the NRHP and any finds consistent with the past and current archaeological constituents would not change the eligibility.

Figure 5-6 Overview of Northeast Project area (facing west).

Figure 5-7 Overview of new segment of grade on CA-RIV-5522H (facing east).

5.1 PREVIOUSLY RECORDED RESOURCES

Æ attempted to revisit and examine the three cultural resources previously recorded within the Project area to determine whether potential impacts could result from Project implementation. Descriptions of these resources are provided below. In the process of revisiting these resources, Æ's crew also identified and documented two newly discovered built-environment resources, which are described below in Section 5.2. The locations of all five cultural resources are depicted on Figure 5-8 and all DPR forms are included in Appendix C.

5.1.1 CA-RIV-3693H (33-003693)

Originally recorded by J. Brock and J. Elliott in 1989 (Archaeological Advisory Group 1989), the site has been significantly altered since the first documentation. Currently, the site is being used as a storage and workshop/garage facility for groundskeepers of the Green River Golf Course. Building 1 is described as one dilapidated/abandoned garage with small living quarters and measures 30 feet east-west by 36 feet north-south. Rehabilitations to Building 1 have changed the dimensions to 59 feet north-south by 49 feet east-west. Newer siding, roofing, concrete slab, garage doors, and many other alterations have rendered the building in a vastly different condition from the original documentation reported in 1989. Building 2 is described as small dilapidated/abandoned storage building and is no longer present. There is an extensive list of historic artifacts represented in the site record and little historic refuse remains at the site. Some glass shards and metal fragments were observed but the entire area around Building 1 is covered with modern groundskeeping equipment (lawnmowers, parts, wheels, engines, etc.).

5.1.2 CA-RIV-5522H (33-005782)

Originally documented in 1995 by A. G. Toren (Greenwood and Associates 1995), the site consists of a section of former railroad grade and associated features (concrete piers, bridge abutments, berms). The site was updated in 2016 by CRM Tech (CRM Tech 2016) and cites the finding of additional features (rail assembly structure, railroad bridge support beams, and faunal remains) found during construction monitoring. These new features are not documented within the Project area of this current Project and were not observed. The current condition of the former grade now functions as a road (used by the golf course, California State Parks staff, bikers, and hikers) and an extension of the Santa Ana River Trail. The road appears to have been graded multiple times and is well maintained. Absent the site record, one would not have any indication that the section of the site (within the Project area) is historic and associated with the railroad. No historic refuse was observed along the segment within the Project area. The areas adjacent to the road are completely overgrown with vegetation and ground visibility is very poor (0–5 percent). One new segment of the grade was documented immediately north of the current road. This new segment is likely a remnant of the former grade which may have been misplotted on the EIC maps. The new segment is within 15 feet of the mapped location of the current road/trail.

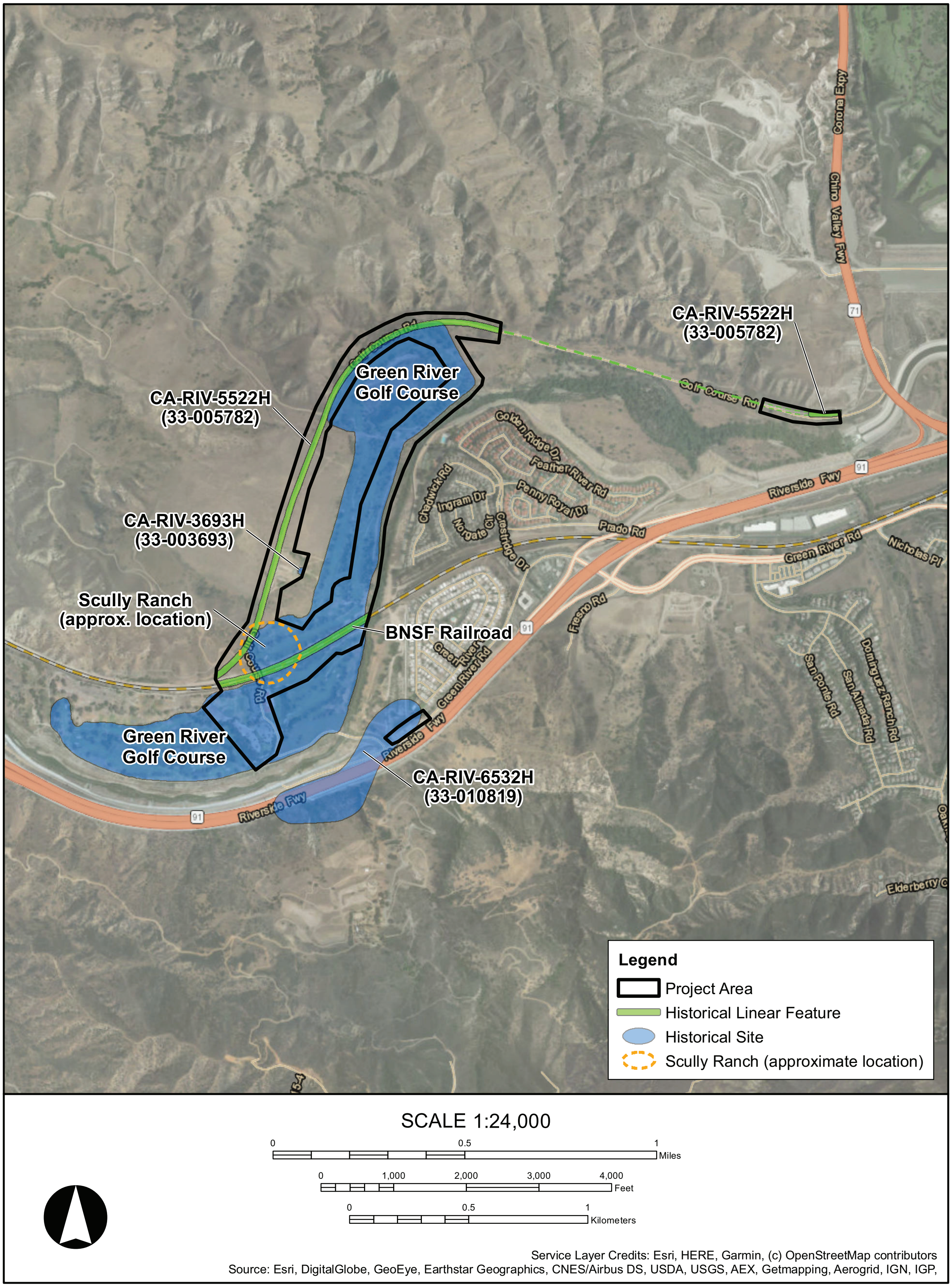

Figure 5-8 Cultural resources in the Project Area.

5.1.3 CA-RIV-6532H (33-10819)

This site was originally documented in 2000 by Statistical Research, Inc., (Sterner 2000) and consists of the remains (features, structures, artifacts) of the former town of Alta Vista. Also known as Green River Camp. The site was tested and evaluated in 2008 by Statistical Research,

Inc. The results of the testing concluded the site to be ineligible for listing in the NRHP (Goodwin 2008). The 2008 update also indicates that much of the site had been destroyed by construction of the Green River Golf Course and the realignment of Canyon Road prior to the construction of State Route 91. Only a small portion of the site is within the boundary of the current Project area; however, no evidence of the site was seen in this area. The area of the former site is currently a parking lot for construction trailers associated with railroad construction. The area has seen extensive grading and alterations in very recent years and any remnants of the site in this area appear destroyed.

5.2 NEWLY IDENTIFIED RESOURCES

During the survey of the Project area, two newly discovered built-environment resources were identified and documented (see Figure 5-8). The resources are described below.

5.2.1 Green River Golf Course

Green River Golf Course has the distinction of being in three counties: Riverside, San Bernardino, and Orange counties. Green River Golf Course, located at the head of Santa Ana Canyon, opened to play on June 17, 1959. The original 18-hole course, designed by golf architect Lawrence Hughes, was built and funded by local golfers and businessmen Henry Bickler and James Joslyn through the corporation they formed for the project, Bicklyn, Inc. In September 1963, they added nine holes, and in 1972 they added an additional nine holes to form two 18-hole courses referred to as “Orange” and “Riverside” based on their location (Distell 1972; Langhorne 2013; Parra 1976:166;). In 2006, the flood-control districts of Orange, Riverside and San Bernardino counties purchased the course as part of the $2.1 billion Santa Ana River Mainstream Project, with Orange County holding a 90 percent stake. During construction of the flood-control project in the canyon, the course was modified to its current 18-hole, approximately 180-acre configuration

5.2.2 BNSF Railway

The Atchison, Topeka, and Santa Fe Railway (ATSF) operated a line through the Santa Ana Canyon beginning in 1887 until 1996 when it merged with the Burlington Northern & Santa Fe Railroad (BNSF), the current operator. The approximately 0.5-mile railroad line segment in the Project area, however, was built circa 1939 by the ATSF after a major flooding event in the Santa Ana Canyon in 1938 damaged existing tracks (BNSF 2019:28–29). At the time of construction, the previous ATSF railway route was abandoned in favor of the current route in anticipation of the construction of the Prado Dam that was completed in May 1941. While the segment’s route is primarily the same as when constructed, the design (alignment), workmanship, and materials have been updated, and largely replaced. When the line was built, the Santa Ana Canyon was still primarily wide open space, with orchards, farms, and ranches dotting the countryside on either side of the tree-lined Santa Ana River. Visitors to this area of the canyon were primarily seeking recreation and camping. Today it is a primary commuter corridor between the Inland Empire and Los Angeles and is lined with tracts of homes. The setting has since been altered by the continuing development.

6
SIGNIFICANCE EVALUATIONS

This chapter provides an assessment of the significance of CA-RIV-3693H, -5522H, -6532H, the Green River Golf Course, and the BNSF Railway in order to evaluate the eligibility of these resources for listing in the NRHP/CRHR.

6.1 CA-RIV-3693H (33-003693)

In 1989, J. Brock and J. Elliott, recorded CA-RIV-3693H as "an excellent example of Depression-era workplace/home," and noted two extant, dilapidated built-features: one garage structure with small living quarters and one small storage building (Archaeological Advisory Group 1989). They also included a long list of historical artifacts that could reflect activities occurring on site including farming, ranching, residential occupation, storage, etc. The temporal analysis of artifacts provided on the site record was that materials most likely dated to the 1930s or earlier. None of the artifacts listed and described provide temporally diagnostic certainty, and during the current study, the site was found severely altered with little historic refuse still observable.

In a 1990 report, "Context Evaluation of Historical Sites in the Prado Basin," CA-RIV-3693H is documented as a 1930s dairy and is categorized in a table as having excellent integrity and probably eligible for the NRHP (Greenwood and Foster 1990:86). However, this evaluation appears to have been based on a review of previous site records and reports, and it does not appear the site was visited nor was it fully described or evaluated. During the current investigation, no archival research was located to support the site as a dairy. CA-RIV-3693H appears to be originally the site of the ATSF Scully railway stop on the Scully Ranch. Evidence suggests that the remaining structure remnants were most likely built in the late 1920s or early 1930s to support the activities of the surrounding Scully ranch/farm and may have included storehouses for goods shipped in or out of the canyon ranch by rail (Figure 6-1).

6.1.1 Evaluation of Significance

CA-RIV-3693H lies within the borders of Rancho La Sierra (Yorba), a Californio Land Grant secured by Bernardo Yorba in 1846 and finally confirmed by U.S. Land Patent in 1875. Most of the land that encompasses the Project area was awarded to Yorba's daughter, Maria Jesus Y. de Scully (State of California, District Court of the 17th Judicial District 1877; Lech 2004:46–47). Maria Jesus Yorba, after the death of her first husband Anastasio Botiller, had married Thomas J. Scully, and the Scully family established a ranch and home that was in the Project area on what is now the property operated as the Green River Golf Course (see Figure 3-1) (Desborough 1981; State of California, District Court of the 17th Judicial District 1877).

In 1985, the Scully Ranch site was described in a study prepared for the U.S. Army Corps of Engineers in anticipation of improvements to the flood control system of the Santa Ana River Canyon. The report noted that the ranch, no longer extant, had included orange groves located in a cul-de-sac on the north side of the Santa Ana River and north of the what is now the Green

River Golf Course. The Scully Ranch was assigned a temporary number for that report, PB-138; however, the site was never assigned a trinomial presumably because no built-environment or archaeological remains were noted (Langenwalter and Brock 1985:8-110–8-111). Suggestively, they also assigned another temporary number, PB-139, to a site titled “Unknown.”

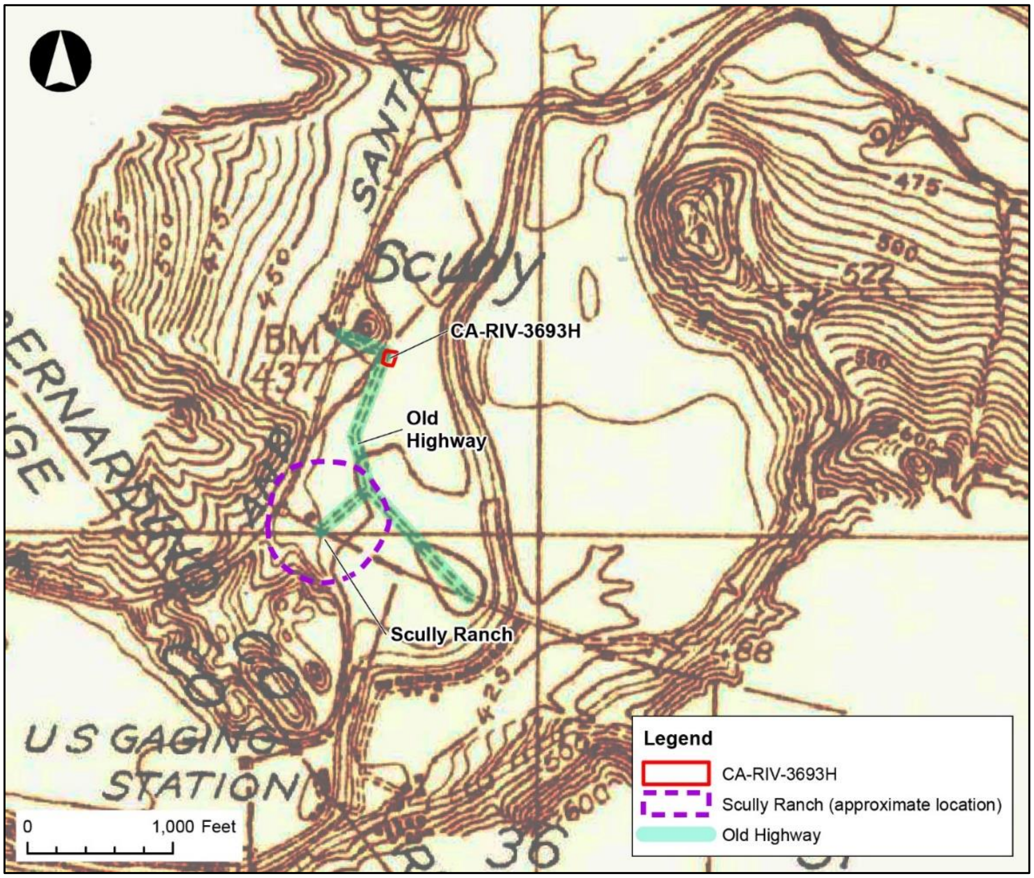

Figure 6-1 USGS Map showing the Scully stop on the ATSF railway line in context with CA-RIV-3693H. Note the approximate location of the Scully Ranch complex to the southwest (USGS 1933).

This site, no longer extant at that time, was described based on a 1936 aerial photograph of the Prado Basin, to include “a house surrounded by trees, two barns, corrals, and several outbuildings” (Langenwalter and Brock 1985:8-111). This description actually matches the historical accounts of the Scully Rancho complex (Davila 1893; Desborough 1981). It appears that temporary site PB-138, rather than Scully Ranch, may have been CA-RIV-3693H and the location of the ATSF railroad “Scully” stop that was located near the orchard groves just to the northeast of the ranch complex. Therefore, PB-139, noted as unknown, was the actual ranch site itself (Figure 6-2). In 1887, the Santa Fe Railroad completed the California Southern Line through Santa Ana Canyon. The line ran from Corona, through Prado, following the north bank of the Santa Ana River into the canyon, and through the Scully Ranch (CA-RIV-5522H). In 1896, the Santa Fe Railroad emerged from receivership as the ATSF, and records indicate that the Scully Ranch was a railway stop along this line through 1938 when the rail line was rerouted to its current alignment after a severe flood episode washed out much of the rail lines in the canyon, and in anticipation of the construction of the Prado Dam. CA-RIV-3693H is situated in the approximate location of the railway stop (see Figures 6-1 and 6-2) (Ferguson 2017; USGS 1933).

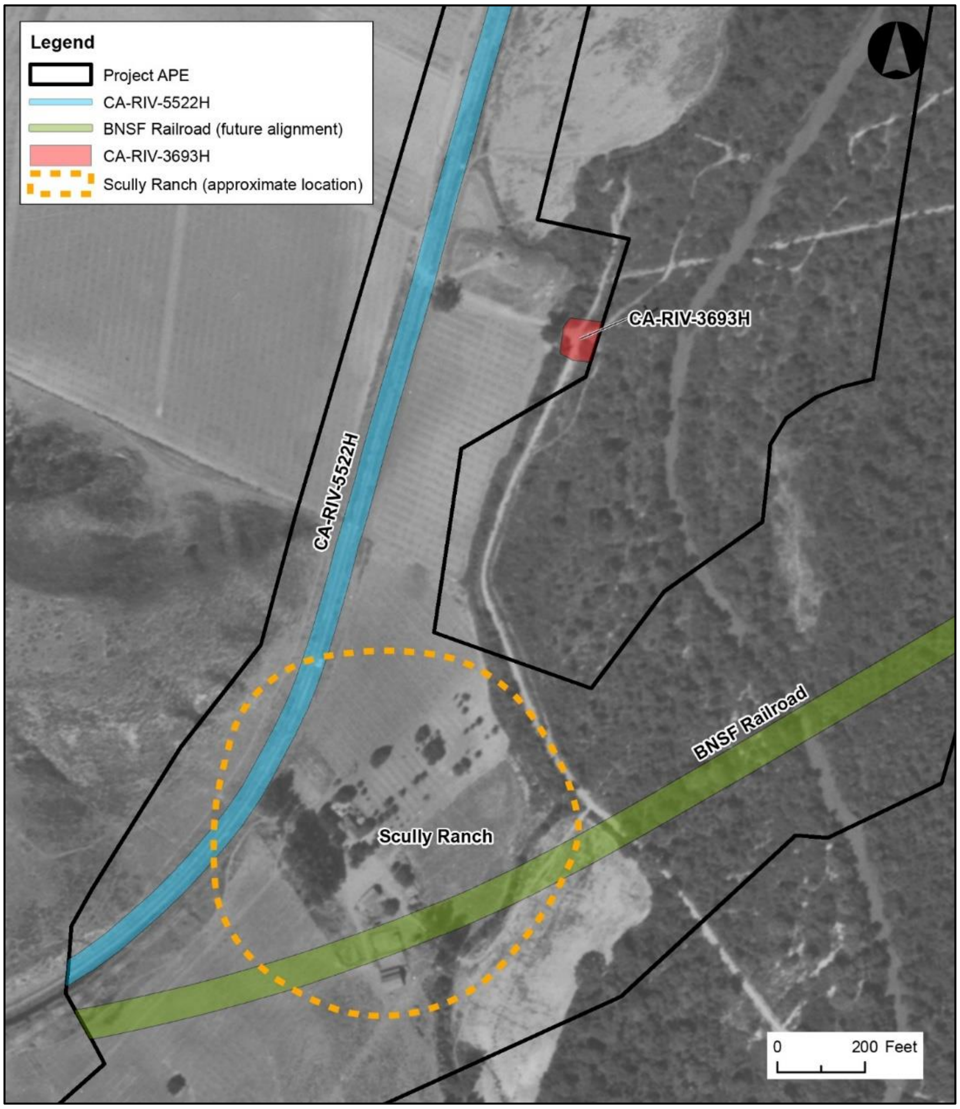

Figure 6-2 1936 Aerial Photograph with an overlay of the Project area, CA-RIV-3693H, CA-RIV-5522H (Historic ATSF Alignment), and the approximate location of the Scully Ranch complex (UCSB 1931).

During the current cultural resource survey for the Santa Ana River Trail, it was observed that the site is being used as a storage and workshop/garage facility for groundskeepers of the Green River Golf Course. Building 1 is described as one dilapidated/abandoned garage with small living quarters and measures 30 feet east-west by 36 feet north-south. Rehabilitations to Building 1 has changed the dimensions to 59 feet north-south by 49 feet east-west. Newer siding, roofing, concrete slab, garage doors, and many other alterations have rendered the building in a vastly different condition from the original documentation. Building 2 is described as a small dilapidated/abandoned storage building and it is no longer present. There was an extensive list of historic artifacts represented in the site record. Little historic refuse remains at the site at present. Some glass shards and metal fragments were observed but the entire area around Building 1 is covered with modern groundskeeping equipment (lawnmowers, parts, wheels, engines, etc.) (Appendix C, CA-RIV-3693H-Update).

Archival and archaeological evidence suggests that CA-RIV-3693H, and the nearby Scully Ranch site, if fully extant and in good condition, would be a historically significant complex due to association with the Yorba family, the early railroads in California, and farming and ranching in the Santa Ana Canyon. However, little to nothing remains of either site; what does remain has been significantly altered. Therefore, CA-RIV-3693 is recommended as ineligible for listing on the NRHP and CRHR under any criterion. Since CA-RIV-3693H is recommended ineligible for the NRHP and CRHR, no integrity evaluation is provided.

6.2 CA-RIV-5522H (33-005782)

CA-RIV-5522H is a road along the original alignment of the Santa Fe Railroad's California Southern Line, San Bernardino and San Diego route through Santa Ana Canyon completed in 1887. During the current cultural resource survey for the Santa Ana River Trail, one new segment of grade was found within the Project area (see Figure 5-2) (Dodge 1959).

In 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the ATSF (see Figure 2-4) (BNSF 2019:28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic though the region. The line ran from Corona, through Prado, following the north bank of the Santa Ana River into the canyon, and through the Scully Ranch in the Project area. Records indicate that the Scully Ranch was a railway stop along this line through 1939 when the line was rerouted to its current path to accommodate the construction of the Prado Dam (Figure 6-3) (Ferguson 2017; USGS 1933).

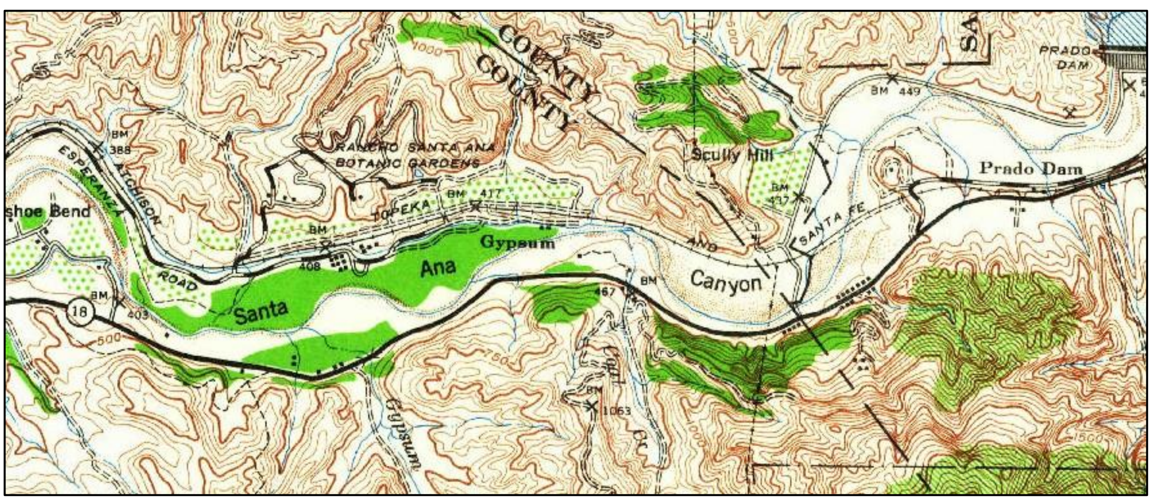

Figure 6-3 ATSF Rail Line through the Project area in the Santa Ana Canyon. Note the new, more direct route through the Project area built after the 1939 flood and to facilitate the construction of the Prado Dam (USGS 1942).

Originally documented in 1995 by A. G. Toren (Greenwood and Associates 1995), the site consists of a section of former railroad grade and associated features (concrete piers, bridge abutments, berms). The site was updated in 2016 by CRM Tech and they documented the findings of additional features (rail assembly structure, railroad bridge support beams, and faunal remains) exposed during construction monitoring. These new features are not within the Project area of the current Project and were not observed. What was observed is the current condition of the former grade, which now functions as a road (used by the golf course, California State Parks staff, cyclists, and hikers) and an extension of the Santa Ana River Trail. The road appears to have been graded multiple times in recent years and is well maintained. Absent the site record, one would not have any indication that the section of the site (within the Project area) is historic and associated with the railroad. There was no historic refuse observed along the segment within the Project area. The areas adjacent to the road are completely overgrown with non-native vegetation and ground visibility is very poor (0–5 percent). However, the new segment of grade identified is directly adjacent to the existing road/trail on the far east end of the current Project area. The new segment of grade is 14 feet wide on the interior. There is a berm (6 feet wide x 18 inches tall) for the entire length of the north side of the grade. Additionally, there is a berm of the same size along the southern side but only on the western half of the 492-foot-long segment. The new segment of grade terminates in the west due to a finger ridge that extends south from the small hills immediately to the north.

6.2.1 Evaluation of Significance

Few other events altered the course of California history as significantly as the arrival of the railroad in the 1870s and 1880s. The railroad was a primary contributing factor to the rise of population in California as it opened up new lands and opportunities for Americans in the east. The rail wars of the 1880s in California between the Southern Pacific and the Santa Fe Railroad made these opportunities available to members of the middle-class as well as the wealthy land speculators. Initially, to expand their service farther into California, and due to restrictions of their competition with Southern Pacific, the Santa Fe Railroad used the purchase of smaller lines to expand their reach. A 1902 map (surveyed in 1894 and 1899) of the Project area shows Santa Fe Railroad's "Southern California Railroad – San Bernardino and San Diego Line" running through the Santa Ana Canyon in 1887.

In 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the ATSF (BNSF 2019:28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic though the region. However, the segment in the Project area was decommissioned when the line was rerouted in 1939 to accommodate the construction of the Prado Dam (see Figure 6-3).

While the economic impact of the railroads diminished after the 1950s when automobiles became the preferred method of transportation in the region, the ATSF, in its updated configuration, continued service through the Santa Ana Canyon until their merger with the Burlington Northern Railroad to form the Burlington Northern Santa Fe Railroad (BNSF) in 1995 (BNSF 2019:29). The site represents the significance of the railroad as a mode of transportation and commerce in Southern California and as an important connection to the rest of the country and is significant under Criterion A/1 for listing on the NRHP and CRHR with a period of operation from 1887 to 1939 when the segment of the line in the Project area was decommissioned.

6.2.2 Evaluation of Integrity

Although the ATSF Railway, now part of BNSF, is eligible as a whole for the NRHP/CRHR under Criterion 1/A, the two segments within the Project area lack integrity. While both segments retain their association with the historical ATSF railway line, the overall loss of integrity has compromised both the ability of both segments to convey the significance of this resource. The one-mile segment in the south of the Project area no longer exists, except as a dirt road. The only remains of the newly identified grade segment are the earthen berms on either side. The site lacks integrity of setting, feeling, workmanship, design, materials and Æ recommends the site ineligible for listing on the CRHR and NRHP.

6.3 CA-RIV-6532H (33-010819) (ALTA VISTA/GREEN RIVER CAMP)

CA-RIV-6532H was recorded in April 2000 by Mathew Sterner and Matt Bischoff of Statistical Research, Inc. (SRI) as the remains of the 1920s–1950s town of Alta Vista also known as Green River Camp located approximately 6 miles west of Corona and to the south of the Santa Ana River. Alta Vista or Green River Camp emerged during the period of the 1920s and 1930s as a collection of resort-cabins for those in more urban areas to escape the city. Later, it developed into a small community that catered to campers, tourists, and travelers along the remote canyon road. Much of the town was demolished during the construction of the Green River Golf Course in the mid to late 1950s and 1960s, and what remained was mostly removed during construction of SR 91 (Sterner and Bischoff 2000). At this time no structural remains were noted to the north of SR 91 except for a concrete patio slab and brick barbeque at the eastern end of the site, and test excavations uncovered several minor features in this area. However, SRI recommended the site ineligible due to a complete lack of integrity (Sterner and Bischoff 2000:52). In May 2008, Riordan Goodwin of Statistical Research, Inc., revisited the site to investigate the formally documented Feature 6, to the south of SR 91, which during the previous investigation had been obscured by vegetation and become inaccessible. While Feature 6 had also been extensively damaged by the construction of the Green River Golf Course and the subsequent construction of SR 91, Goodwin documented the remains of an extensive residential ruins complex, although no site evaluation was prepared (Goodwin 2008).

During the current cultural resource survey for the Santa Ana River Trail, no cultural materials associated with this site were found within the Project area. Further, it is possible that what remained in the portion of the site in the Project area was destroyed during the current reconstruction of the Santa Ana River railroad bridge, and the site is now a staging area for additional construction (see Figure 5-5). As the site no longer exists, it lacks all seven aspects of integrity and therefore cannot reflect its historical significance. Æ concurs with the recommendation that the site is ineligible for listing on the CRHR and NRHP.

6.4 GREEN RIVER GOLF COURSE

Green River Golf Course has the distinction of being in three counties: Riverside, San Bernardino, and Orange counties. The course, located at the head of Santa Ana Canyon, opened to play on June 17, 1959. The original 18-hole course, designed by golf architect Lawrence Hughes, was built by local golfers and businessmen Henry Bickler and James Joslyn through the corporation they formed for the project, Bicklyn, Inc. In September 1963, they added nine holes, and in 1972 they added an additional nine holes to form two 18-hole courses referred to as “Orange” and “Riverside” based on their location (Langhorne 2013; Parra 1976:166). In 2006, the flood-control districts of Orange, Riverside, and San Bernardino counties purchased the course as part of the $2.1 billion Santa Ana River Mainstream Project, with Orange County holding a 90 percent stake. During construction of the flood-control project in the canyon, the course was modified to its current 18-hole, approximately 180-acre configuration (see Figure 2-7) (County of Orange, OC Public Works 2019; Langhorne 2013).

6.4.1 Evaluation of Significance

In 1957, The Green River Golf Course was conceived of and built as a public course accessible to all; today it still retains its middle-class roots, noted in a 2013 Orange County Register article as “Green River Golf’s blue-collar beauty” (Langhorne 2013; Parra 1976:166). Bickler and Joslyn, the owners and builders of the original course were golfers themselves who lived locally. When outdoor entertainment pursuits were booming, they funded and built the course. They formed Bicklyn, Inc., and sought affordable land for the site. They secured a 50-year lease from the Santa Ana River Development Company. Solidly middle-class, Bickler and Josyln took a chance, and due to the popularity of outdoor pursuits mid-century, business was immediately booming. Aside from outdoor sports, the Green River Golf Course also offered camaraderie with the organization of a men’s golf club, and eventually an active senior’s club, both of which survive to this day (Bill Oliver, personal communication 2019; Parra 1976:166). The Green River Golf Course, although originally located in an undeveloped semi-wilderness along the Santa Ana River, still retains the feeling of open countryside due to its situation in the narrow canyon with the river still flowing along its edge and surrounded by hillside. The Green River Golf Course is significant under Criterion 1/A locally and nationally as a vernacular, public golf course built for the average, middle class golfer during the post-World War II-era Southern California middle-class population boom during the period from 1959, when it opened, to the 1990s when the original clubhouse was demolished.

6.4.2 Evaluation of Integrity

Green River Golf Course is still in the location of its original construction in 1957–1959, and even though it has been altered and reconfigured multiple times, it does retain its integrity of location. The original setting of the course was in an open canyon with the Santa Ana River flowing through and along the course and with minimal commercial or residential development surrounding the site. Today, SR 91 rushes by the course to the south and housing developments are present near the golf course. While a player still can, in the more northern areas of the course, get the feeling of being out in the open countryside, the passing BNSF trains and nearby bridge construction, and the visibility of the crowded freeway from the southern part of the course disrupt the tranquil experience of outdoor recreation. The course lacks integrity of setting and feeling. The original course was built by a successful golf architect; however, only a couple of the original holes remain (Bill Oliver, personal communication 2019). The course lacks his original design. Additionally, the original clubhouse was demolished and replaced in the 1990s. The course lacks integrity of workmanship, materials, and design. While the course still retains association with its significance as a middle class, blue collar, vernacular public golf course, the lack of integrity of setting, feeling, design, workmanship, and materials reduces the ability for the course to evidence its significance and is recommended ineligible for listing on the CRHR and NRHP under Criterion 1/A. It is not eligible under any of the other criteria for similar reasons.

6.5 BNSF RAILWAY

The ATSF operated a line through the Santa Ana Canyon beginning in 1887 until 1996 when it merged with the Burlington Northern Railroad to form the BNSF, the current operator. The approximately one-half mile railroad line segment in the Project area, however, was built circa 1939 by the ATSF after a major flooding event in the Santa Ana Canyon in 1938 damaging existing tracks (Figure 6-4) (BNSF 2019:28–29). At the time of construction, the previous ATSF railway route was abandoned in favor of the current route in anticipation of the construction of the Prado Dam that was completed in May 1941.

Figure 6-4 Overview of railroad from crossing (facing northeast).

6.5.1 Evaluation of Significance

Few other events altered the course of California history more than the arrival of the railroad in the 1870s and 1880s. The railroad was a primary contributing factor to the rise of population in California as it opened up new lands and opportunities for Americans in the east; the rail wars of the 1880s in California between the Southern Pacific and the Santa Fe Railroad made these opportunities available to members of the middle-class as well as wealthy land speculators. Initially, to expand their service farther into California, and due to restrictions of their competition with Southern Pacific, the Santa Fe Railroad used the purchase of smaller lines to expand their reach. A 1902 map (surveyed in 1894 and 1899) of the Project area shows Santa Fe Railroad's

"Southern California Railroad – San Bernardino and San Diego Line" that began running through the Santa Ana Canyon in 1887 (see Figure 6-3) (Dodge 1959).

In 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the Atchison, Topeka and Santa Fe Railway Company (ATSF) (BNSF 2019:28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic though the region (see Figure 2-4). The significance of the railroads diminished after the 1950s when automobiles became the preferred method of transportation in the region. Nonetheless, ATSF continued service through the Santa Ana Canyon until its merger with the Burlington Northern Railroad to form the BNSF in 1995 (BNSF 2019:29). Although the segment of rail line in the Project area was constructed after the original line, being re-routed in 1939 to accommodate the Prado Dam, it still represents the significance of the railroad as a mode of transportation and commerce in Southern California and as an important connection to the rest of the country and is significant under Criterion A/1 for listing on the NRHP and CRHR during the era from 1939–1950s.

6.5.2 Integrity Evaluation

Although the ATSF Railway, now part of BNSF, is eligible as a resource in its entirety for the NRHP/CRHR under Criterion 1/A, the half-mile segment within the Project area lacks integrity. The segment built in 1939 in its current route maintains integrity of location. However, when built the Santa Ana Canyon was still primarily wide-open space, with orchards, farms, and ranches dotting the countryside on either side of the tree-lined Santa Ana River. Visitors to this area of the canyon were primarily seeking respite, recreation, and camping. Today it is a primary commuter corridor between the Inland Empire and Los Angeles and is lined with tracts of homes. The segment lacks integrity of setting and feeling. While the segment's route is primarily the same, the design, workmanship, and materials have been updated and largely replaced, and this has compromised historical integrity. The segment lacks integrity of workmanship, materials and design. While the segment retains its association with the historical ATSF railway line, the loss of integrity has compromised the resource's ability to convey its significance. The segment is recommended ineligible for the NRHP and CRHR under Criterion 1/A.

8
MANAGEMENT RECOMMENDATIONS

At the outset of the present investigation, the archaeological literature and records searches (Chapter 4) indicated three previously recorded cultural resources within the Project area (CA-RIV-3693H, -5522H, -6532H). However, Æ's field surveys of the Project area resulted in confirmation of only two of the three previously recorded resources still within the Project area. CA-RIV-6532H was not re-identified. Additionally, Æ identified and documented, two newly discovered and not previously recorded cultural resources within the Project area (Green River Golf Course and the BNSF Railway).

All four cultural resources within the Project area were evaluated for eligibility for listing on the NRHP and CRHR. Æ recommends CA-RIV-3693H, CA-RIV-5522H, and the Green River Golf Course as ineligible for listing on the NRHP and CRHR. The BNSF Railway (formerly the ATSF), is recommended eligible for listing on the NRHP and CRHR under Criterion A/1. However, the segment within the Project area does not retain integrity and therefore is not a contributing component of the larger resource.

The ground surface throughout the entire Project area has been disturbed substantially by the construction of the Green River Golf Course, historic railroads, recreational camps, orchards, and homesteading. Of the six soil series mapped across the Project area, none include a buried A horizon. However, ground visibility within the western half of the Project area (Alternative 1) was poor, and considering the proximity to the Santa Ana River, archaeological sensitivity for Alternative 1 is moderate. The archaeological sensitivity of the eastern half of the Project area (Alternative 2) is considered low as a result of the extensive disturbance from the construction of the golf course and the location within the flood plain of the river. Therefore, full-time cultural resource monitoring of the western half of the Project area (Alternative 1) within native soils is recommended.

In the event that potentially significant archaeological materials are encountered during construction, all work must be halted in the vicinity of the discovery until a qualified archaeologist can visit the site of discovery and assess the significance of the find. If significant archaeological remains are encountered, any discoveries, and subsequent evaluation and treatment, should be documented in a cultural resource report, which should be submitted to the EIC and SCCIC.

Additionally, Health and Safety Code Section 7050.5, CEQA Guidelines Section 15064.5(e), and Public Resources Code Section 5097.98 mandate the process to be followed in the unlikely event of an accidental discovery of human remains in a location other than a dedicated cemetery.

Finally, if the Project is expanded to include areas not covered by this survey or other recent cultural resource studies, additional cultural resource studies may be required.

9
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APPENDIX A

Records Search Results Map

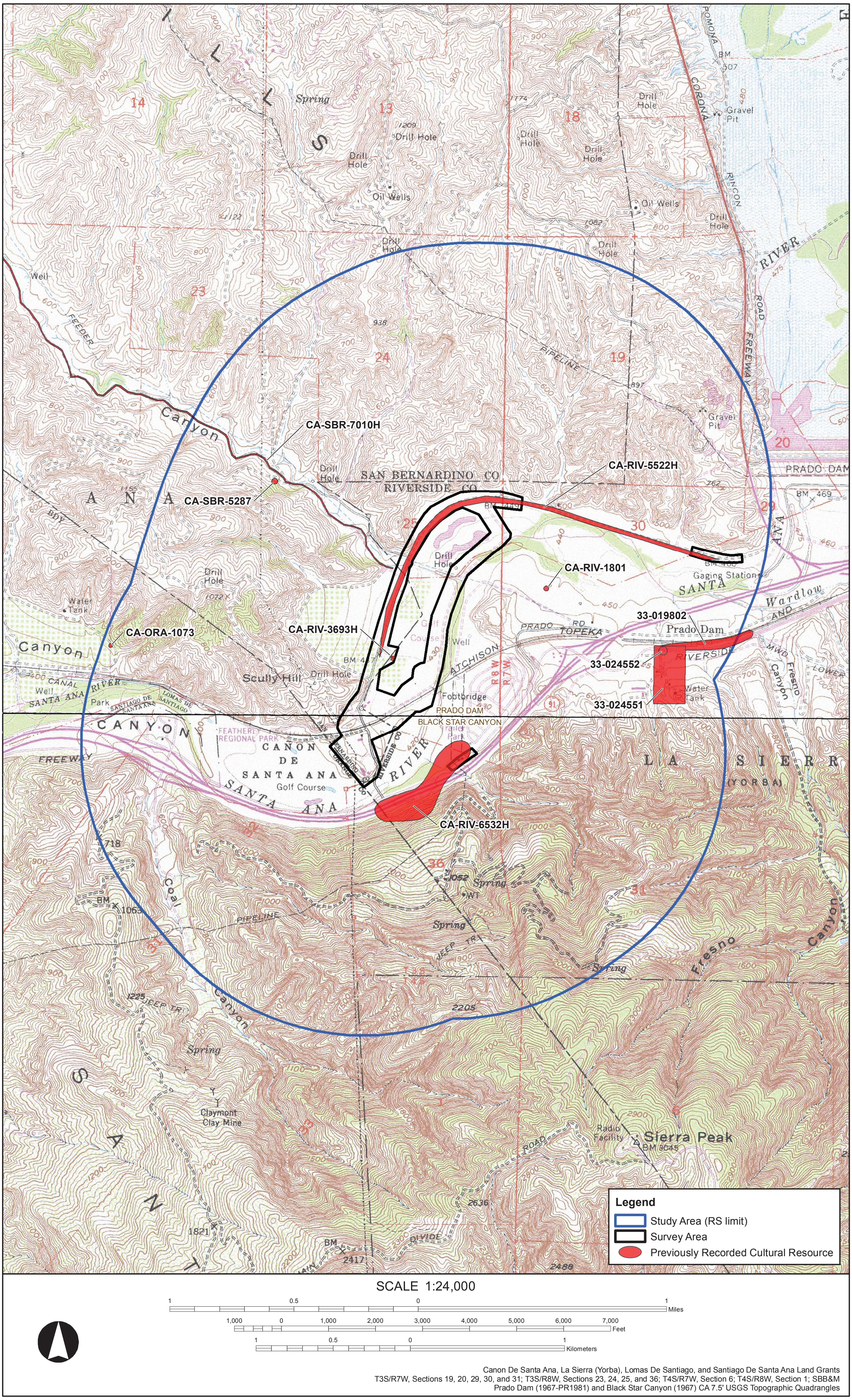

Figure A-1 **Records Search results map for the *Santa Ana River Trail - Phase 6 through Green River Golf Course Project* .**

APPENDIX B

Sacred Lands File Search

Sacred Lands File & Native American Contacts List Request

Native American Heritage Commission

1550 Harbor Boulevard, Suite 100
West Sacramento, CA 95691
916-373-3710
916-657-5390 – Fax
nahc@nahc.ca.gov

Information Below is Required for a Sacred Lands File Search

Date: 5/30/2019

Project: Santa Ana River Trails 2

County: Riverside, San Bernardino, and Orange.

USGS Quadrangle Name: Prado Dam (1967 PR 1981), Black Star Canyon (1967)

Township: 3 South **Range:** 8 West **Section(s):** 25, Canon De Santa Land Grant, La Sierra (Yorba) Land Grant
Township: 3 South **Range:** 7 West **Section(s):** 30, La Sierra (Yorba) Land Grant

Company/Firm/Agency: Applied EarthWorks, Inc.

Contact Person: Evan Mills

Street Address: 3550 East Florida Avenue, Suite H

City: Hemet **Zip:** 92544

Phone: (951) 766-2000

Fax: (951) 766-0020

Email: emills@appliedearthworks.com

Project Description:
The Riverside County Transportation Commission, in cooperation with the Riverside County Regional Parks and Open-Space District, San Bernardino County, and Orange County Public Works, as part of the Santa Ana River Trail Project, proposes a new trail segment through the Green River Golf Course. The project will result in ground disturbance. Applied EarthWorks, Inc. has been contracted to conduct a cultural resource study of the Project area in accordance with the California Environmental Quality Act (CEQA). Also, potential National Historic Preservation Act, Section 106 consultation with the United States Army Corps of Engineers.

STATE OF CALIFORNIA **Gavin Newsom, Governor**

NATIVE AMERICAN HERITAGE COMMISSION
Cultural and Environmental Department
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691 Phone: (916) 373-3710
Email: nahc@nahc.ca.gov
Website: http://www.nahc.ca.gov

June 18, 2019

Evan Mills
Applied EarthWorks

VIA Email to: emills@appliedearthworks.com

RE: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Santa Ana River Trails 2 Project, Orange, Riverside, and San Bernardino Counties

Dear Mr. Mills:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;

- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;

- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and

- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measures.

   All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the NAHC was negative.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: steven.quinn@nahc.ca.gov.

Sincerely,

Steven Quinn

Steven Quinn
Associate Governmental Program Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
Riverside, San Bernardino, Orange Counties
6/18/2019

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive
Palm Springs, CA, 92264
Phone: (760) 699 - 6800
Fax: (760) 699-6919
Cahuilla

Augustine Band of Cahuilla Mission Indians
Amanda Vance, Chairperson
P.O. Box 846
Coachella, CA, 92236
Phone: (760) 398 - 4722
Fax: (760) 369-7161
hhaines@augustinetribe.com
Cahuilla

Cabazon Band of Mission Indians
Doug Welmas, Chairperson
84-245 Indio Springs Parkway
Indio, CA, 92203
Phone: (760) 342 - 2593
Fax: (760) 347-7880
jstapp@cabazonindians-nsn.gov
Cahuilla

Cahuilla Band of Indians
Daniel Salgado, Chairperson
52701 U.S. Highway 371
Anza, CA, 92539
Phone: (951) 763 - 5549
Fax: (951) 763-2808
Chairman@cahuilla.net
Cahuilla

Gabrieleno Band of Mission Indians - Kizh Nation
Andrew Salas, Chairperson
P.O. Box 393
Covina, CA, 91723
Phone: (626) 926 - 4131
admin@gabrielenoindians.org
Gabrieleno

Gabrieleno/Tongva San Gabriel Band of Mission Indians
Anthony Morales, Chairperson
P.O. Box 693
San Gabriel, CA, 91778
Phone: (626) 483 - 3564
Fax: (626) 286-1262
GTTribalcouncil@aol.com
Gabrieleno

Gabrielino /Tongva Nation
Sandonne Goad, Chairperson
106 1/2 Judge John Aiso St., #231
Los Angeles, CA, 90012
Phone: (951) 807 - 0479
sgoad@gabrielino-tongva.com
Gabrielino

Gabrielino Tongva Indians of California Tribal Council
Robert Dorame, Chairperson
P.O. Box 490
Bellflower, CA, 90707
Phone: (562) 761 - 6417
Fax: (562) 761-6417
gtongva@gmail.com
Gabrielino

Gabrielino-Tongva Tribe
Charles Alvarez,
23454 Vanowen Street
West Hills, CA, 91307
Phone: (310) 403 - 6048
roadkingcharles@aol.com
Gabrielino

Juaneno Band of Mission Indians
Sonia Johnston, Chairperson
P.O. Box 25628
Santa Ana, CA, 92799
sonia.johnston@sbcglobal.net
Juaneno

Juaneno Band of Mission Indians Acjachemen Nation
Matias Belardes, Chairperson
32161 Avenida Los Amigos
San Juan Capisttrano, CA, 92675
Phone: (949) 293 - 8522
kaamalam@gmail.com
Juaneno

Juaneno Band of Mission Indians Acjachemen Nation - Romero
Teresa Romero, Chairperson
31411-A La Matanza Street
San Juan Capistrano, CA, 92675
Phone: (949) 488 - 3484
Fax: (949) 488-3294
tromero@juaneno.com
Juaneno

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Santa Ana River Trails 2 Project, Riverside, San Bernardino, Orange Counties.

La Jolla Band of Luiseno Indians
Fred Nelson, Chairperson
22000 Highway 76 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 3771

Los Coyotes Band of Cahuilla and Cupeño Indians
Shane Chapparosa, Chairperson
P.O. Box 189 — Cahuilla
Warner Springs, CA, 92086-0189
Phone: (760) 782 - 0711
Fax: (760) 782-0712
Chapparosa@msn.com

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Rroad — Cahuilla
Banning, CA, 92220 — Serrano
Phone: (951) 849 - 8807
Fax: (951) 922-8146
dtorres@morongo-nsn.gov

Pala Band of Mission Indians
Robert Smith, Chairperson
35008 Pala Temecula Road — Cupeno
Pala, CA, 92059 — Luiseno
Phone: (760) 891 - 3500
Fax: (760) 742-3189
rsmith@palatribe.com

Pauma Band of Luiseno Indians
Temet Aguilar, Chairperson
P.O. Box 369 — Luiseno
Pauma Valley, CA, 92061
Phone: (760) 742 - 1289
Fax: (760) 742-3422
bennaecalac@aol.com

Pechanga Band of Luiseno Indians
Mark Macarro, Chairperson
P.O. Box 1477 — Luiseno
Temecula, CA, 92593
Phone: (951) 770 - 6000
Fax: (951) 695-1778
epreston@pechanga-nsn.gov

Ramona Band of Cahuilla
Joseph Hamilton, Chairperson
P.O. Box 391670 — Cahuilla
Anza, CA, 92539
Phone: (951) 763 - 4105
Fax: (951) 763-4325
admin@ramona-nsn.gov

Rincon Band of Luiseno Indians
Jim McPherson, Tribal Historic Preservation Officer
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
vwhipple@rincontribe.org

Rincon Band of Luiseno Indians
Bo Mazzetti, Chairperson
One Government Center Lane — Luiseno
Valley Center, CA, 92082
Phone: (760) 749 - 1051
Fax: (760) 749-5144
bomazzetti@aol.com

San Luis Rey Band of Mission Indians
San Luis Rey, Tribal Council
1889 Sunset Drive — Luiseno
Vista, CA, 92081
Phone: (760) 724 - 8505
Fax: (760) 724-2172
cjmojado@slrmissionindians.org

Santa Rosa Band of Cahuilla Indians
Steven Estrada, Chairperson
P.O. Box 391820 — Cahuilla
Anza, CA, 92539
Phone: (951) 659 - 2700
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mflaxbeard@santarosacahuilla-nsn.gov

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Santa Ana River Trails 2 Project, Riverside, San Bernardino, Orange Counties.

Soboba Band of Luiseno Indians
Scott Cozart, Chairperson
P. O. Box 487
San Jacinto, CA, 92583
Phone: (951) 654 - 2765
Fax: (951) 654-4198
jontiveros@soboba-nsn.gov

Cahuilla
Luiseno

Torres-Martinez Desert Cahuilla Indians
Thomas Tortez, Chairperson
P.O. Box 1160
Thermal, CA, 92274
Phone: (760) 397 - 0300
Fax: (760) 397-8146
tmchair@torresmartinez.org

Cahuilla

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

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APPENDIX C

California Department of Parks and Recreation (DPR) 523

State of California — The Resources Agency | **Primary #** 33-003693
DEPARTMENT OF PARKS AND RECREATION | **HRI #/Trinomial** CA-RIV-3693H

CONTINUATION SHEET

☐ Continuation ☒ Update

Page 1 of 5 **Resource Name or #:** 33-003693/CA-RIV-3693H

Recorded by: Susan Wood **Date:** August 1, 2019 ____ **Continuation** __X__ **Update**

Originally recorded by J. Brock and J. Elliott in 1989, the site has been significantly altered since the first documentation. During the current cultural resource survey for the Santa Ana River Trail, it was observed that the site is being used as a storage and workshop/garage facility for groundskeepers of the Green River Golf Course. Brock and Elliott described Building 1 as one dilapidated/abandoned garage with small living quarters and measures 9.2 meters east/west by 11 meters north/south. Rehabilitations to Building 1 have changed the dimensions to 18 meters north/south by 15 meters east/west. Newer siding, roofing, concrete slab, garage doors, and many other alterations have rendered the building in a vastly different condition from the original documentation. Building 2 is described as small dilapidated/abandoned storage building and is no longer present. There is a large list of historic refuse represented in the site record and little historic refuse is remaining at present. Some glass shards and metal fragments were observed but the entire area around Building 1 is covered with modern groundskeeping equipment (lawnmowers, parts, wheels, engines, etc. (Figures 1 and 2).

Figure 1 **Front elevation of Building 1, looking northeast (Mills et al. 2019: Roll 3877-02-dm, Frame #12).**

Figure 2 **North elevation of Building 1, looking southwest. Note the more recent plywood siding and the new cement slab (Mills et al. 2019: Roll 3877-02-dm, Frame #14).**

CA-RIV-3693H lies within the borders of Rancho LA Sierra (Yorba), a Californio Land Grant secured by Bernardo Yorba in 1846 and finally confirmed by U.S. Land Patent in 1875. In 1858, during the land patent insecurity under the new American rule, Bernardo Yorba died, leaving behind a large and prosperous rancho to his numerous children that was able to sustain the costly years of litigation with the government that forced sale of many of the former rancho lands. In 1877, after the land patent was finally confirmed, a partition amongst Yorba's heirs of Rancho La Sierra was approved by the 17th Judicial District of California (Figure 3).

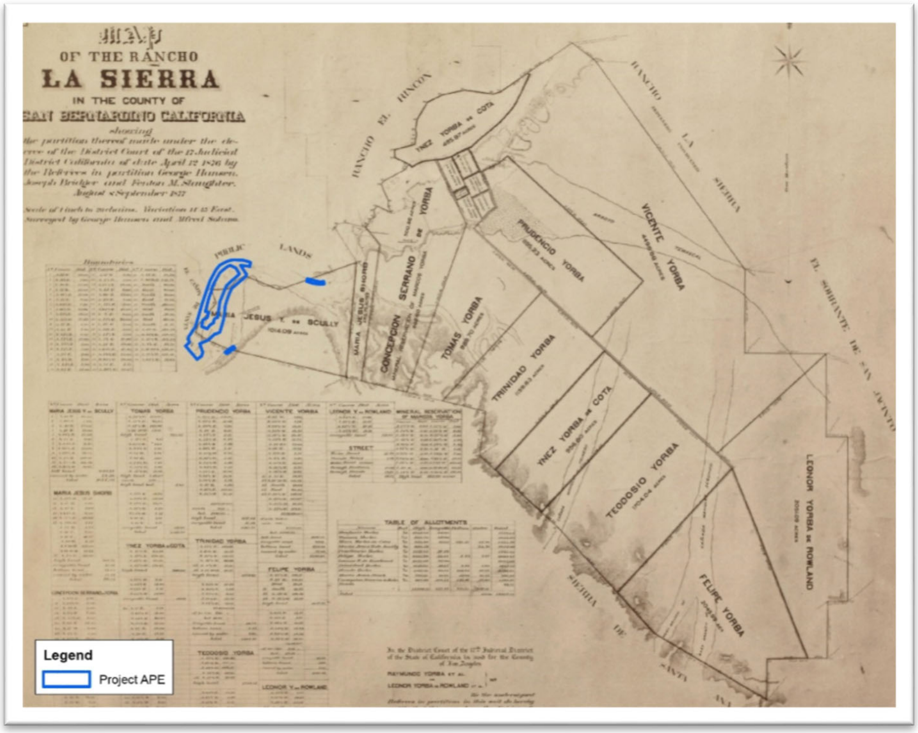


Figure 3 **Project APE superimposed over the partition map of Rancho La Sierra (1877) showing Maria Jesus Y. de Scully's allotment (The Huntington Library 1877).**

Most of the land that encompasses the Project APE of Potential Effects (APE) was awarded to Yorba's daughter, Maria Jesus Y. de Scully (District Court of the 17th District Court of the State of California, County of Los Angeles 1877; Lech 20004:46–47). Maria Jesus Yorba, after the death of her first husband Anastasio Botiller, had married Thomas J. Scully who had been hired as a school teach for the children at Rando La Sierra, and together they had six children (Davila 1893). Records indicate that after her inheritance, the Scully family established a ranch and home that was in the Project APE on what is now the property operated as the Green River Golf Course (Desborough 1981; State of California 1877). In 1985, the Scully Ranch site, just to the southwest of CA-RIV-3693H, was described in a study prepared for the U.S. Army Corps of Engineers in anticipation of improvements to the flood control system of the Santa Ana River Canyon. The report noted that the ranch, no longer extant, had included orange groves located in a cul-de-sac on the north side of the Santa Ana River and north of the what is now the Green River Golf Course. The Scully Ranch was assigned a temporary number for this report, PB-138; however, the site was never assigned a trinomial presumable because no built-environment or archaeological remains were noted (Langenwalter and Brock 1985:8-110–8-111). Interestingly, they also assigned another temporary number, PB-139, to a site titled "Unknown." This site, also no longer extant at that time, was described based on a 1936 aerial photograph of the Prado Basin, to include "a house surrounded by trees, two bars, corrals, and several outbuildings" (Langenwalter and Brock 1985:8-111). This description actually matches the historical accounts of the Scully Rancho complex (Desborough 1981: Davila 1893). It appears that temporary site PB-138, rather than Scully Ranch, may have been CA-RIV-3693H and the location of the ATSF railroad "Scully" stop that was located near the orchard groves just to the northwest of the ranch complex, and therefore, PB-139, noted as unknown, was the ranch site itself. In 1887, the Santa Fe Railroad completed the California Southern Line through Santa Ana Canyon. The line ran from Corona, through Prado, following the north bank of the Santa Ana River into the canyon, and through the Scully Ranch. In 1896, the Santa Fe Railroad emerged from receivership as the Atchison, Topeka and Santa Fe Railway (ATSF), and records indicate that the

Scully Ranch was a railway stop along this line through 1938 when the rail line was rerouted to its current alignment after a severe flood episode washed out much of the rail lines in the canyon, and in anticipation of the construction of the Prado Dam. The site is situated in the approximate location of the railway stop (Figures 4 and 5) (Ferguson 2017; USGS 1933).

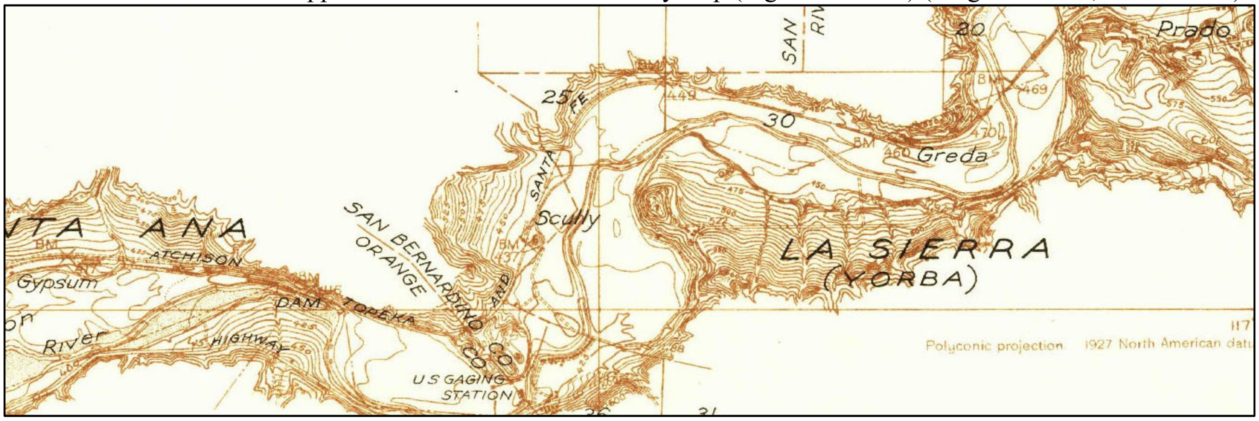


Figure 4 - 1933 USGS Map marking the ATSF stop at Scully in the approximate location of the site.

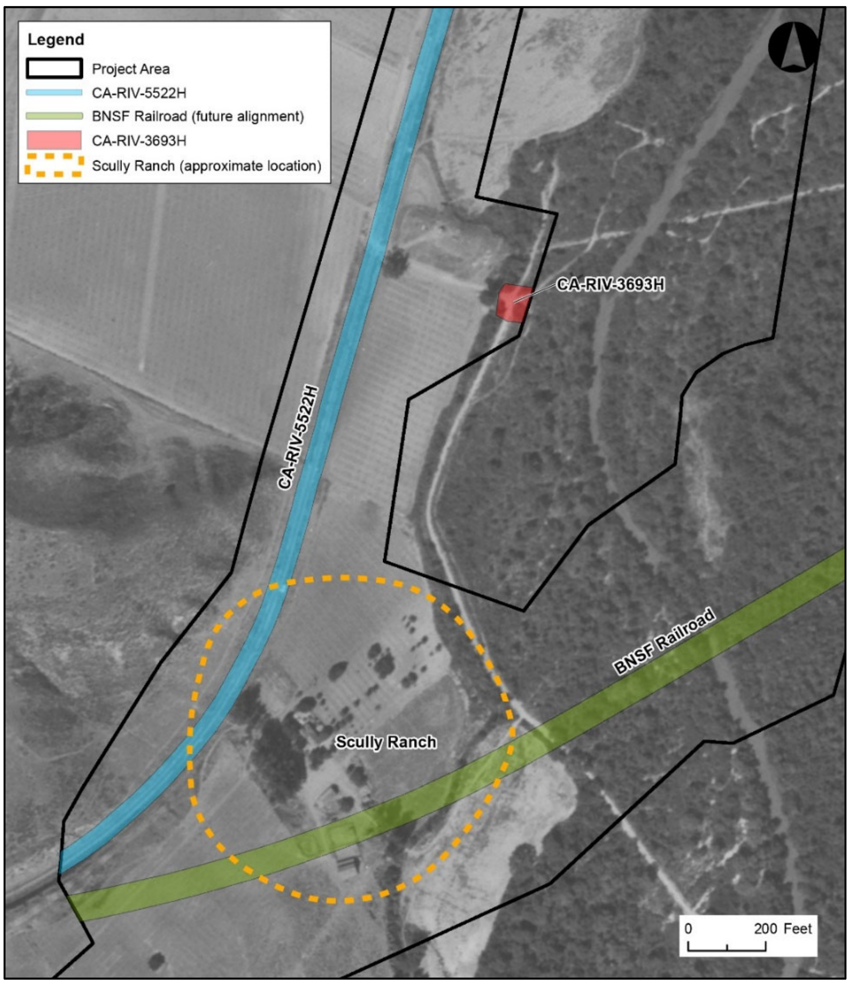


Figure 5 1936 Aerial Photograph with an overlay of the Project APE, CA-RIV-3693H, CA-RIV-5522H (Historic ATSF Alignment), and the approximate location of the Scully Ranch complex (UCSB 1931).

In 1989, J. Brock and J. Elliott, recorded CA-RIV-3693H as "an excellent example of Depression-era workplace/home," and noted two extant, dilapidated built-features: one garage structure with small living quarters and one small storage building. They also included a long list of historical artifacts that could suggest activities including farming or ranching, residential occupation, storage, etc. The temporal analysis of the site provided on the site record was that it most likely dated to the 1930s or earlier. None of the artifacts as listed and described provide temporally diagnostic certainty, and during the current study, the site was found severely altered with little historic refuse still observable. In a 1990 report, "Context Evaluation of Historical Sites in the Prado Basin," CA-RIV-3693H is documented as a 1930s dairy and is categorized in a table as having excellent integrity and probably eligible for the NRHP (Greenwood and Foster 1990:86). However, this evaluation appears to be based on a review of previous site records and reports. It does not appear the site was visited nor was it fully described or evaluated for this report. During the current investigation, no archival research was located to support this as a dairy site. CA-RIV-3693H appears to be originally the site of the ATSF Scully railway stop. Evidence suggests that the structure remnants that remain were most likely built in the late 1920s or early 1930s to support the activities of the ranch/farm and may have been storehouses for goods shipped in or out of the canyon ranch by rail.

Significance Evaluation:
Archival and archaeological evidence suggests that CA-RIV-3693H, and the nearby Scully Ranch site, if fully extant and in good condition, would be a historically significant site complex due to association with the Yorba family, the early railroads in California, and farming and ranching in the Santa Ana Canyon. However, little to nothing remains; what does remain has been significantly altered, and archival evidence is not conclusive. Therefore, CA-RIV-3693 is recommended as ineligible for listing on the NRHP and CRHR under any Criterion. Since CA-RIV-3693H is recommended ineligible for the NRHP and CRHR, no integrity evaluation is required.

References:

BNSF
2019 The History of BNSF: A Legacy for the 21st Century, https://www.bnsf.com/about-bnsf/our-railroad/pdf/History_and_Legacy.pdf, accessed August 7, 2019.

Desborough, Christina F.
1981 Rincon's One Hundred Years, 1839-1939: From Mexican Grant to Flood Control Era. Ms. On file, Corona Public Library, Heritage Room, Corona, California.

Dodge, R.V.
1959 *Perris and Its Railroad.* Railway History Page: San Diego Railroad Museum, http://sdrm.info/history/cs/perris.html, accessed August 14, 2019.

Ferguson, Jim
2017 *California Railroads: Passenger Stations and Stops*. Railwaystations.uk, http://www.railwaystationlists.co.uk/pdfusarr/californiarrs3.pdf, accessed August 14, 2019.

Greenwood, Roberta S., and John S. Foster
1990 Context and Evaluation of Historical Sites in the Prado Basin, In Partial Fulfillment of Contract No. DACW09-86-D-0034 for Cultural Studies, Civil Works Projects within the Southern California, Southern Nevada, and Arizona Regions.. Greenwood and Associates, Pacific Palisades, California, and Infotec Research Incorporated, Sonora, California. Prepared for the U.S. Army Corps of Engineers, Los Angeles District, Los Angeles, California.

Hogan, Michael
2016 *Final Report on Archaeological and Paleontological Resources Monitoring Santa Ana Canyon – Below Prado: Incland Empire Brine Line Protection Project, near the City of Corona, Riverside County, California.* CRM Tech, Riverside, California.

Langenwalter, Paul E., and James Brock
1985 *Phase II Archaeological Studies, Prado Basin and the Lower Santa Ana River, Contract No. DACW09-83-C-0033.* ECOS Management Criteria, Inc., Cypress, California. Prepared for the U.S. Army Corps of Engineers, Los Angeles District, Los Angeles, California.

Mills, Evan, Dennis McDougall, and Susan Wood
2019 *Cultural Resource Assessment for the Santa Ana River Trails Project, Riverside and San Bernardino Counties, California.* Applied EarthWorks, Inc., Hemet, California.

The Huntington Library, Art Collections, and Botanical Gardens.
1877 *Map of the Rancho La Sierra.* Solano-Reeve Collection, Maps-Huntington Digital Library, Digital I.D. #314036, https://hdl.huntington.org/digital/collection/p15150coll4/id/13261/, accessed August 21, 2019.

University of California, Santa Barbara (UCSB)
1931 *Corona* [air photo]. 1:12,000. Flight ID: C1740_9. Frame #71. Corona, Calif. 1939. https://Mil.library.ucsb.edu/ap-indexes/FrameFinder/. Accessed August 7, 2019 at FrameFinder.com.

1939 *Corona* [air photo]. 1:18,000. Flight ID: C5928_60. Frame #60. Corona, Calif. 1939. https://Mil.library.ucsb.edu/ap-indexes/FrameFinder/. Accessed August 7, 2019 at FrameFinder.com.

U.S. Geological Survey
1902 California Corona Quadrangle [map]. Edition of 1902 (surveyed in 1894 and 1899), 1:125,000. accessed July, 8 2019 at https://ngmdb.usgs.gov/topoview/.

1933 California Corona Quadrangle [map]. Edition of 1933 1:31,680, accessed July, 8 2019 at https://ngmdb.usgs.gov/topoview/.

1942 California Corona Quadrangle [map]. Edition of 1942 reprinted in 1947 (surveyed in 1894 and 1899), 1:125,000, accessed July 8, 2019 at https://ngmdb.usgs.gov/topoview/.

Archaeological Advisory Group

ARCHAEOLOGICAL SITE RECORD **Permanent Trinomial:** CA-RIV-3693-H
Other Designations: CSULB1

1. **County:** Riverside
2. **USGS Quad:** Prado Dam 7.5′ (1967, Photorevised 1981)
3. **UTM Coordinates:** Zone: 11 438030 m Easting 3748670 m Northing
4. **Township** 3S **Range** 8W; Unsectioned area **Base Mer.** SBM
5. **Map Coordinates:** 561 mmS 308 mmE **6. Elevation** 423-433′
7. **Location:** Santa Ana Canyon 2 miles west-southwest of Prado Dam./Access through Green River County Club.
8. **Prehistoric**___ **Historic** X **Protohistoric**___
9. **Site Description:** Site consists of two dilapidated historic farm structures with a heavy scatter of historical artifacts around them. Site dates to the late 1930s or earlier.
10. **Area:** 50 m N-S (length)x 30 m E-W (width) 1200 m^2
    Method of Determination: Transit shots of artifact distribution
11. **Depth:** Unknown **Method of Determination:** N/A
12. **Features:** One dilapidated/abandoned garage structure with small living quarters (Building 1), one small dilapidated/abandoned storage building (Building 2), and remnants of fence line. Both buildings have tin siding and roofs. There is a weatherboard addition off of the northeastern corner of Building 1. Building 1 measures 9.2 m E-W and 11 m N-S. Building 2 measures 3.65 m E-W and 5.5 m N-S.
13. **Artifacts:** Outside Building 1: 1 food jar, 1 ceramic insulator, 6 corrugated tin frags., 1 steel cable, 1 five gallon metal can, 6 ceramic tile pipe frags., 12 clear glass frags., 1 galvanized steel cable, 3 concrete pipe frags., 4 milk glass frags., 12 boards (various sizes), 1 Alberhill brick, 1 bed spring, 1 three gallon metal container, 1 master lock key, 1 industrial spring, 6 large staples, 1 duraglass frag., 3 spark plugs, 1 table knife, 1 fork, 1 fuse box, 1 wire mesh, 1 gas cap, 1 wire coat hanger, 3 threaded pipe frags., 1 flux brush, 3 metal caps, 7 bolts (various types), 12 nails (various types), 1 can, 1 auto tire (70-14, 4 ply), 1 rubber hose. Outside Building 2: 1 partial Fresno scraper, 1 pipe joint, 10 irrigation regulator plates, 6 concrete pipe frags, 6 lengths of sprinkler pipe, 1 food jar, 4 flat glass frags., 1 green glass frag., 1 clear bottle base, 1 brown glazed ceramic frag., 5 aqua glass frags., 1 steel frame, 3 golf balls (modern), 1 large metal part from farm implement, 1 galvanized pipe, 1 seeder (partial), 1 rubber hose. Inside Building 1: 1 large pipe joint, 1 threaded pipe, 25 wood siding pieces, 6 bed springs, 1 tool box with rubber handle, 2 galvanized pipe frags., 1 fuse box, 2 large wooden box lids, 1 faded metal sign, 1 work bench, 2 "Royal Triton" cans of Union Oil, 1 hex clamp, 1 harness strap nailed to wall, 1 large sheet metal frag., 6 bolts (various), 8 nuts, 3 staples, 1 glass frag., 1 spark plug, 1 valve cover, 1 door lock with key, 1 large bottle base, 25 nails (various), 1 oil pan, 1 exhaust pipe, 1 porcelain toilet, 1 metal bath tub, 20 glass frags. (mirror), 1 tin pan, 3 barbed wire frags, 3 forty gallon drums, 1 ten gallon drum, 2 irrigation pipes, 1 jack, 1 five gallon can (square), 1 five gallon can (round), 1 two-inch galvanized pipe . .

Archaeological Advisory Group

ARCHAEOLOGICAL SITE RECORD

Permanent Trinomial: CA-RIV-3693-H ___|___ Mo. Yr.

Other Designations: CSULB1

13. **Artifacts** (continued)
    1 radiator (partial), 1 metal pulley, 1 large metal collar, 1 galvanized steel cable, 1 metal bar (stock), 1 metal window frame, 1 sawed redwood plank. This is only a partial inventory compiled by J. Elliott.
14. **Non-Artifactual Constituents and Faunal Remains:** Clam shell frags
15. **Date Recorded:** 01 Sept. 1989 **16. Recorded By:** J. Brock and J. Elliott
17. **Affiliation and Address:** Archaeological Advisory Group, 1539 Monrovia Ave., Suite 11, Newport Beach, CA 92663
18. **Human Remains:** None
19. **Site Disturbances:** Natural decay, livestock disturbance, and minor vandalism
20. **Nearest Water:** Santa Ana River flows N-S 350 m to east
21. **Vegetation Community (site vicinity):** Intrusive grasses and weeds
22. **Vegetation (on site):** Same
23. **Site Soil:** Dark brown clayey loam
24. **Surrounding Soil:** Same
25. **Geology:** Alluvium
26. **Landform:** Flood plain
27. **Slope:** 0-10 degrees **28. Exposure:** Open
29. **Landowner and Address:** U.S. Army Corps of Engineers, Los Angeles District, P.O. Box 2711, Los Angeles, CA 90053-2325
30. **Remarks:** Site is excellent example of Depression-era workplace/home.
31. **References:**

Langenwalter, Paul E., II, and James Brock
  1985 Phase II Archaeological Studies of Prado Basin and the Lower Santa Ana River. Ms. on file, U.S. Army Corps of Engineers, Los Angeles.

Rosenthal, E. Jane, and Steven J. Schwartz
  1979 A Cultural Resources Survey of the Proposed Santa Ana River Hiking/Biking Trail in the Prado Flood Control Basin. Ms. on file, U.S. Army Corps of Engineers, Los Angeles.

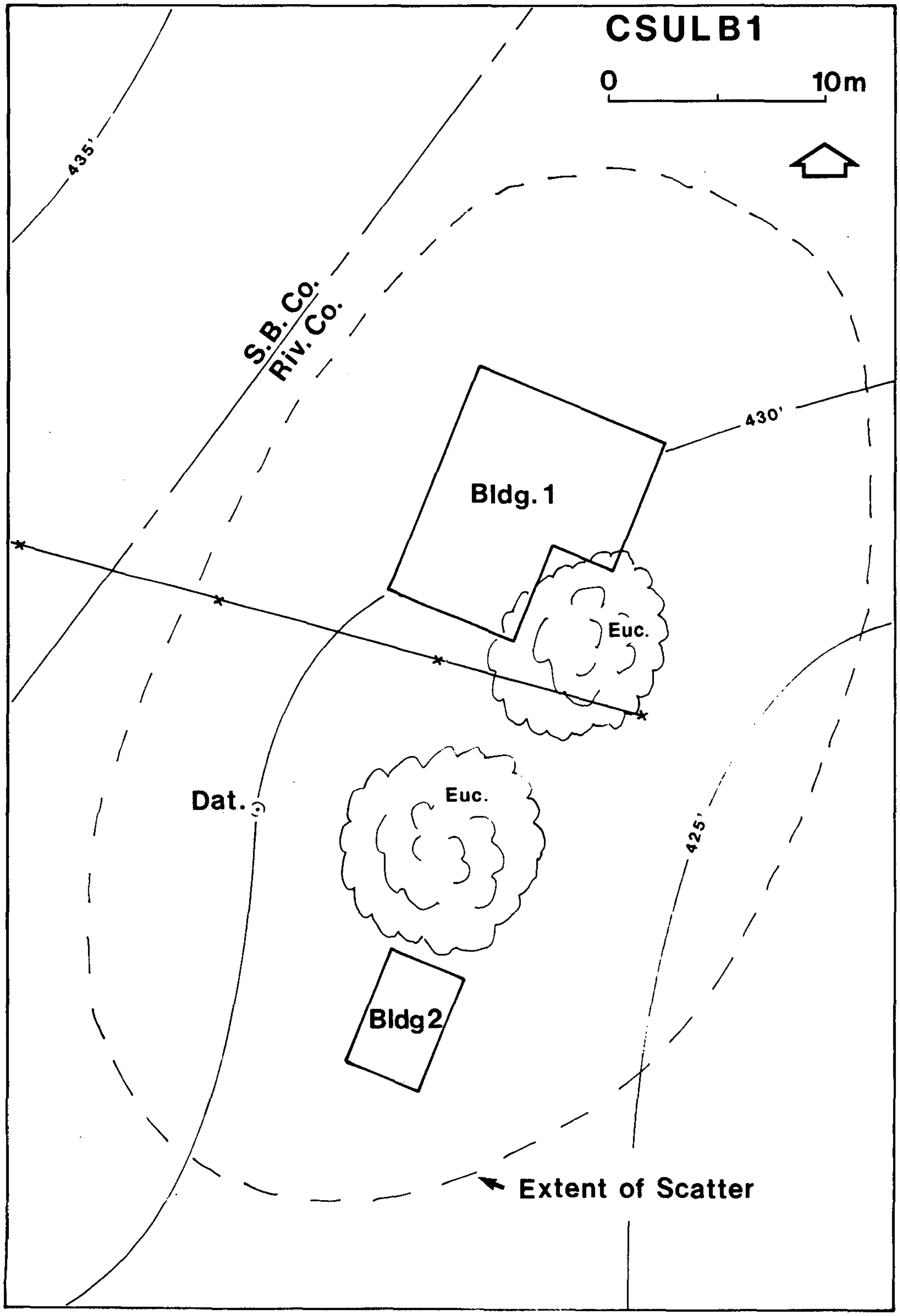
32. **Name of Project:** Prado Basin site forms
33. **Type of Investigation:** Site forms completion only
34. **Site Accession Number:** N/A **Curated At:** N/A
35. **Photos:** B&W prints on file at Archaeological Advisory Group

Archaeological Advisory Group

ARCHAEOLOGICAL SITE MAP

Permanent Trinomial: CA-RIV- 3693-H ___/___ Mo. Yr.

Other Designations: CSULB1



Archaeological Advisory Group

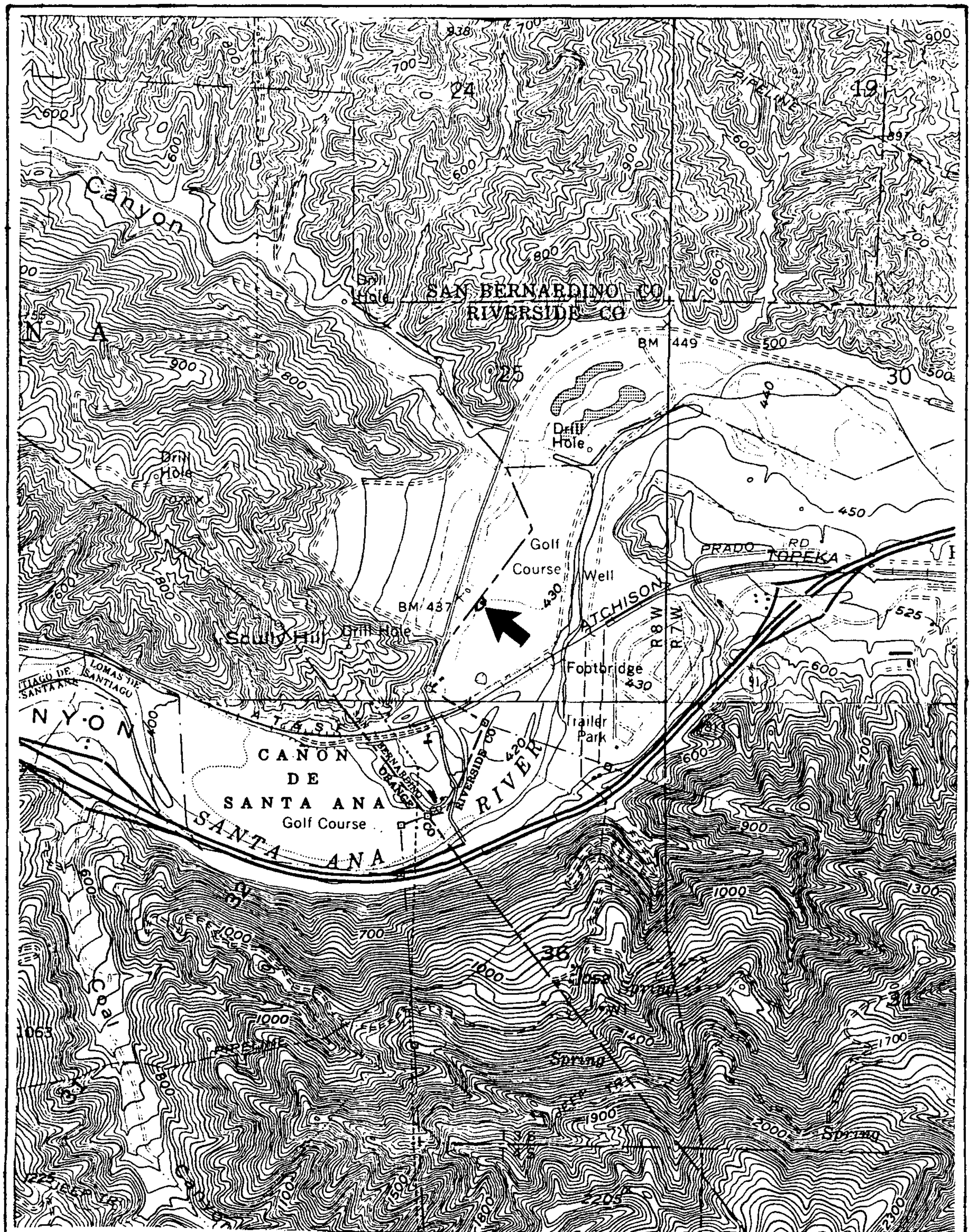
ARCHAEOLOGICAL SITE LOCATION MAP

Permanent Trinomial: CA-RIV-3693-H ___|___ Mo. Yr.

Other Designations: CSULB1

Page 4 of 4.

Map is composite of portions of the USGS Prado Dam and Black Star Canyon 7.5´ quads.



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # 33-005782
HRI #/Trinomial CA-RIV-5522H

☐ Continuation ☒ Update

 Resource Name or #: Atchison, Topeka, And Santa Fe Railway (ATSF)

Recorded by: Susan Wood **Date:** August 1, 2019 ____ **Continuation** __X__ **Update**

During the current cultural resource survey for the Santa Ana River Trail, (Mills et al. 2019), one new segment of grade was found within the Project Area of Potential Effects (APE). The majority of the site is now a road along the original alignment of the Santa Fe Railroad's California Southern Line, San Bernardino and San Diego route through Santa Ana Canyon completed in 1887 (Figures 1 and 2) (Dodge 1959).

Figure 1 - Overview of site from the southwest (Mills et al. 2019: Roll 3877-02-Em, Frame #21).

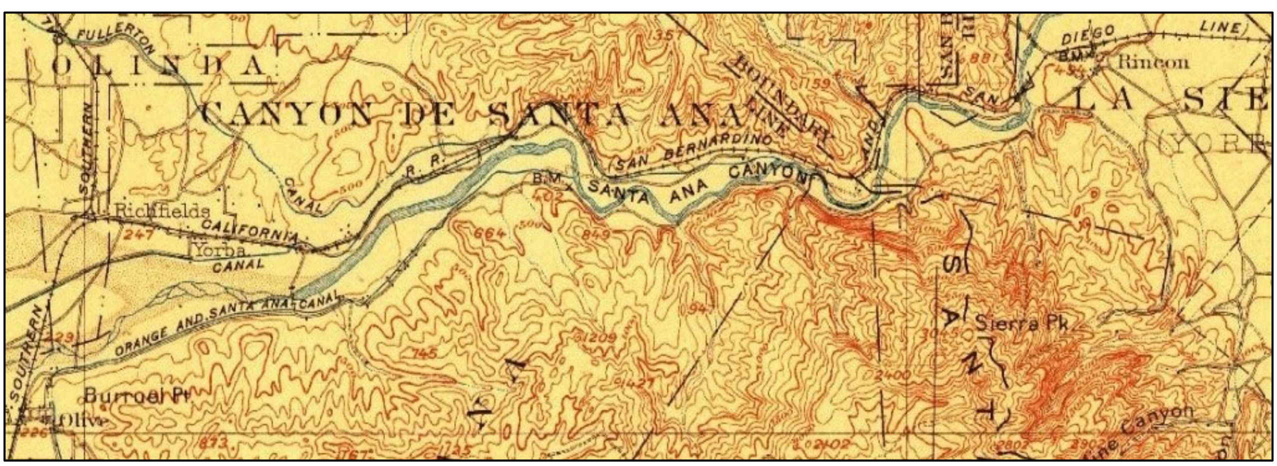


Figure 2 The Southern California Railroad – San Bernardino and San Diego Line owned by the Santa Fe Railroad Company through the Santa Ana Canyon surveyed in 1894 (USGS Corona 1902).

In 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the Atchison, Topeka and Santa Fe Railway Company (ATSF) (see Figure 3) (BNSF 2019 28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic through the region. The line ran from Corona, through Prado, following the north bank of the Santa Ana River into the canyon, and through the Scully Ranch in the Project APE.

Records indicate that the Scully Ranch was a railway stop along this line through 1939 when the line was rerouted to its current path to accommodate the construction of the Prado Dam (Figures 3 and 4) (Ferguson 2017; USGS 1933).

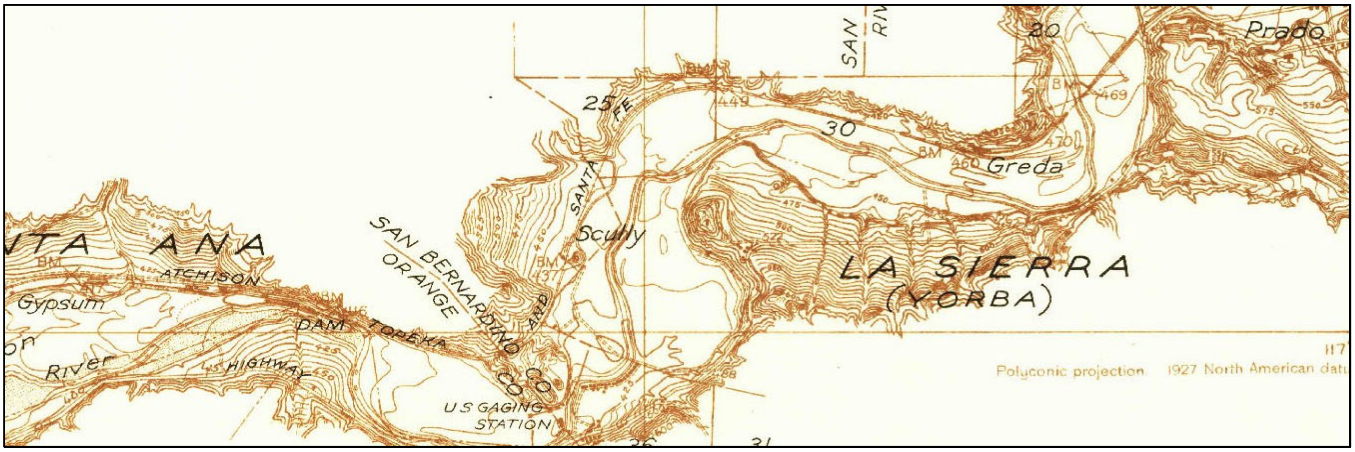


Figure 3: The ATSF Railway route through the Project APE in the Santa Ana Canyon with stops noted at Prado, Greda, Scully, and Gypsum (USGS Corona 1933).

Originally documented in 1995 by A. G. Toren, the site consists of a section of former railroad grade and associated features (concrete piers, bridge abutments, berms). The site was updated in 2016 by CRM Tech and cites the finding of additional features (rail assembly structure, railroad bridge support beams, and faunal remains) during construction monitoring. These new features are not within the APE of this current project and were not observed. What was observed is the current condition of the former grade, which now functions as a road (used by the golf course, California State Parks staff, cyclists, and hikers) and an extension of the Santa Ana River Trail. The road appears to have been graded multiple times and is well maintained. Absent the site record, one would not have any indication that one segment of the site (within the APE) is historic and associated with the railroad. There was no historic refuse observed along the segment within the Project APE. The areas adjacent to the road are completely overgrown with vegetation and ground visibility is very poor (0–5 percent). However, the new segment of grade identified is directly adjacent to the existing road/trail on the far east end of the current Project APE (Figure 5). The new segment of grade is 14 feet wide on the interior. There is a berm (6 feet wide x 18 inches tall) for the entire length of the north side of the grade. Additionally, there is a berm of the same size along the southern side but only on the western half of the 492-foot-long segment. The new segment of grade terminates in the west due to a finger ridge that extends south from the small hills immediately to the north. UTM coordinates for the new segment are: Eastern terminus 440222mE / 3749539mN and Western terminus 440078mE / 3749540mN.

☐ Continuation ☒ Update

 Resource Name or #: Atchison, Topeka, And Santa Fe Railway (ATSF)

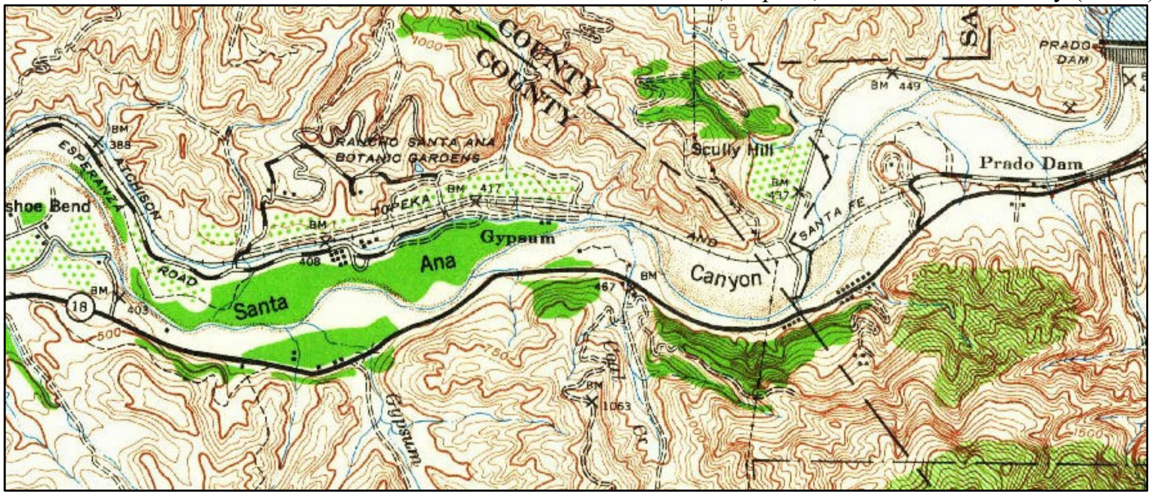


Figure 4 ATSF Rail Line through the Project APE in the Santa Ana Canyon. Note the new, more direct route through the Project APE built after the 1939 flood and to facilitate the construction of the Prado Dam (USGS Corona 1942).

Figure 5 Overview of new road grade segment (facing east).

Significance Evaluation:
Few other events altered the course of California history than the arrival of the railroad in the 1870s and 1880s. The railroad was a primary contributing factor to the rise of population in California as it opened up new lands and opportunities for Americans in the east; the rail wars of the 1880s in California between the Southern Pacific and the Santa Fe Railroad made these opportunities available to members of the middle-class as well as the wealthy land speculators. Initially, to expand their service farther into California, and due to restrictions of their competition with Southern Pacific, the Santa Fe Railroad used the purchase of smaller lines to expand their reach. A 1902 map (surveyed in 1894 and 1899) of the Project APE shows Santa

Fe Railroad's "Southern California Railroad- San Bernardino and San Diego Line" that began running through the Santa Ana Canyon in 1887.

In 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the Atchison, Topeka and Santa Fe Railway Company (ATSF) (BNSF 2019:28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic through the region. However, the segment in the Project APE was decommissioned when the line was rerouted in 1939 to accommodate the construction of the Prado Dam (see Figure 4).

While the significance of the railroads diminished after the 1950s when automobiles became the preferred method of transportation in the region, the ATSF, in its updated configuration, continued service through the Santa Ana Canyon until their merger with the Burlington Northern Railroad to form the Burlington Norther Santa Fe Railroad (BNSF) in 1995 (BNSF 2019:29). The site represents the significance of the railroad as a mode of transportation and commerce in Southern California and as an important connection to with the rest of the country and is significant under Criterion A/1 within the era from 1887 to 1939 when the segment of the line in the Project APE was decommissioned.

Integrity Evaluation: Although the ATSF Railway, now part of BNSF, is eligible as a whole for the NRHP/CRHR under Criterion 1/A, the two segments within the APE lack integrity. While both segments retain their association with the historical ATSF railway line, the overall loss of integrity has compromised both segments' ability to convey the significance of this resource. The one-mile segment in the south of the APE no longer exists, except as a dirt road. The only remains of the newly identified grade segment are the earthen berms on either side. The site lacks integrity of setting, feeling, workmanship, design, materials and AE recommends the site ineligible for listing on the CRHR and NRHP.

References:

BNSF
2019 The History of BNSF: A Legacy for the 21st Century, https://www.bnsf.com/about-bnsf/our-railroad/pdf/History_and_Legacy.pdf, accessed August 7, 2019.

Dodge, R. V.
1959 *Perris and Its Railroad.* Railway History Page: San Diego Railroad Museum, http://sdrm.info/history/cs/perris.html, accessed August 14, 2019.

Ferguson, Jim
2017 *California Railroads: Passenger Stations and Stops*. Railwaystations.uk, http://www.railwaystationlists.co.uk/pdfusarr/californiarrs3.pdf, accessed August 14, 2019.

Hogan, Michael
2016 *Final Report on Archaeological and Paleontological Resources Monitoring Santa Ana Canyon – Below Prado: Incland Empire Brine Line Protection Project, near the City of Corona, Riverside County, California.*

Mills, Evan, Dennis McDougall, and Susan Wood
2019 *Cultural Resource Assessment for the Santa Ana River Trails Project, Riverside and San Bernardino Counties, California.* Applied EarthWorks, Inc., Hemet, California.

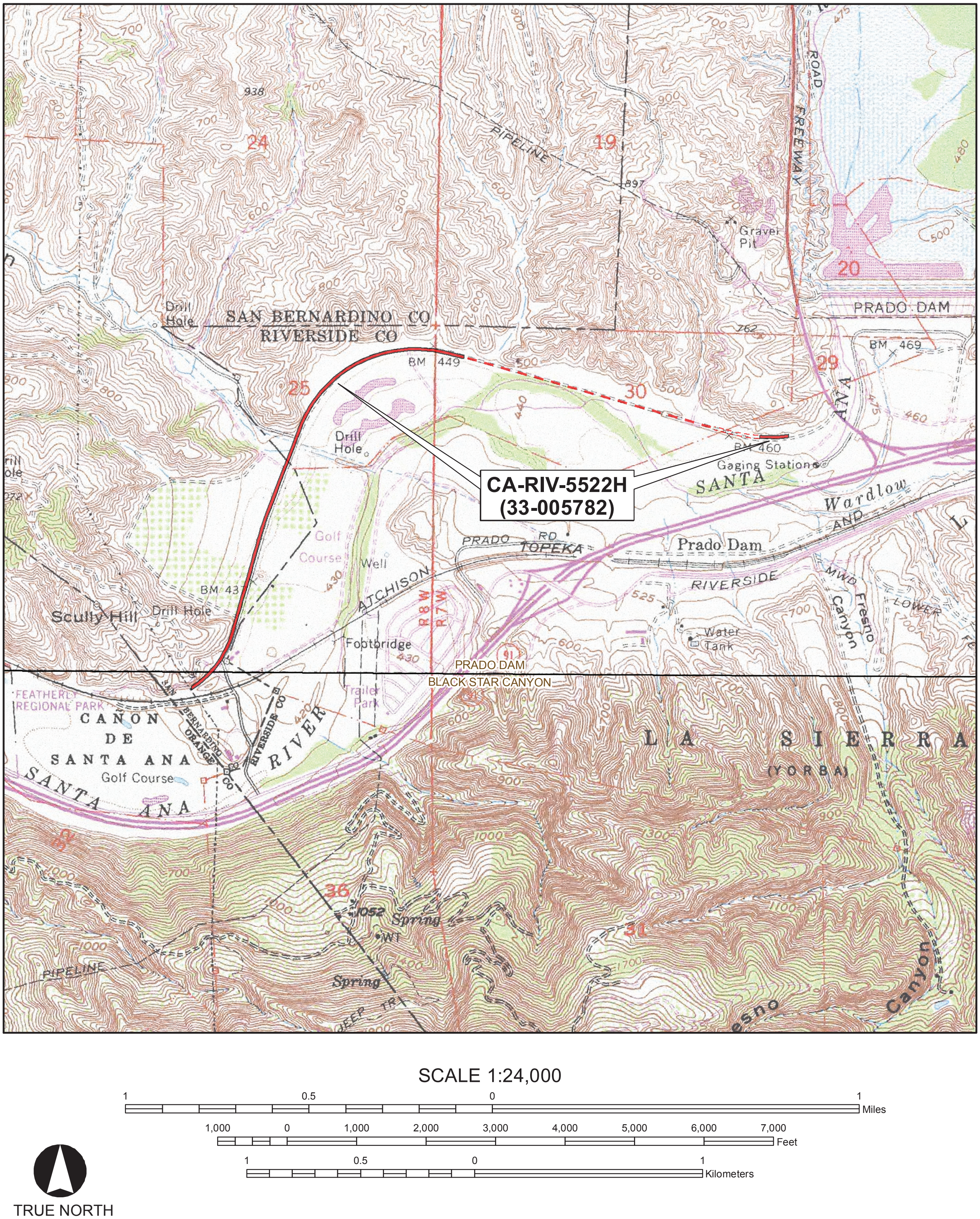
U.S. Geological Survey
1902 California Corona Quadrangle [map]. Edition of 1902 (surveyed in 1894 and 1899), 1:125,000. accessed July, 8 2019 at https://ngmdb.usgs.gov/topoview/.
1933 California Corona Quadrangle [map]. Edition of 1933 1:31,680, accessed July, 8 2019 at https://ngmdb.usgs.gov/topoview/.
1942 California Corona Quadrangle [map]. Edition of 1942 reprinted in 1947 (surveyed in 1894 and 1899), 1:125,000, accessed July 8, 2019 at https://ngmdb.usgs.gov/topoview/

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #
HRI#
Trinomial

Page 5 **of** 6 **Resource Name or #:** Atchison, Topeka and Santa Fe Railway (ATSF) **Scale:** 1:24,000

Map Name: Prado Dam and Black Star Canyon (both 1967, photorevised 1981), CA, USGS 7.5' quadrangles **Date:** 2019



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary #
HRI#
Trinomial

 ***Resource Name or #:** Atchison, Topeka and Santa Fe Railway (ATSF)

***Drawn by:** E. Mills ***Scale:** 1 inch equals 1,500 feet **Date:** August 2019

Recorded by Ben Kerridge **Date** June 29, 2016 ___ Continuation √ Update
Form Prepared by Ben Kerridge **Date** June 29, 2016
Affiliation: CRM TECH, Colton **Project No:** CRM TECH 2903

Between November 2015 and June 2016, CRM TECH provided archaeological resources monitoring services on a "spot-check" and on-call basis during the installation of approximately 2,500 linear feet of sheet pile at two locations along the course of Site 33-005782 (now the Santa Ana River Trail) near the City of Corona. The project location lies to the north of State Route (SR) 91, west of SR 71, and just south of the Riverside-San Bernardino county line, within Section 30 of T3S R7W and Section 25 of T3S R8W, San Bernardino Base Meridian.

A number of historic-period artifacts and features were discovered as a result of the monitoring program. Most of the artifacts were found in backdirt, and these included a railroad spike, two concrete fragments (one with a pattern on its flattest edge), a 3.5-inch-diameter iron ring, a freight car door brace, three rod-and-washer assemblies of various lengths, a large horse vertebra, and an 8-inch nail. Also, an approximately seven-foot-long segment of rail was discovered around 12 feet downslope of the former railroad grade. Because all of these artifacts were found out of depositional context, no provenience data could be assigned to any of them.

Some of the artifacts and features were discovered *in situ*, including a rail assembly structure, remnants of support beams for a railroad bridge, and elements of a large mammal skeleton. These findings are discussed further below.

- **Rail Assembly Structure:** In the eastern portion of the main trench, along the south wall and at five to six feet below ground surface, a wooden assembly was discovered on April 7, 2016 (Figure 3). Constructed of 5x5-inch beams, the main structure continued into the south wall, but no evidence of this feature was visible in the north wall of the trench. On top of the main structure sat two other beams of the same size running perpendicular to those underneath them. Below the main structure, two more beams measuring five inches wide and two inches tall ran parallel to those on top. The structure was heavily eroded and in poor condition, with much of the wood displaying superficial signs of fire damage.

  The soil underneath the assembly was loose, white, very fine sand with almost no rocks, and the soil above was hard, grey/red/charcoal-colored and compacted. Two highly decomposed nails were removed from either corner of the exposed segment. The nails are not uniform. One appears to be a wire nail, approximately six inches in length. The other is also six inches long but much thicker and much more decomposed.

- **Railroad Bridge Support Beams:** In the Aliso Wash area of the project (the westernmost segment), at the bottom of the trench, a set of four pairs of support beam bases were encountered. The support beams also measured 5x5 inches in thickness, stood in pairs approximately six feet from each other, and were arranged in sets spaced ten feet apart across the Aliso Wash. Four sets were visible at the time of the field visit on April 7, 2016. Each of the beams appeared to have been burned and smelled strongly of creosote oil. Consistent to the alignment of the former rail line, these beams evidently represent the remains of a railroad bridge.

- **Faunal Remains:** In the westernmost portion of the trench line, about 10 feet from the west end, an assortment of bones was discovered in the south trench wall some 12 feet below the road grade and 8 feet below the golf course grade. The bones were unearthed approximately eight feet to the west of a section of the trench in mostly black alluvial soil, in an area that featured mostly very fine loose brown soil. Just below the bones was a coarser, harder-packed brown sandy soil with many rock inclusions.

  The bones appear to be from a large, quadrupedal mammal and are in a badly decayed state. All but a pair of long bone fragments crumbled at any attempts to remove them from the wall without digging substantially around them. The condition of the bones suggests that they are not prehistoric but are likely more than a few decades old.

Most of the artifacts and features discovered during the monitoring program are undoubtedly associated with Site 33-005782, but as peripheral elements of common character, none of them demonstrates the potential to yield any important archaeological data for the study of history. Therefore, they do not contribute to the historic significance of the site. In light of the location of the project along a dismantled rail line, it was anticipated that such artifacts and features would be encountered during the project. No further treatment will be necessary for these artifacts and features.

Some of the artifacts were re-buried at the locations where they were found, while others were collected for further examination. The collected artifacts, as listed in the attached catalogue (see p. 4), were delivered to the RCFCWCD for possible curation by the State of California Department of Parks and Recreation, which has jurisdiction over the land on which the project was carried out.

Report Citation:

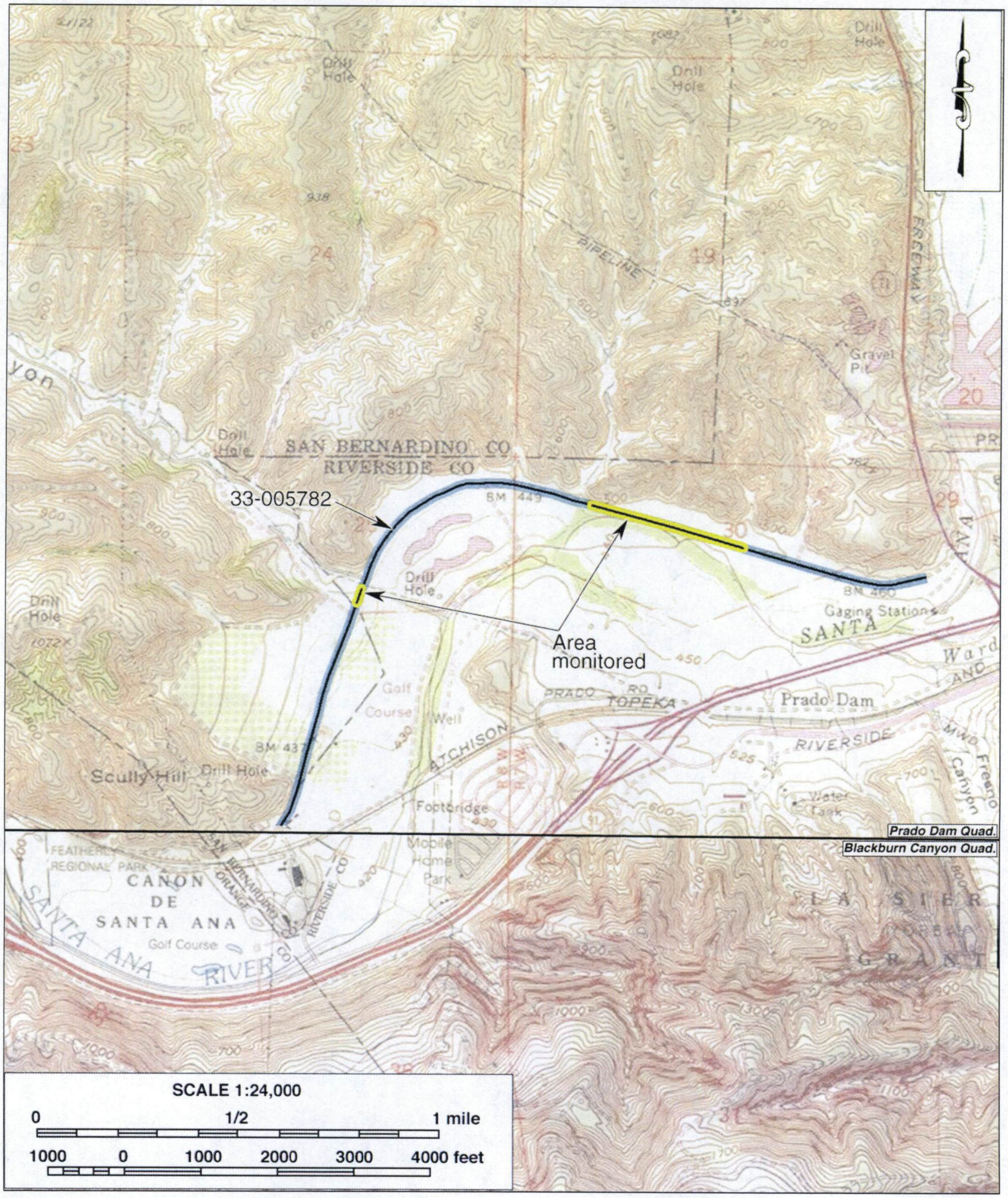
Michael Hogan
2016 Final Report on Archaeological and Paleontological Resources Monitoring Santa Ana Canyon - Below Prado: Inland Empire Brine Line Protection Project, near the City of Corona, Riverside County, California.

State of California--The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # 33-005782 (Update)
HRI #
Trinomial CA-RIV-5522H (Update)

Page 3 **of** 4 **Resource name or #** (Assigned by recorder)

***Map Name:** Prado Dam and Blackburn Canyon, Calif.
***Scale:** 1:24,000 ***Date of Map:** 1981/1988



Archaeological Catalogue

Cat #	Material	Artifacts	Ct	Loc	Depth	Date	Dimensions	Remarks
2903-01H	metal	iron ring	1	unknown	unknown	1/20/2016	4.5-inch diameter	
2903-02H	metal	rail spike	1	unknown	unknown	1/28/2016	6 inches long	
2903-03H	metal	rod and washer unit	1	unknown	unknown	3/24/2016	2 foot long; 5-inch washers	
2903-04H	metal	freight car door brace	1	unknown	unknown	2/24/2016	6x2x3 inches	base says "FREIGHT"
2903-05H	cement	concrete fragment	1	unknown	unknown	3/30/2016	6x6x3 inches	appears to be a paving stone
2903-06H	metal	nails	2	main trench	5-6 feet	4/7/2016	6 inches long	pulled from the rail assembly
2903-07H	metal	nail	1	unknown	unknown	5/19/2016	8 inches long	
2903-08H	metal	rod and washer unit	1	unknown	unknown	5/19/2016	18 inches long	washer has eroded off the unit
2903-09H	metal	rod and washer unit	1	unknown	unknown	6/1/2016	1 foot long; 5-inch washer	
2903-10H	cement	concrete fragment	1	unknown	unknown	6/1/2016	5.5x4x2 inches	part of a gutter or drain
2903-11H	bone	faunal remains	3	main trench	12 feet	6/16/2016	6.5 inches long; 2-inch diameter	three pieces of two bones from a large quadruped

33-5782

1. **County:** Riverside

2. **USGS Quad:** Prado Dam **(7.5′)** 1967 **(15′)** **Photorevised:** 1981

3. **UTM Coordinates: Zone** 11 440700 **m Easting** 3 749 600 **m Northing**

4. **Township** 3S **Range** 7W Center of N 1/2 of NW 1/4 of Section 29. **Base Mer.** SBM

5. **Map Coordinates:** 522 **mmS** 417 **mmE (from NW corner of map)** 6. **Elevation:** 460 ft

7. **Location:** The site is located in the flat area just below, and south of, Prado Dam. Five piers, a bridge abutment and road bed segment are present on the east side of the Santa Ana River. The former road bed starts at the base of a rock lined terrace bank 1300 feet west from the east end of the dam. The alignment runs southwest to the river levee.

   Access: From Corona, take Auto Center Drive north to gate of Prado Flood Control Basin. Continue on the paved road (old Pomona-Rincon Road) for 0.35 mile, and take the dirt road that branches off to the west. Continue west to the dam and then follow the road south at the east end of the dam. Continue down the road along the base of the dam for 1000 feet. The railroad berm and road bed run southwest from this point. The bridge abutment lies a short distance to the southwest and is marked by the benchmark on the USGS Prado Dam topo. The concrete bridge piers should be readily visible.

8. **Prehistoric** **Historic** X **Protohistoric**

9. **Site Description:** The site consists of section of former railroad grade, a bridge abutment and five concrete piers for a former Santa Fe Railroad bridge. Five oval concrete piers are readily visible. One is buried up to its top but the others show more height, up to approximately eight feet. The bridge was built in the late 1920s (Langenwalter and Brock 1985) and was abandoned when the railroad shifted its alignment because of dam construction in the 1940s. A U.S. Coast and Geodetic Survey marker dated 1924 is present on the south side of the bridge abutment. The bridge abutment and bridge piers were made of poured concrete utilizing wooden forms in their construction.

10. **Area:** 275 **m** (NE-SW) **x** 10 **m** (NW-SE); 2,750 **m²**.
    Method of Determination: Surface expression and interpretation of air photos.

11. **Depth:** Unknown **cm. Method of Determination:** NA

12. **Features:** Five concrete piers for former bridge. The concrete bridge abutment for the eastern end of the bridge and former berm and cut for grade. The piers are oval in shape and formed of poured concrete. They measure 30 feet long and 7 feet wide and slightly flare toward the bottom. Two rectangular 4 by 4.7 feet rectangular pads, one on either end of the bridge, supported the bridge. These pads exhibit eight 1inch bolts to anchor the steel bridge.

    The bridge abutment takes the form of a concrete retaining wall with a shelf to support the east end of the bridge. This feature is partially buried, but measures 25 feet and 2 feet wide across the top. The shelf is 4 feet below the top of the structure, and is 2 feet wide.

13. **Artifacts:** None noted.

14. **Non-Artifactual Constituents and Faunal Remains:** None observed.

RECEIVED IN
APR 27 1995
EIC

15. **Date Recorded:** 2-28-95

16. **Recorded By:** A.G. Toren.

17. **Affiliation and Address:** Greenwood and Associates, 725 Jacon Way, Pacific Palisades, California 90272

18. **Human Remains:** None.

19. **Site Disturbances:** Construction of the dam and rechanneling of the Santa Ana River has probably caused the removal of one or more piers. Periodic flooding and siltation may have obscured other associated features.

20. **Nearest Water (type, distance and direction):** Santa Ana River adjacent to the site.

21. **Vegetation Community (site vicinity):** Grasses and shrubs, riparian along river banks.

22. **Vegetation (on site):** Shrubs and grasses.

23. **Site Soil:** Sands and silts derived from flooding.

24. **Surrounding Soil:** Same.

25. **Geology:** Alluvial deposition of granitic derived soils and cobbles.

26. **Landform:** Level flood plain.

27. **Slope:** Level.

28. **Exposure:** Open.

29. **Landowner(s) (and/or tenants) and Address:** U.S. Army, Corps of Engineers, Los Angeles District.

30. **Remarks:**

31. **References:** PB-97 is referenced in: Langenwalter, P. and J. Brock, *Phase II Archaeological Studies of the Prado Basin and Lower Santa Ana River*. 1985: ECOS Management Criteria, Inc. Ms. submitted to the U.S. Army Corps of Engineers, Los Angeles District.

32. **Name of Project:** Prado Basin Eleven Sites Testing

33. **Type of Investigation:** Archaeological testing program, preliminary survey.

34. **Site Accession Number:** N/A **Curated At:** N/A

35. **Photos:** N/A

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

MAP SHEET

Page 3 of 5

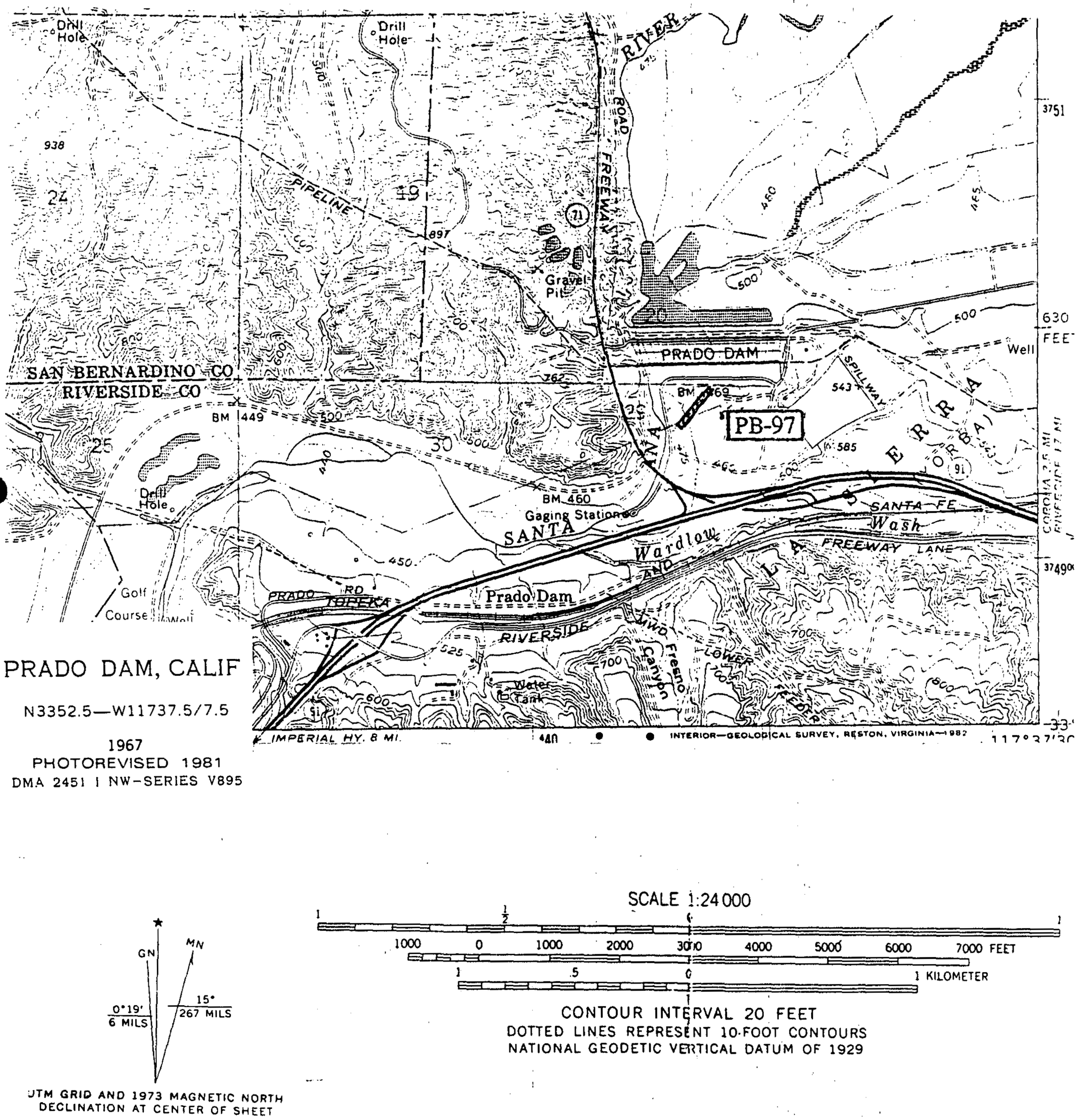
Primary # CA-RIV-5522H

HRI#/Trinomial PB-97 ~~33-5782~~

Resource Identifier: PB-97

Map Name: Concrete bridge pier and bridge abutment Scale: Not to scale Date: 2-28-95

Note: Include bar scale and north arrow on map.



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

Primary # CA-RIV-5522H

MAP SHEET

HRI#/Trinomial PB-97

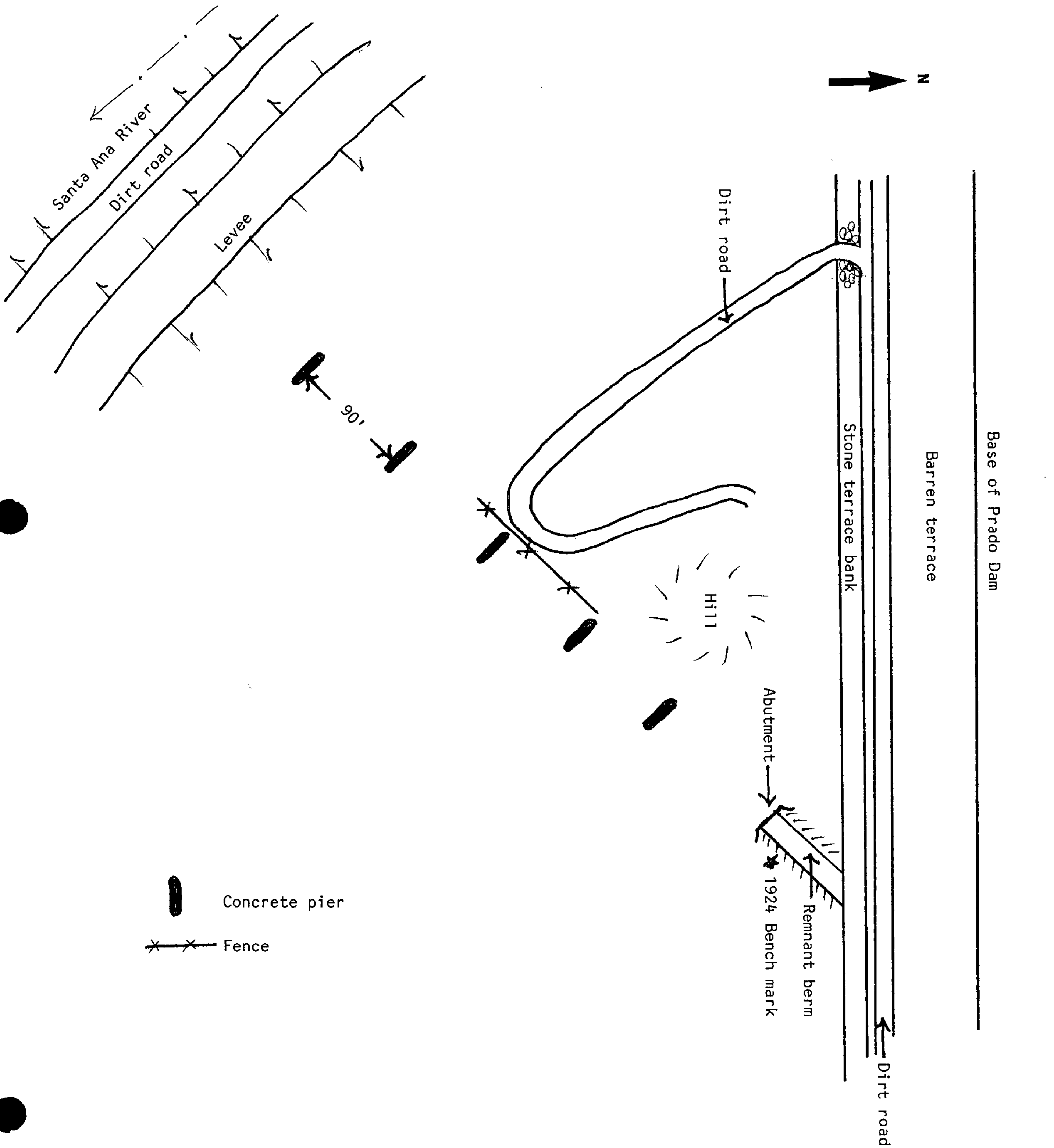
Page 4 of 5

33-5782

Resource Identifier: PB-97

Map Name: PB site map Scale: Not to scale Date: 2-28-95

Note: Include bar scale and north arrow on map.



State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

MAP SHEET

Primary # CA-RIV-5522H

HRI#/Trinomial PB-97 ~~33-5782~~

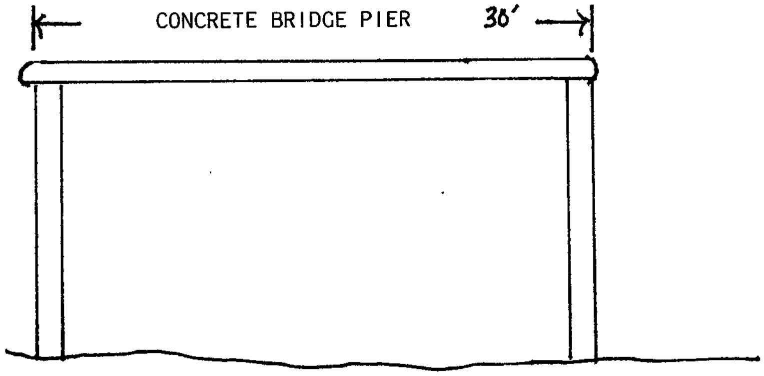
Page 5 of 5

Resource Identifier: PB-97

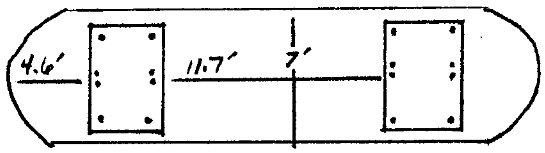
Map Name: Location site map **Scale:** 1:24000 **Date:** 2-28-95

Note: Include bar scale and north arrow on map.

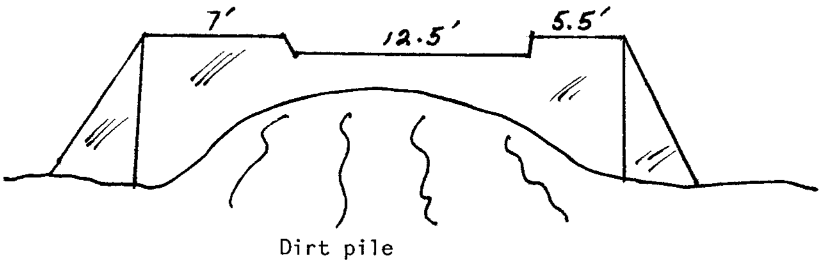
PROFILE



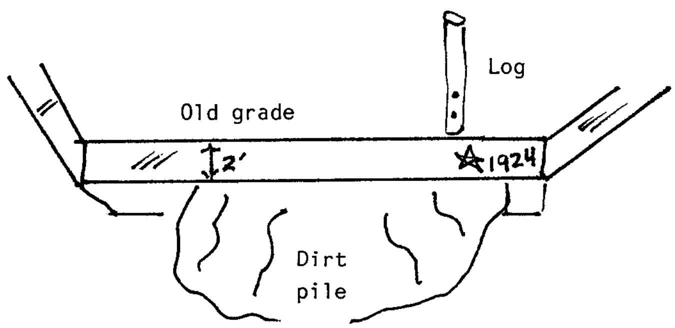
PLAN OF TOP



BRIDGE ABUTMENT



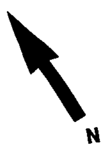
PROFILE, LOOKING NORTHEAST



• Bolt

☆ Bench mark

//// Concrete



Recorded by: Susan Wood **Date:** August 1, 2019 ____ **Continuation** __X__ **Update**

The site was recorded in April 2000 by Mathew Sterner of SRI, Inc. as the remains of the 1920s–1950s town of Alta Vista also known as Green River Camp located approximately 6 miles west of Corona and to the south of the Santa Ana River. They noted that most of the buildings were removed during the construction of the Green River Golf Course in the 1950s and 1960s and later the construction of the Riverside Freeway (SR 91). No structural remains were noted to the north of SR 91 except for a concrete patio slab and brick barbeque at the eastern end of the site, and test excavations uncovered several minor features in this area. However, SRI recommended the site ineligible due to a complete lack of integrity (Sterner and Bischoff 2000). In May 2008, Riordan Goodwin of SRI, Inc. revisited the site to investigate the formally documented feature 6, to the south of Highway 91, which during the previous investigation had been obscured by vegetation and inaccessible. While feature 6 had also been extensively damaged by the construction of the Green River Golf Course and the subsequent construction of SR 91, Goodwin documented the remains of an extensive residential ruins complex (Goodwin 2008).

Alta Vista also known as Green River Camp emerged during the period of the 1920s and 1930s as a collection of resort-cabins for those in more urban areas to escape the city. Later, it developed into a small community that catered to campers and tourists, and travelers along the remote canyon road. Much of the town was demolished during the construction of the Green River Golf Course in the mid to late 1950s and 1960s, and what remained was mostly removed during construction of SR 91 (Sterner and Bischoff 2000). During the current cultural resource survey for the Santa Ana River Trail, (Mills et al. 2019), no cultural materials associated with this site were found within the Project APE. Further, it is possible that the site was destroyed due to the current reconstruction of the Santa Ana River railroad bridge, and the site is now a staging area for this construction (Figures 1, 2, and 3). As the site no longer exists, it lacks all seven aspects of integrity and Æ concurs with the recommendation that the site is ineligible for listing on the CRHR and NRHP.

Figure 1 Overview of the staging area in the Project APE for the current reconstruction of the railroad bridge over the Santa Ana River looking northeast.

Resource Name or #: Alta Vista/Green River Camp

Figure 2 Overview of the staging area in the Project APE for the current reconstruction of the railroad bridge over the Santa Ana River looking west/northwest.

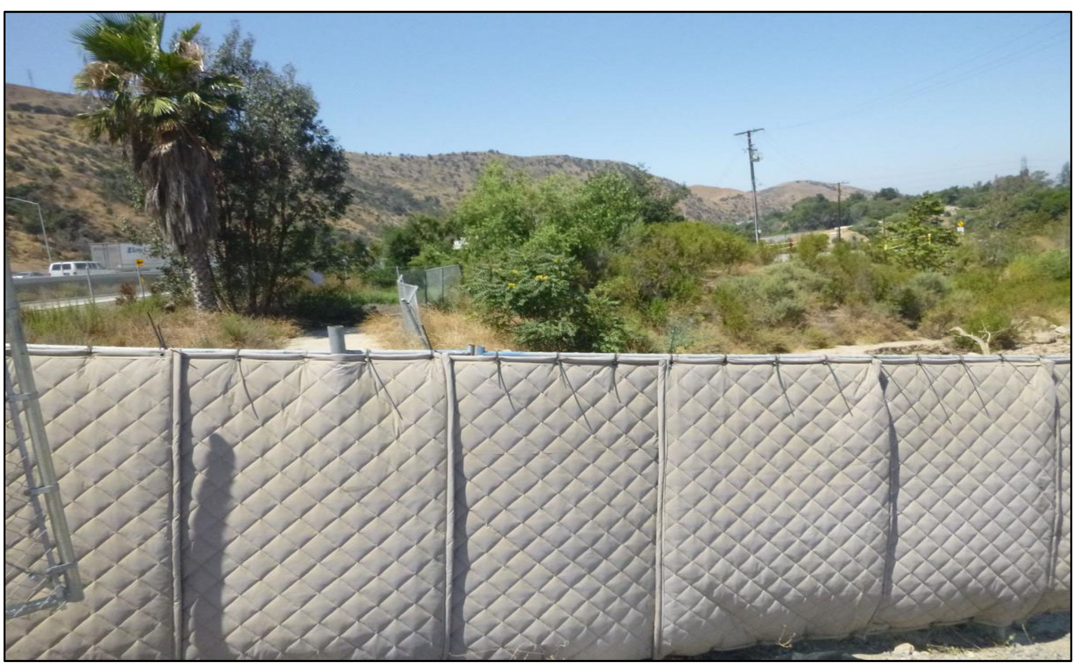


Figure 1 - Overview of the staging area in the Project APE for the current reconstruction of the railroad bridge over the Santa Ana River looking southwest.

References:

Goodwin, Riordan
2008 *National Register of Historic Places Eligibility Testing at Alta Vista/Green River Camp (PB-145), Riverside County, California, Technical Series 00-56, Site Update.* Statistical Research, Inc., Tucson, Arizona.

Mills, Evan, Dennis McDougall, and Susan Wood
2019 *Cultural Resource Assessment for the Santa Ana River Trails Project, Riverside and San Bernardino Counties, California.* Applied EarthWorks, Inc., Hemet, California.

Sterner. Matthew A., and Matt C. Bischoff.
2000 *National Register of Historic Places Eligibility Testing at Alta Vista/Green River Camp (PB-145), Riverside County, California, Technical Series 00-56.* Statistical Research, Inc., Tucson, Arizona.

State of California — The Resources Agency

DEPARTMENT OF PARKS AND RECREATION

CONTINUATION SHEET

Primary # 33-10819

HRI #

Trinomial CA-RIV-6532H

***Resource Name or #**: (Assigned by recorder) Green River Camp Feature 6

*Recorded by Riordan Goodwin *Date: May 29, 2008 ___ Continuation X Update

Statistical Research, Inc. (SRI) previously documented, tested, and evaluated the historic 1920s–1950s Alta Vista/Green River Camp site. The results of the SRI excavations indicated that the site is not eligible for listing in the National Register of Historic Places. However, Feature 6 was minimally mapped and not tested by SRI. The site was largely destroyed by construction of the Green River Golf Course and the realignment of the canyon road prior to construction of State Route 91 (SR-91). Vegetation removed from the area for the current SR-91 widening project exposed Feature 6, facilitating further examination and documentation.

Feature 6 is an unusually extensive complex of rock-and-mortar foundation footing walls, tiered and contiguous retaining walls, stairways, patio slabs, and other features, including a spring retention basin, landscaping planters, cinderblock building elements, a broken concrete deer statue, and accents (a few inlaid ceramic tiles). The expansive residential ruin represents design and construction techniques common from the 1880s to the present (i.e., both rectilinear and contour-following free-form stone and mortar/concrete construction common to the 19th century), as well as "formal" post-war rectilinear masonry using modern materials (cinderblock and galvanized steel cable). There is a large (approximately 6 feet) undocumented water conveyance feature (100+ foot flume) constructed of board-formed and poured concrete on the west edge, as well as undocumented historic refuse in the southeast corner of Feature 6. These features may have been obscured by vegetation at the time of SRI's testing program. The diagnostic items (glass makers' marks dating to 1920–1964 and 1933–1947) in the associated refuse are consistent in age with the period of occupation on the site record (1910s–1971). The appearance of the rock and mortar/cinderblock features, along with the age of the refuse, suggests that a residence may have been constructed here as early as the mid-to-late 1930s. Some charcoal and composition roofing suggest the building may have burned.

Feature 6 is not indicated on the United States Geological Survey (USGS) 1947 *Corona, California* topographic quadrangle map; however, this map was copied from the USGS 1942 *Corona, California* topographic quadrangle map, which was based on surveys done in 1933. The feature/complex appears to reflect occupation of the historic community of Green River Camp from the 1930s through at least the immediate post-war period.


Feature 6: lower steps and rubble. View to north.


Feature 6: approach to lower steps. View to southeast.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # 33-10819
HRI #
Trinomial CA-RIV-6532H

Page 2 of 4 *Resource Name or #: (Assigned by recorder) Green River Camp Feature 6
*Recorded by Riordan Goodwin *Date: May 29, 2008 ___ Continuation X Update


Feature 6: lower steps from first terrace. View north.


Feature 6: cobble and cinderblock 'cold storage.' View west.


Feature 6: historic refuse in southeast corner of footing wall. View east.


Feature 6: steps and retaining wall of second terrace. View south.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # 33-10819
HRI #
Trinomial CA-RIV-6532H

 ***Resource Name or #**: (Assigned by recorder) Green River Camp Feature 6

*Recorded by Riordan Goodwin *Date: May 29, 2008 ____ Continuation X Update

Feature 6: first terrace showing retaining wall for walkway and steps. View to east.

Feature 6: western portion of first terrace showing retaining wall and steps. View to southwest.

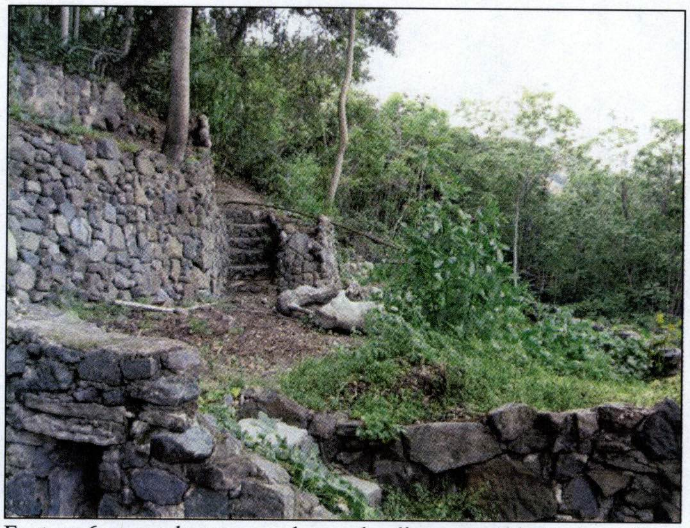
Feature 6: western portion of first terrace showing round water retention feature and cinderblock feature. View to west.

Feature 6: poured concrete flume at west end of feature. View to north-northwest.

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
CONTINUATION SHEET

Primary # 33-10819
HRI #
Trinomial CA-RIV-6532H

*Resource Name or #: (Assigned by recorder) Green River Camp Feature 6
*Recorded by Riordan Goodwin *Date: May 29, 2008 ____ Continuation X Update


Feature 6: second terrace and steps leading up to third terrace. View to west-southwest.


Feature 6: third terrace and steps leading up to fourth terrace. View to southwest.


Feature 6: fourth terrace retaining wall/bench feature with inlaid tile. View to east.

State of California -- The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary # 33-10819
HRI #
Trinomial CA-RIV-6532H
NRHP Status Code
Other Listings
Review Code   Reviewer

*Resource Name or #: (Assigned by recorder) PB-145

P1. **Other Identifier:** Alta Vista / Green River Camp

*P2. **Location:** ☐ Not for Publication ☑ Unrestricted *a. **County** Riverside, Orange
and (P2b and P2c or P2d. Attach Location Map as necessary.)
*b. **USGS 7.5' Quad** Black Star Canyon **Date** 1967 (1988) **T** 3S ; **R** 8W ; SE **1/4 of** NW **1/4 of Sec** 36 ; SB **B.M.**
c. Address Green River Golf Course, 5215 Green River Road City Corona Zip 92880
d. UTM: (Give more than one for large and/or linear resources) Zone 11 ; 438200 mE/ 3747760 mN
438460 mE/ 3748060 mN; mE/ mN; mE/ mN
e. Other Locational Data (e.g., parcel #, directions to resource, elevation, etc., as appropriate)
Most of the site is located on land owned by the Green River Golf Course.

*P3a. **Description:** (Describe resource and its major elements. Include design, materials, condition, alterations, size, setting, and boundaries.)
This site defines the remains of the town of Alta Vista, also known as Green River Camp. The site is located on the south side of the Santa Ana River, about 6 miles west of Corona. Most of the buildings in the town were removed during improvements to Riverside Freeway (SR 91) and construction of the Green River Golf Course. No structural remains exist on the north side of SR 91 with the exception of a concrete patio and brick barbecue at the extreme east end of the site. Test excavations uncovered several minor features on the north side of SR 91. Some structural remains (primarily foundation remnants) are present on the south side of SR 91 on private land belonging to the Green River Ranch. No subsurface evaluation was performed in this area. See the Archaeological Site Record for feature list.

*P3b. **Resource Attributes:** (List attributes and codes) AH2--foundations; AH16 - other

*P4. **Resources Present:** ☐ Building ☐ Structure ☐ Object ☑ Site ☐ District ☐ Element of District ☐ Other (Isolates, etc.)

P5a. Photograph or Drawing (Photograph required for buildings, structures, and objects.)

RECEIVED IN
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P5b Description of Photo: (View, date, accession #)

*P6. **Date Constructed/Age and Sources:** ☑ Historic ☐ Prehistoric ☐ Both

*P7. **Owner and Address:**
Green River Golf Course, 5215 Green River Road, Corona, CA 92880

*P8. **Recorded by** (Name, affiliation, and address
Matthew Sterner
Statistical Research, Inc.
6099 E. Speedway Blvd.
Tucson, AZ 85712

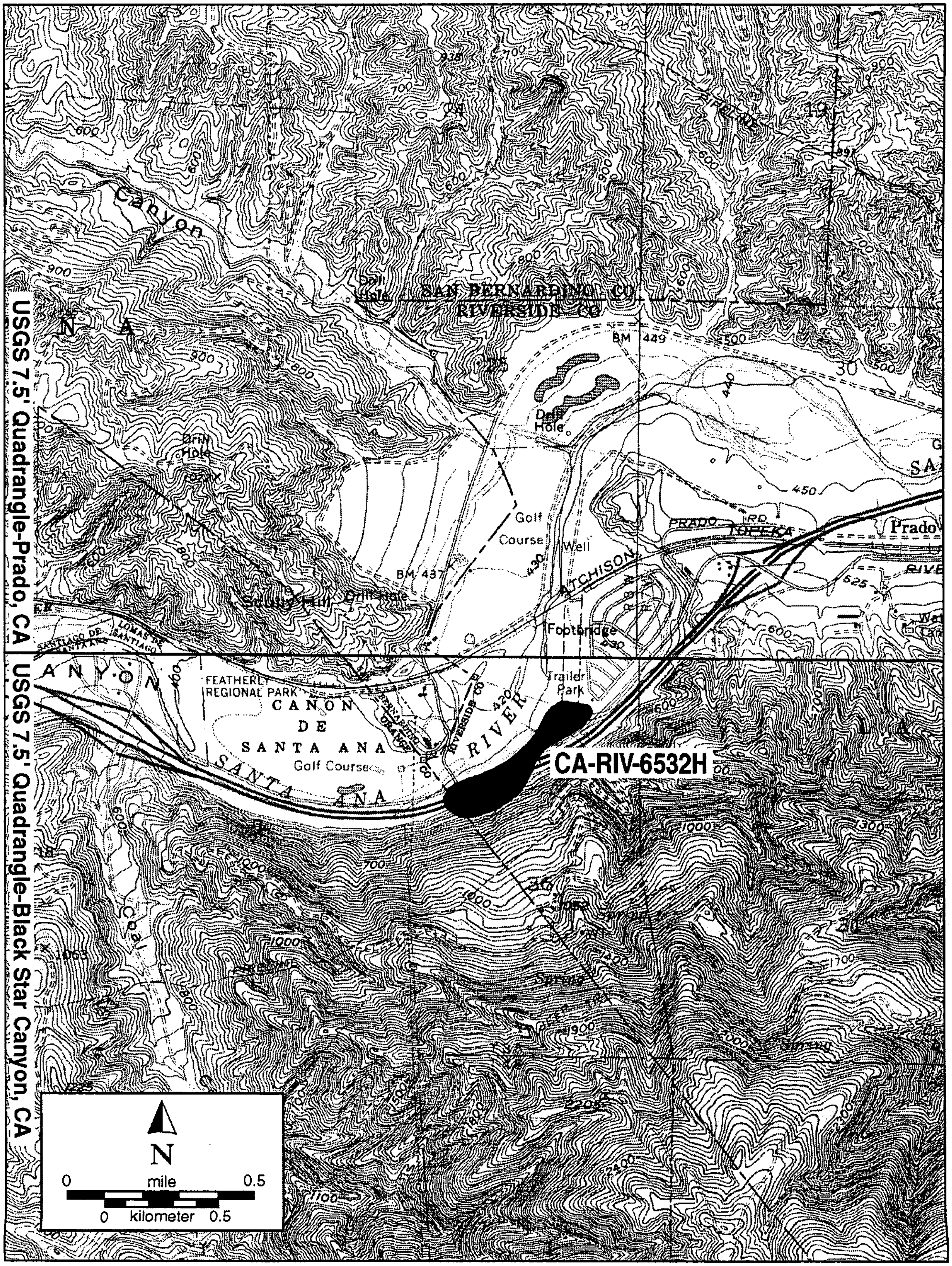
*P9. **Date Recorded:** 28-Apr-00

*P10. **Survey Type:** (Describe)
NRHP eligibility testing

*P11. **Report Citation:** (Cite survey report and other sources, or enter "none."):
National Register of Historic Places Eligibility Testing at Alta Vista / Green River Camp (PB-145), Riverside County, California. By Matthew A. Sterner and Matt C. Bischoff. Technical Series 00-56. Statistical Research, Inc., Tucson, Arizona. (2000)

*Attachments: ☐ NONE ☑ Location Map ☑ Sketch Map ☐ Continuation Sheet ☐ Building, Structure, and Object Record
☑ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record
☐ Photograph Record ☐ Other List):

33-10819


USGS 7.5' Quadrangle-Prado, CA
USGS 7.5' Quadrangle-Black Star Canyon, CA
CA-RIV-6532H
SAN BERNARDINO CO
RIVERSIDE CO
Canyon
Golf Course
Well
ATCHISON
TOPEKA
PRADO RD
Prado
Footbridge
Trailer Park
FEATHERLY REGIONAL PARK
CANON DE SANTA ANA
Golf Course
SANTA ANA RIVER
Scully Hill
Drill Hole
BM 449
BM 437
N
mile
0
0.5
kilometer

ARCHAEOLOGICAL SITE RECORD

*Resource Name or #: PB-145 (Alta Vista / Green River Camp)

*A1. Dimensions: a. Length 1800 ft (E/W) x b. Width 1150 ft (N/S)
Method of Measurement: ☐ Paced ☐ Taped ☐ Visual estimate ☑ Other: measured on site map
Method of Determination (Check any that apply): ☐ Artifacts ☐ Features ☐ Soil ☐ Vegetation ☐ Topography ☐ Cut bank ☐ Animal Burrow ☐ Excavation ☐ Property boundary ☐ Other (Explain):
Approximate limits of town site known from maps; limits of archaeological site correspond to limits of project area, which is smaller than the town site.

Reliability of Determination: ☐ High ☐ Medium ☑ Low Explain:
Other subsurface features related to the town site may be preserved outside of the project area.

Limitations (Check any that apply): ☑ Restricted access ☑ Paved/built over ☑ Site limits incompletely defined ☑ Disturbances ☑ Vegetation ☐ Other (Explain):

A2. Depth: ☐ None ☑ Unknown Method of Determination:
*A3. Human Remains: ☐ Present ☑ Absent ☐ Possible ☐ Unknown (Explain):

*A4. Features (Number, briefly describe, indicate size, list associated cultural constituents, and show location of each feature on sketch map.):
1: 3/4" iron pipe uncovered in backhoe trench; 2: concrete post footing; 3: pair of small soil anomalies, probably remains of rotted lumber; 4: concrete building pad, 14.5' × 10'; 5: cobble masonry stairway; 6: group of cobble masonry foundation remnants, probable residential complex; 7: smaller group of foundation remnants; 8: segment of 24" concrete drainage pipe; 9: remnant of cobble retaining wall; 10: concrete patio with brick barbecue; 11: rectangular pit with pipe, probable leaching pit.

*A5. Cultural Constituents: (Describe and quantify artifacts, ecofacts, cultural residues, etc., not associated with features.):
More than 1,400 historical-period artifacts: ceramics (36), glass (400+), cans (50+), other metal (~400), miscellaneous materials (360+), construction materials (184). A complete artifact catalog is included as an appendix to report cited on Primary Record. Artifacts will be curated at San Bernardino County Museum.

*A6. Were Specimens Collected? ☐ No ☑ Yes (If yes, attach Artifact Record or catalog and identify where specimens are curated.)
*A7. Site Condition: ☐ Good ☐ Fair ☑ Poor (Describe disturbances.):
Archaeological testing shows that site has been significantly impacted since abandonment and retains little integrity. Features still visible as recently as a few years ago have been removed by current landowners. Additionally, filling of large portion of floodplain with modern refuse has compromised integrity of this portion of site.

*A8. Nearest Water: (Type, distance, and direction.)
Santa Ana River, adjacent on north

*A9. Elevation: 430–450 feet above mean sea level (from U.S.G.S. 7.5' map)
A10. Environmental Setting: (Describe culturally relevant variables i.e. vegetation, fauna, soils, geology, landform, slope, aspect, exposure, etc.)

A11. Historical Information:
Alta Vista (also known as Green River Camp) was established sometime in the period 1910–1920, initially as a collection of cabins and functioning as a small resort area. A small year-round community soon arose, catering to tourist and vacationer traffic along the Riverside highway. Construction for the Green River Golf Course in the 1950s eliminated much of the residential area of the town. Later highway improvements, culminating with completion of the 8-lane Riverside Freeway in 1971, effectively ended the town's existence.

*A12. Age: ☐ Prehistoric ☐ Protohistoric ☐ 1542-1769 ☐ 1769-1848 ☐ 1848-1880 ☐ 1880-1914 ☑ 1914-1945 ☑ Post 1945 ☐ Undetermined Describe position in regional prehistoric chronology or factual historic dates if known:
Occupation began in period 1910–1920, ended by 1971.

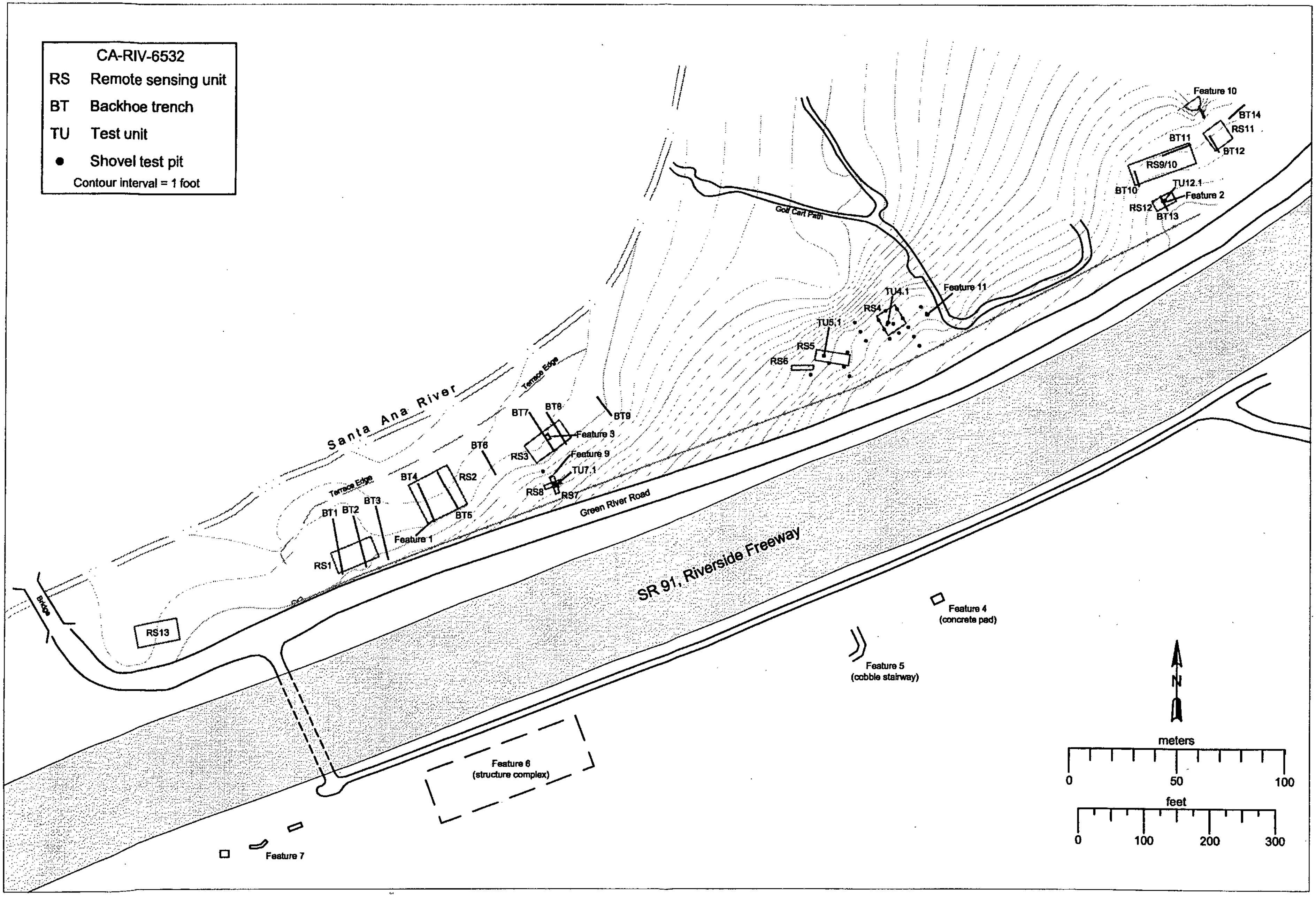
A13. Interpretations: (Discuss data potential, function[s], ethnic affiliation, and other interpretations):

A14. Remarks:

A15. References: (Documents, informants, maps, and other references)

A16. Photographs (List subjects, direction of view, and accession numbers or attach a Photograph Record.):
Original Media/Negatives Kept at:

*A17. Form Prepared by: Matthew A. Sterner Date: 28-Apr-00
Affiliation and Address: Statistical Research, Inc., 6099 E. Speedway Blvd., Tucson, AZ 85712



CA-RIV-6532
RS Remote sensing unit
BT Backhoe trench
TU Test unit
• Shovel test pit
Contour interval = 1 foot
Santa Ana River
Terrace Edge
Terrace Edge
Golf Cart Path
Green River Road
SR 91, Riverside Freeway
Bridge
RS1
RS2
RS3
RS4
RS5
RS6
RS7
RS8
RS9/10
RS11
RS12
RS13
BT1
BT2
BT3
BT4
BT5
BT6
BT7
BT8
BT9
BT10
BT11
BT12
BT13
BT14
TU4.1
TU5.1
TU7.1
TU12.1
Feature 1
Feature 2
Feature 3
Feature 4
(concrete pad)
Feature 5
(cobble stairway)
Feature 6
(structure complex)
Feature 7
Feature 9
Feature 10
Feature 11
N
meters
0
50
100
feet
0
100
200
300

33-10819

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

 Resource Name or # Burlington Northern & Santa Fe Railroad (BNSF)

P1. Other Identifier: Atchison, Topeka and Santa Fe Railway (ATSF)

***P2. Location: a. County:** Riverside and San Bernardino ☒ **Not for Publication** ☐ **Unrestricted**

b. USGS 7.5′ Quad: Prado and Black Star Canyon **Date:** (1967- PR1981) (1967). T 3 South, R 8 West; **¼ of ¼ of** Section 2 and Canyon De Santa Ana Land grant S.B. **B.M.**

c. Address:

d. UTM: NAD 83, Zone 11S; East end of Segment 438232 **mE /** 3748684 **mN**
West end of Segment 437604 **mE** / 3748392 **mN**

e. Other Locational Data: From State Route 91, exit Green River go west. Continue .75 miles then turn right (West) to enter the Green River Golf Course. The Tracks are immediately north of the Clubhouse.

***P3a. Description:** The Atchison, Topeka and Santa Fe Railway (ATSF) operated a line through the Santa Ana Canyon beginning in 1887 until 1996 when it merged with the Burlington Northern & Santa Fe Railroad (BNSF), the current operator. The approximately one-half mile railroad line segment in the Project Area of Potential Effects (APE), however, was built circa 1939 by the (ATSF) after a major flooding event in the Sant Ana Canyon in 1938 damaged existing tracks (BNSF 2018:28–29). At the time of construction, the previous ATSF railway route was abandoned in favor of the current route in anticipation of the construction of the Prado Dam that was completed in May 1941.

***P3b. Resource Attributes:** HP 39: Other- Railroad

***P4. Resources Present:** ☐ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

***P5a. Photograph or Drawing:**

P5b. Description of Photo: Photo roll: 3877-02-dm, frame 49. Overview of railroad from crossing (facing NE)

***P6. Date Constructed/Age and Sources:** ☐ Prehistoric ☒ Historic ☐ Both

***P7. Owner and Address:** BNSF Railroad, 740 Carnegie Dr., San Bernardino, Ca, 92408

***P8. Recorded By:** Susan Wood
Applied EarthWorks, Inc.

***P9. Date Recorded:** July 17 and August 1, 2019

***P10. Survey Type:** ☐ Intensive ☒ Reconnaissance ☐ Other
Describe: Built Environment Assessment for the Santa Ana River Trails Project

***P11. Report Citation:** Mills, Evan, Dennis McDougall, and Susan Wood
2019 *Cultural Resource Assessment for the Santa Ana River Trails Project, Riverside and San Bernardino Counties, California.* Applied EarthWorks, Inc., Hemet, California.

***Attachments:** ☐ NONE ☒ Location Map ☒ Sketch Map ☐ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record ☐ Photograph Record ☐ Other (list):

B1. Historic Name: Atchison, Topeka and Santa Fe Railway (ATSF), Burlington Northern & Santa Fe Railroad (BNSF

B2. Common Name: BNSF

B3. Original Use: Railroad **B4. Present Use:** Railroad

***B5. Architectural Style:** No Style

***B6. Construction History (construction date, alterations, and dates of alterations):**

The railroad line segment in the Project APE was built circa 1939 by the (ATSF) after a major flooding event in the Sant Ana Canyon in 1938 damaged pre-existing tracks (BNSF 2018:28–29; Turhollow 1975:198). At the time of construction, the previous ATSF railway route in the Project APE was abandoned in favor of the current route in anticipation of the construction of the Prado Dam that was completed in May 1941 (UCSB 1939; Turhollow 1975:198–200).

***B7. Moved?:** ☒ No ☐ Yes ☐ Unknown Date: Original Location:

***B8. Related Features:** berm, rails, ties

B9. a. Architect: Unknown **b. Builder:** Atchison, Topeka, and Santa Fe Railway

***B10. Significance:** Theme: Transportation Area: Santa Ana Canyon
Period of Significance: 1939 – 1950s Property Type: Railroad Applicable Criteria: A/1

Few other events altered the course of California history than the arrival of the railroad in the 1870s and 1880s. The railroad was a primary contributing factor to the rise of population in California as it opened up new lands and opportunities for Americans in the east; the rail wars of the 1880s in California between the Southern Pacific and the Santa Fe Railroad made these opportunities available to members of the middle-class as well as the wealthy land speculators. Initially, to expand their service farther into California, and due to restrictions of their competition with Southern Pacific, the Santa Fe Railroad used the purchase of smaller lines to expand their reach. A 1902 map (surveyed in 1894 and 1899) of the Project APE shows Santa Fe Railroad's "Southern California Railroad - San Bernardino and San Diego Line" that began running through the Santa Ana Canyon in 1887 (see Figure 1) (Dodge 1959).

Figure 1 The Southern California Railroad – San Bernardino and San Diego Line owned by the Santa Fe Railroad Company through the Santa Ana Canyon in 1902 (USGS Corona 1902).

However, in 1896, the Santa Fe Railroad entered receivership, and after restructuring emerged as the Atchison, Topeka and Santa Fe Railway Company (ATSF) (BNSF 2019:28). The ATSF provided a direct route for freight and passengers from the east coast to the west and carried most of the rail traffic through the region (see Figure 2). The significance of the railroads diminished after the 1950s when automobiles became the preferred method of transportation in the region. ATSF continued service through the Santa Ana Canyon until their merger with the Burlington Northern Railroad to form the Burlington Norther Santa Fe Railroad (BNSF) in 1995 (BNSF 2019:29). Although the segment of rail line in the Project APE was constructed after the original line, being rerouted in 1939 to accommodate the Prado Dam, it still represents the significance of the railroad as a mode of transportation and commerce in Southern California and as an important connection to with the rest of the country and recommended eligible under Criterion A/1 for listing on the NRHP and CRHR with a period of significance from 1939–1950s.

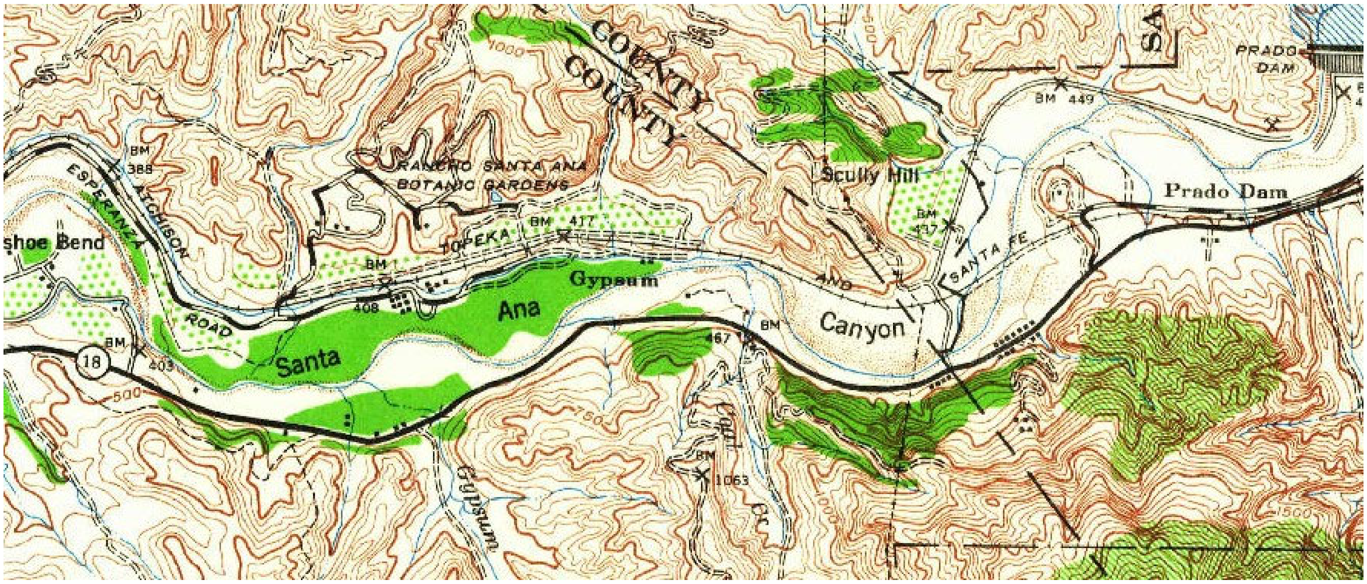


Figure 2 ATSF Rail Line through the Project APE in the Santa Ana Canyon. Note the new, more direct route through the Project APE built after the 1939 flood and to facilitate the construction of the Prado Dam (USGS Corona 1942).

Integrity Evaluation: Although the ATSF Railway, now part of BNSF, is eligible as a whole for the NRHP/CRHR under Criterion 1/A, the half-mile segment within the APE lacks integrity. The segment built in 1939 in its current route maintains integrity of location. However, when built the Santa Ana Canyon was still primarily wide-open space, with orchards, farms, and ranches dotting the countryside on either side of the tree-lined Santa Ana river. Visitors to this area of the canyon were primarily seeking recreation and camping. Today it is a primary commuter corridor between the inland empire and Los Angeles, and is lined with tracts of homes. The segment lacks integrity of setting and feeling. While the segment's route is primarily the same, design, workmanship, and materials have been updated, and largely replaced, and this compromised historical integrity. The segment lacks integrity of workmanship, materials and design. While the segment retains its association with the historical ATSF railway line, the loss of integrity has compromised the resource's ability to convey its significance. The segment is recommended ineligible for the NRHP and CRHR under Criterion 1/A.

B11. Additional Resource Attributes (list attributes and codes): In addition to the mainline, there are numerous contributing components to the railroad including, but not limited to spurs, wood box culverts, trestles, bridges, and signage.

***B12. References:**

BNSF
2019 The History of BNSF: A Legacy for the 21st Century, https://www.bnsf.com/about-bnsf/our-railroad/pdf/History_and_Legacy.pdf, accessed August 7, 2019.

Dodge, R.V.
1959 *Perris and Its Railroad.* Railway History Page: San Diego Railroad Museum, http://sdrm.info/history/cs/perris.html, accessed August 14, 2019.

Turhollow, Anthony F.
1975 A History of the Los Angeles District, U.S. Army Corps of Engineers, 1898-1965, https://google books.com, accessed August 7, 2019.

BUILDING, STRUCTURE, AND OBJECT RECORD

*NRHP Status Code

 Resource Name or #: Santa Fe Railroad

University of California, Santa Barbara
1939 *Corona* [air photo]. 1:18,000. Flight ID: C5928_60. Frame #60. Corona, Calif. 1939. https://Mil.library.ucsb.edu/ap-indexes/FrameFinder/. Accessed August 7, 2019 at FrameFinder.com.

U.S. Geological Survey
1902 California Corona Quadrangle [map]. Edition of 1902 (surveyed in 1894 and 1899), 1:125,000. accessed July, 8 2019 at https://ngmdb.usgs.gov/topoview/.

1942 California Corona Quadrangle [map]. Edition of 1942 reprinted in 1947 (surveyed in 1894 and 1899), 1:125,000. accessed July 8, 2019 at https://ngmdb.usgs.gov/topoview/

B13. Remarks: None

***B14. Evaluator:** Susan M. Wood, Applied EarthWorks, Inc., 3292 E. Florida Ave, Suite H, Hemet, Ca. 92544.
Date of Evaluation: August 13, 2019.

This space reserved for official comments.

Sketch Map

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

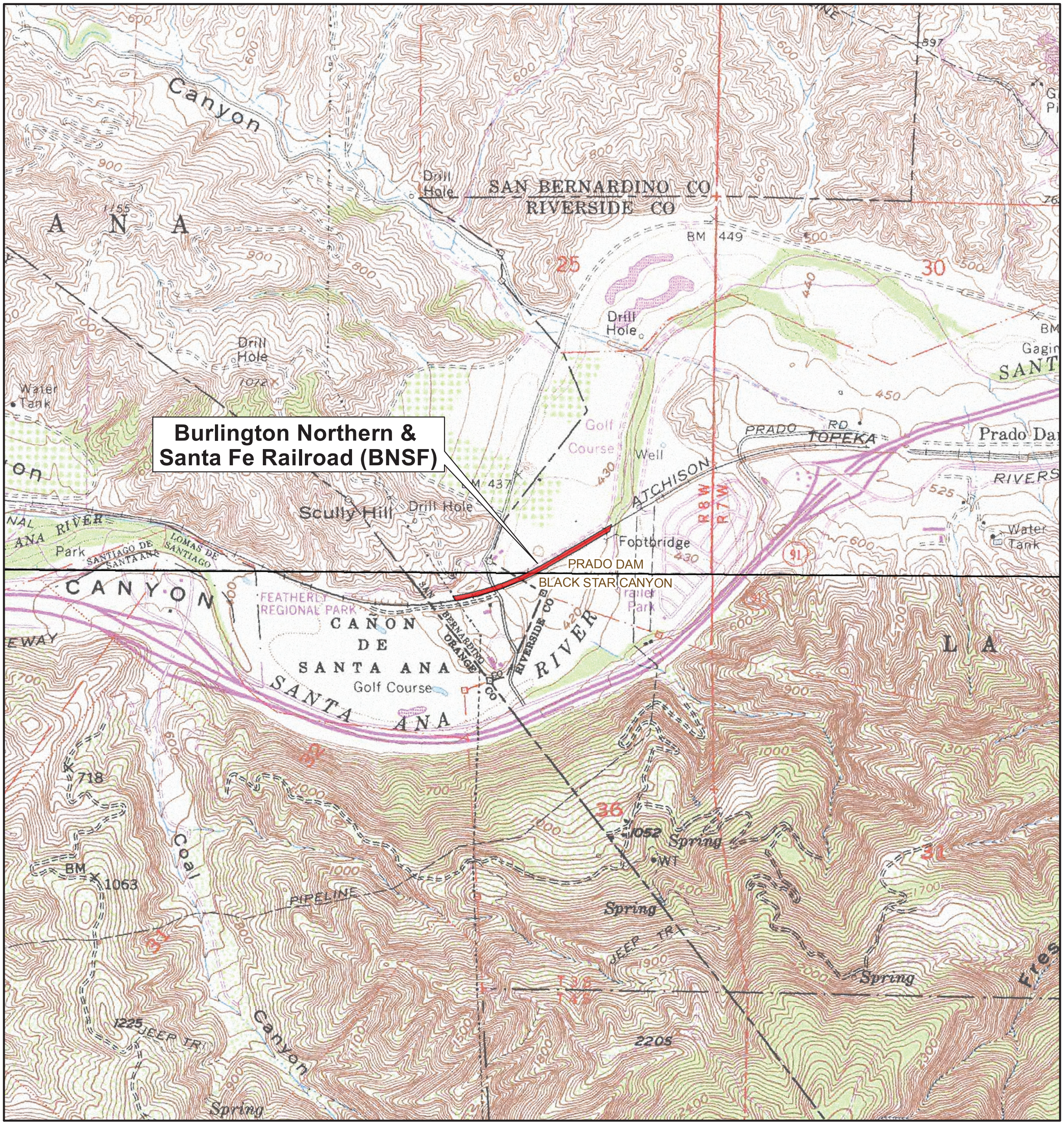
Primary #
HRI#
Trinomial

Resource Name or #: Burlington Northern and Santa Fe Railroad (BNSF)

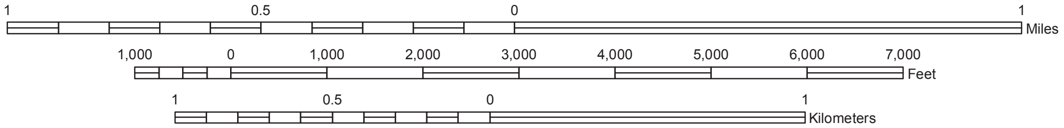
Scale: 1:24,000

Map Name: Prado Dam and Black Star Canyon (both 1967, photorevised 1981), CA, USGS 7.5' quadrangles

Date: 2019



SCALE 1:24,000



TRUE NORTH

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
PRIMARY RECORD

Primary #
HRI #
Trinomial
NRHP Status Code

Other Listings
Review Code Reviewer Date

 Resource Name or # Green River Golf Course

P1. Other Identifier:

***P2. Location: a. County:** Riverside, San Bernardino, and Orange ☐ **Not for Publication** ☐ **Unrestricted**

b. USGS 7.5′ Quad: Prado and Blackstar Canyon **Date:** 1967 (PR 1981) and 1967. T 3 South , R 8 West ; **¼ of ¼ of** Sections 25, 36, Canon De Santa Ana land grant S.B. **B.M.**

c. Address:

d. UTM: NAD 83, Zone 11S; 437799 **mE /** 3748312 **mN** (Clubhouse location)

e. Other Locational Data: From State Route 91, exit Green River Rd. Proceed west 0.75 miles, turn right (west) and enter the Green River Golf Course.

***P3a. Description:** Green River Golf Course has the distinction of being in three counties: Riverside, San Bernardino, and Orange counties. Green River Golf Course located at the head of Santa Ana Canyon opened to play on June 17, 1959. The original 18-hole course, designed by golf architect Lawrence Hughes, was built by local golfers and businessmen Henry Bickler and James Joslyn through the corporation they formed for the project, Bicklyn, Inc. In September 1963, they added nine holes, and in 1972 they added an additional nine holes to form two 18-hole courses referred to as “Orange” and “Riverside” based on their location (Parra 1976:166; Langhorne 2013). In 2006, the flood-control districts of Orange, Riverside and San Bernardino counties purchased the course as part of the $2.1 billion Santa Ana River Mainstream Project, with Orange County holding a 90-percent stake. During construction of the flood-control project in the canyon, the course was modified to its current 18-hole, approximately 180-acre configuration (Langhorne 2013; County of Orange, OC Public Works 2019).

***P3b. Resource Attributes:** HP39 – Other – Golf Course

***P4. Resources Present:** ☒ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other:

***P5a. Photograph or Drawing:**

P5b. Description of Photo: Hole #1 – Looking west from the tee.

***P6. Date Constructed/Age and Sources:** ☐ Prehistoric ☒ Historic ☐ Both

***P7. Owner and Address:** County of Orange, OC Public Works, 300 N. Flower Ave, Santa Ana, Ca. 92702

***P8. Recorded By:** Susan Wood
Applied EarthWorks, Inc.

***P9. Date Recorded:** July 17 and August 1, 2019

***P10. Survey Type:** ☐ Intensive ☐ Reconnaissance ☒ Other
Describe: Built Environment assessment for the Santa Ana River Trails Project

***P11. Report Citation:**

***Attachments:** ☐ NONE ☒ Location Map ☒ Sketch Map ☐ Continuation Sheet ☒ Building, Structure, and Object Record ☐ Archaeological Record ☐ District Record ☐ Linear Feature Record ☐ Milling Station Record ☐ Rock Art Record ☐ Artifact Record

Resource Name or #: Green River Golf Course

☐ Photograph Record ☐ Other (list):

P5b- continued

Description of Photo: Green River Golf Course Club House looking northeast (Mills et al. 2019; Photo Roll #3877-03-dm, frame 6)

Description of Photo: Wood deck cart bridge over feeder creek between Hole #10 and Hole #11 looking northwest (Mills et al. 2019; Photo Roll #3877-03-dm, frame 35)

BUILDING, STRUCTURE, AND OBJECT RECORD

*NRHP Status Code

 Resource Name or #: Green River Golf Course

B1. Historic Name: Green River Golf Course

B2. Common Name: Green River Golf Course

B3. Original Use: golf course **B4. Present Use:** golf course

***B5. Architectural Style:** Other: Municipal golf course

***B6. Construction History** **(construction date, alterations, and dates of alterations):**

Green River Golf Course was originally constructed beginning in 1957 by Bicklyn, Inc. as a public, 18-hole course designed by golf architect Lawrence Hughes; the course opened on June 17th, 1959. Three years later, in 1962, nine additional holes were added, and it became colloquially known as the "three nines." A severe flood episode in 1969 rendered the course unplayable with much of it underwater (see Figure 1-1) (Parra 1976:166; Distell 1972:18).

Figure 1-1 In 1969, the Santa Ana River overflowed its banks and flooded the course (LA Times 1969: 9).

By 1972, Bicklyn, Inc. had rebuilt the course adding nine additional holes. Cary Bickler, the son of Bicklyn Inc.'s President Henry Bickler, designed the new addition that brought the course up to 36 holes. After this, the two separate 18-hole courses were referred to as "Riverside" and "Orange," named after the county in which they were located (see Figure 1-2) (Distell 1972:18; Parra 1976:166).

Figure 1-2 Aerial View of Green River Golf Course in 1977, after post-flood reconfiguration into two, 18-hole courses. You can see the original clubhouse in the top left corner which was demolished and replaced circa 1990s (UCSB 1977).

According to long-time player and employee, Bill Oliver, the Japanese manufacturing company, Amada, Inc. who purchased the course from Bicklyn, Inc. in 1980, reconfigured several of the holes and planned an expansion that was never approved (Sterner and Bischoff 2001:35). By 1994, the original clubhouse had been demolished and a new clubhouse, pro-shop, and banquet facility had been built on the property (Bill Oliver, personal communication August 1, 2019; Netronline 1994). Mr. Oliver noted that the course was reconfigured again in the early 2000s when the area again experienced severe flooding that inundated the course. In 2006, the course was purchased by Orange, Riverside, and San Bernardino counties flood-control districts as part of the $2.1 billion Santa Ana River Mainstream Project, with Orange County holding a 90-percent stake. During construction of the flood-control project in the canyon, the course was modified to its current 18-hole, approximately 180-acre configuration (see Figure 1-3) (Langhorne 2013; County of Orange, OC Public Works 2019).

Figure 1-3 Aerial View of Green River Golf Course in 2007 in current, 18-hole configuration. Note new clubhouse (red-tiled roof) in the upper left corner (UCSB 2007).

B7. Moved?: ☒ No ☐ Yes ☐ Unknown Date: Original Location:

***B8. Related Features:** Clubhouse, cart paths and bridges, parking lots.

B9. a. Architect: Lawrence Hughes (1957) for original 18 holes, Cary Bickler, nine-hole addition and reconfiguration in 1969-72. According to Bill Oliver, only one or two of the original holes remain in their original design from the mid-century (Bill Oliver, personal communication, August 1, 2019). **b. Builder:** Bicklyn, Inc. (1957–1972)—original course and additions. Orange County Flood Control District for modification post-2006.

***B10. Significance:** Theme: Recreation/Entertainment Area: Southern California
Period of Significance: 1957-present Property Type: Other-Golf Course Applicable Criteria: A/1

In 1957, The Green River Golf Course was conceived of and built as a public course accessible to all; today it still retains its middle-class roots, noted in a 2013 Orange County Register article as "Green River Golf's blue-collar beauty" (Parra 1976:166; Langhorne 2013). Bickler and Joslyn , the owners and builders of the original course were golfers who lived locally during the post-war population explosion in Orange County when outdoor entertainment pursuits were booming. At the suggestion of family, and during this time of optimism and prosperity in Southern California, the men decided to pursue this dream of building their own public golf course. They formed Bicklyn, Inc., and sought affordable land for the site. After some time, they were able to secure a 50-year lease from the Santa Ana River Development Company due to the risk of flooding in the Santa Ana Canyon. Solidly middle-class, Bickler was in the entertainment/catering business and Josyln was a farmer with orchards in the area, but they took a chance, and due to the popularity of outdoor pursuits mid-century, business was immediately booming. Aside from outdoor sports, the Green River Golf Course also offered camaraderie with the organization of a men's golf club, and eventually an active senior's club, both of which survive to this day (Parra 1976:166: Bill Oliver, personal communication 2019). The Green River Golf Course, although originally located in an undeveloped semi-wilderness along the Santa Ana River, still today retains the feeling of open countryside due to its situation in the narrow canyon with the river still flowing along its edge and surrounded by hillside. The Green River Golf Course is significant under Criterion 1/A locally and nationally as a vernacular, public golf course built for the average, middle class golfer during the post-

World War II-era Southern California middle-class population boom with a period of significance from 1959 to the 1990s when the original clubhouse was demolished.

Integrity Evaluation:
Green River Golf Course is still in the location of its original construction in 1957–1959, and even though it has been altered and reconfigured multiple times it does retain its integrity of location. The original setting of the course was in an open canyon with the Santa Ana River flowing through and along the course, and with minimal commercial or residential development surrounding the site. Today, Interstate 91 rushes by the course to the south and housing developments are present neat the course. While you can still get the feeling of being out in the open countryside when you are out on the back part of the course, the passing BNSF trains and nearby bridge construction, and the visibility of the crowded freeway from the western part of the course, disrupt the tranquil experience of outdoor recreation. The course lacks integrity of setting and feeling. The original course was built by a successful golf architect; however, only a couple of the original holes remain. Additionally, the original clubhouse was demolished and replaced in the 1990s. The course lacks integrity of workmanship, materials, and design. While the course still retains its association with its significance as a middle class, blue collar, vernacular public golf course, the lack of integrity of setting, feeling, design, workmanship, and materials reduces the ability for the course to evidence its significance and is recommended ineligible for listing on the CRHR and NRHP under Criterion 1/A.

B11. Additional Resource Attributes (list attributes and codes): N/A

***B12. References:**

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University of California, Santa Barbara (UCSB)
1977 *Corona* [air photo]. 1:24,000. Flight ID: TG_7700. Frame #15-19. Corona, Calif. 1977. https://Mil.library.ucsb.edu/ap-indexes/FrameFinder/. Accessed August 19, 2019 at FrameFinder.com.

2007 *Corona* [air photo]. 1:26,000. Flight ID: EAG_08. Frame #6815. Corona, Calif. 2007. https://Mil.library.ucsb.edu/ap-indexes/FrameFinder/. Accessed August 19, 2019 at FrameFinder.com.

B13. Remarks: None

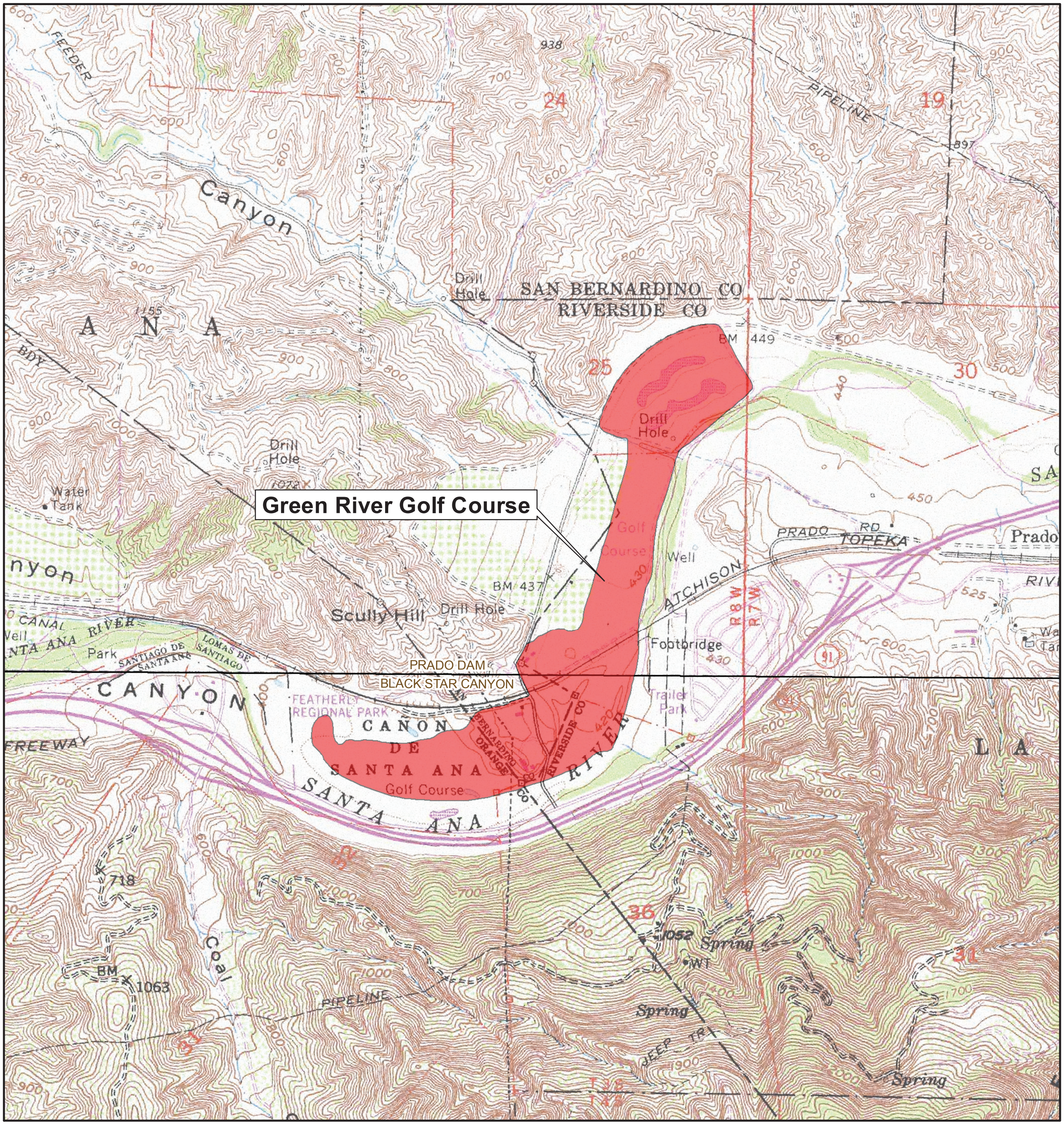
***B14. Evaluator:** Susan M. Wood, Assoc. Architectural Historian, Applied EarthWorks, Inc., 3292 E. Florida Ave, Suite H, Hemet, Ca. 92544
Date of Evaluation: August 19, 2019

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
LOCATION MAP

Primary #
HRI#
Trinomial

Page 6 **of** 7 **Resource Name or #:** Green River Golf Course **Scale:** 1:24,000

Map Name: Prado Dam and Black Star Canyon (both 1967, photorevised 1981), CA, USGS 7.5' quadrangles **Date:** 2019



SCALE 1:24,000

1 0.5 0 1 Miles

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
SKETCH MAP

Primary #
HRI#
Trinomial

Page 7 **of** 7 ***Resource Name or #:** (Assigned by recorder) Green River Golf Course

***Drawn by:** S. Wood, C. Inoway ***Scale:** 1 inch equals 1,000 feet **Date:** August 2019

Paleontological Resource Assessment for the Santa Ana River Trail - Phase 6, Riverside and San Bernardino Counties, California

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October 2019
draft

Paleontological Resource Assessment for the Santa Ana River Trail - Phase 6, Riverside and San Bernardino Counties, California

Prepared By: ______________________________

Chris Shi, M.S., Project Paleontologist

Approved By: ______________________________

Amy Ollendorf, Ph.D., M.S., RPA 12588

Principal Investigator

October 2019

draft

MANAGEMENT SUMMARY

At the request of Michael Baker International, Inc., Applied EarthWorks, Inc. (Æ) completed a paleontological resource assessment (PRA) for the Santa Ana River Trail - Phase 6 (SART - Phase 6) through Green River Golf Course, Riverside and San Bernardino Counties, California (herein referenced as the "Project"). The Project proposes construction of a new segment of the Santa Ana River Trail partially crossing through the Green River Golf Course (Golf Course), which will connect the trail from the Orange and San Bernardino County line on the west to the existing SART - Phase 5 segment in Chino Hills State Park on the east, as well as construction of a second, smaller segment east of the Golf Course that will connect the SART - Phase 5 segment to the existing SART - Phase 3 segment. The Project area consists of two possible alignments (Alternatives 1 and 2), a short segment linking SART - Phase 5 and SART - Phase 3, and a small staging area near the Santa Ana River. The Riverside County Transportation Commission (RCTC) is the Project Manager and Lead Agency for compliance with the California Environmental Quality Act (CEQA).

This PRA was completed through a combination of desktop research and field surveys. The purpose of the desktop studies, including museum records searches, was to identify the geologic units in the Project area and to determine whether previously recorded paleontological localities occur either within the Project area or within the same geologic units elsewhere. Fieldwork consisted of two pedestrian surface reconnaissance surveys to ground-truth the results of the desktop studies. Æ completed the first survey of the two alternative trail alignments, as well as within the proposed staging area. The second survey was conducted in the segment linking SART - Phase 5 and SART - Phase 3.

No paleontological resources were observed within the Project area during either of the surveys; however, one paleontological resource was observed just outside the Project area during the second survey. Æ utilized the results of both desktop studies and fieldwork to assign paleontological sensitivity rankings across the Project area. Based on the results of this assessment, there is a high likelihood that Project-related construction will impact paleontological resources.

Æ recommends that the RCTC retain a paleontologist who meets the Society of Vertebrate Paleontology's (SVP) qualification standards to develop and implement a Paleontological Resource Impact Mitigation Program (PRIMP) for the Project, including Worker's Environmental Awareness Program (WEAP) training of construction personnel prior to the start of ground-disturbing activities.

CONTENTS

FIGURES

TABLES

ACRONYMS AND ABBREVIATIONS

Æ	Applied EarthWorks, Inc.
bgs	below ground surface
CEQA	California Environmental Quality Act
CWA	Clean Water Act
GIS	Geographic Information System
Golf Course	Green River Golf Course
GPS	Global Positioning System
NHMLAC	Natural Historic Museum of Los Angeles County
PRA	Paleontological resource assessment
PR	Paleontologic Resources
PRIMP	Paleontological Resource Impact Mitigation Program
Project	Santa Ana River Trail through Green River Golf Course
RCTC	Riverside County Transportation Commission
SART	Santa Ana River Trail
SBCM	San Bernardino County Museum
SR 91	State Route 91
SVP	Society of Vertebrate Paleontology
UCMP	University of California Museum of Paleontology
USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
WEAP	Worker’s Environmental Awareness Training

1
INTRODUCTION

At the request of Michael Baker International, Inc., Applied EarthWorks, Inc. (Æ) completed a paleontological resource assessment (PRA) for the Santa Ana River Trail - Phase 6 (SART - Phase 6) through Green River Golf Course, Riverside and San Bernardino Counties, California (herein referenced as the "Project") (Figure 1-1). The Project proposes construction of a new segment of the Santa Ana River Trail partially crossing through the Green River Golf Course (Golf Course), which will connect the trail from the Orange and San Bernardino County line on the west to the existing SART - Phase 5 segment in Chino Hills State Park on the east, as well as construction of a second, smaller segment east of the Golf Course that will connect the SART - Phase 5 segment to the existing SART - Phase 3 segment. The Project area consists of two possible alignments (Alternatives 1 and 2), a short segment linking SART - Phase 5 and SART - Phase 3, and a small staging area near the Santa Ana River. The Riverside County Transportation Commission (RCTC) is the Project Manager and Lead Agency for compliance with the California Environmental Quality Act (CEQA).

1.1 PROJECT DESCRIPTION

The Project area is mapped in Section 30 of Township 3 South, Range 7 West, and Sections 25 and 36 of Township 3 South, Range 8 West on the Prado Dam and Black Star Canyon, CA 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle maps (Figure 1-2). The concept for the Santa Ana River Trail has been in design development for the last 50 years. The completed trail will connect the San Bernardino Mountains to the Pacific Ocean in Huntington Beach. Much of the trail has been built through Orange County and only a few short sections remain to be completed in Riverside and San Bernardino counties.

Specifically, the Project will construct a dual-track Class I multi-use path/natural surface trail, connecting the Santa Ana River Parkway Extension west of the Project site at the Orange and San Bernardino County line with the existing SART - Phase 5 segment in Chino Hills State Park on the east within Riverside County. Two possible trail alignments are presently under consideration (Alternatives 1 and 2). Additionally, an approximately 1,000-foot-long segment of the SART will be constructed between the east end of the SART Phase - 5 segment and the west end of the existing SART - Phase 3 segment near the State Route 91 (SR 91) (Riverside Freeway)/State Route 71 (Chino Valley Freeway) Interchange. The Project area also includes a proposed 2.32-acre staging area adjacent to the north side of SR 91. Figure 1-3 illustrates the proposed project features.

The Alternative 1 alignment is approximately 6,280 feet long and would generally extend outside of and along the western boundary of the Golf Course. The Alternative 2 alignment is approximately 8,189 feet long and would generally extend along the eastern boundary of the Golf Course. Ground disturbance for grading and compaction of the new trail segments will extend to a maximum depth of 5 feet below ground surface (bgs). However, excavations at the bridge locations will reach a maximum depth of approximately 40 feet bgs.

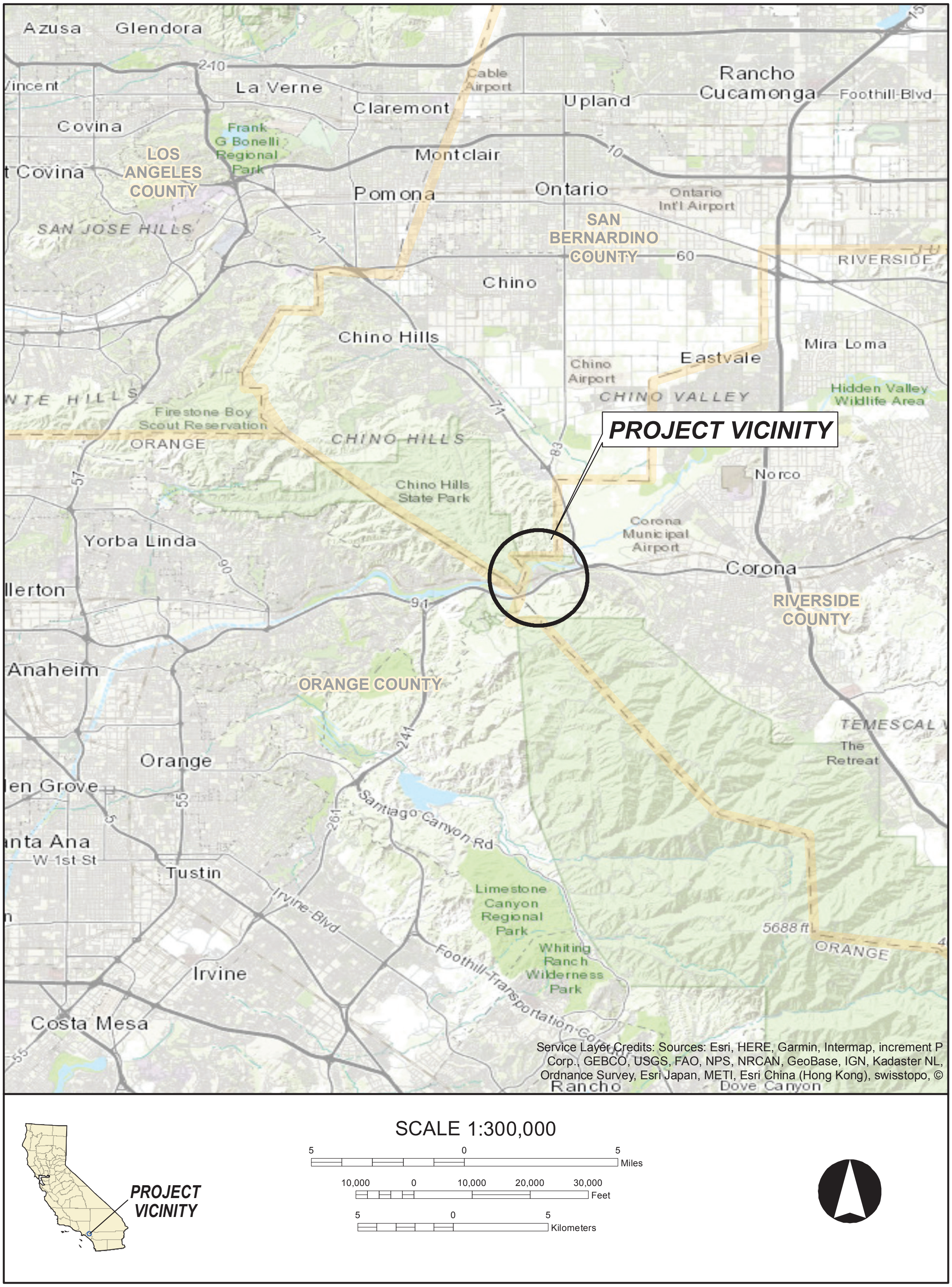

Figure 1-1 Project vicinity in Orange, San Bernardino, and Riverside counties, California

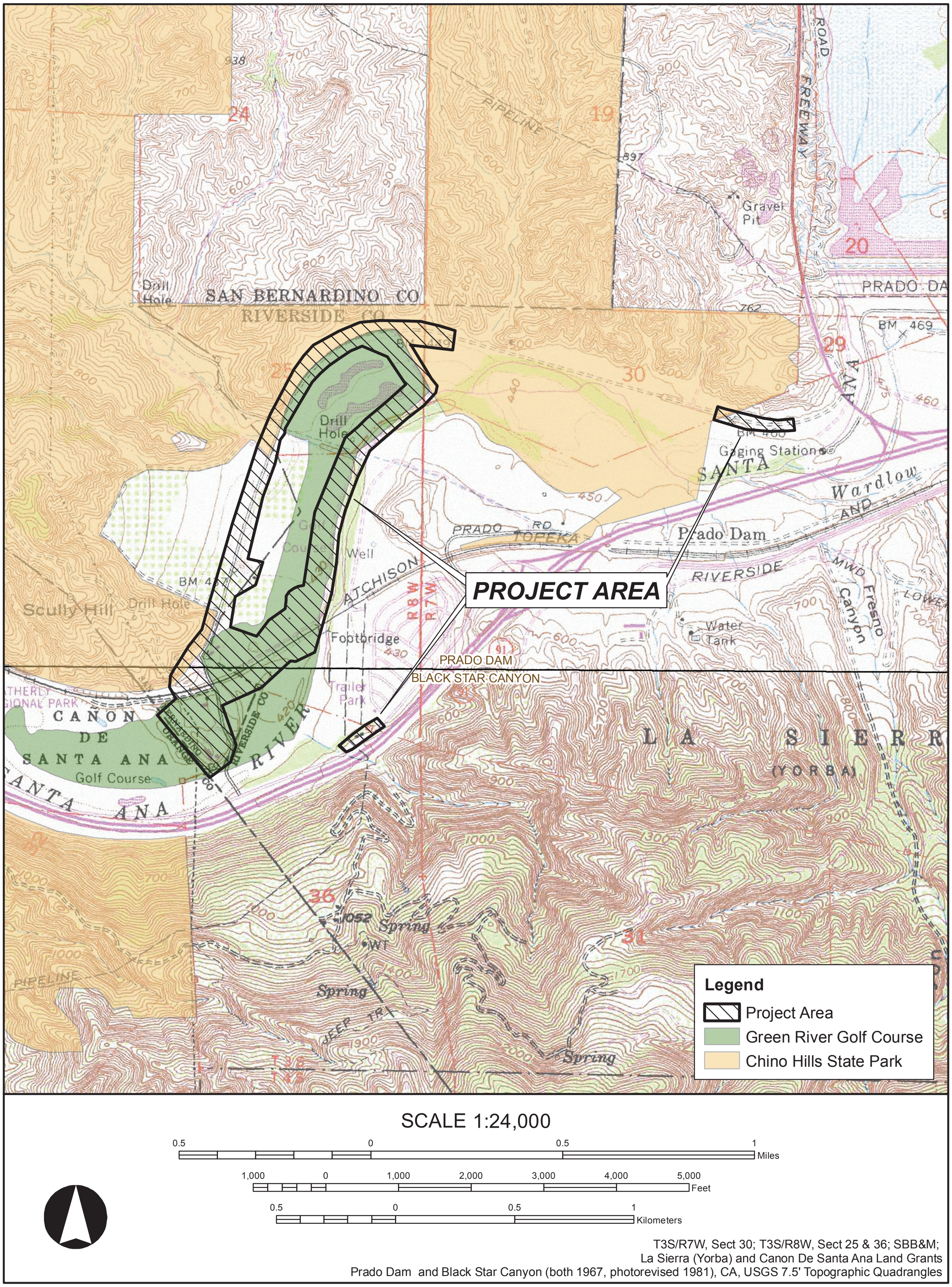

Figure 1-2 Project location map.

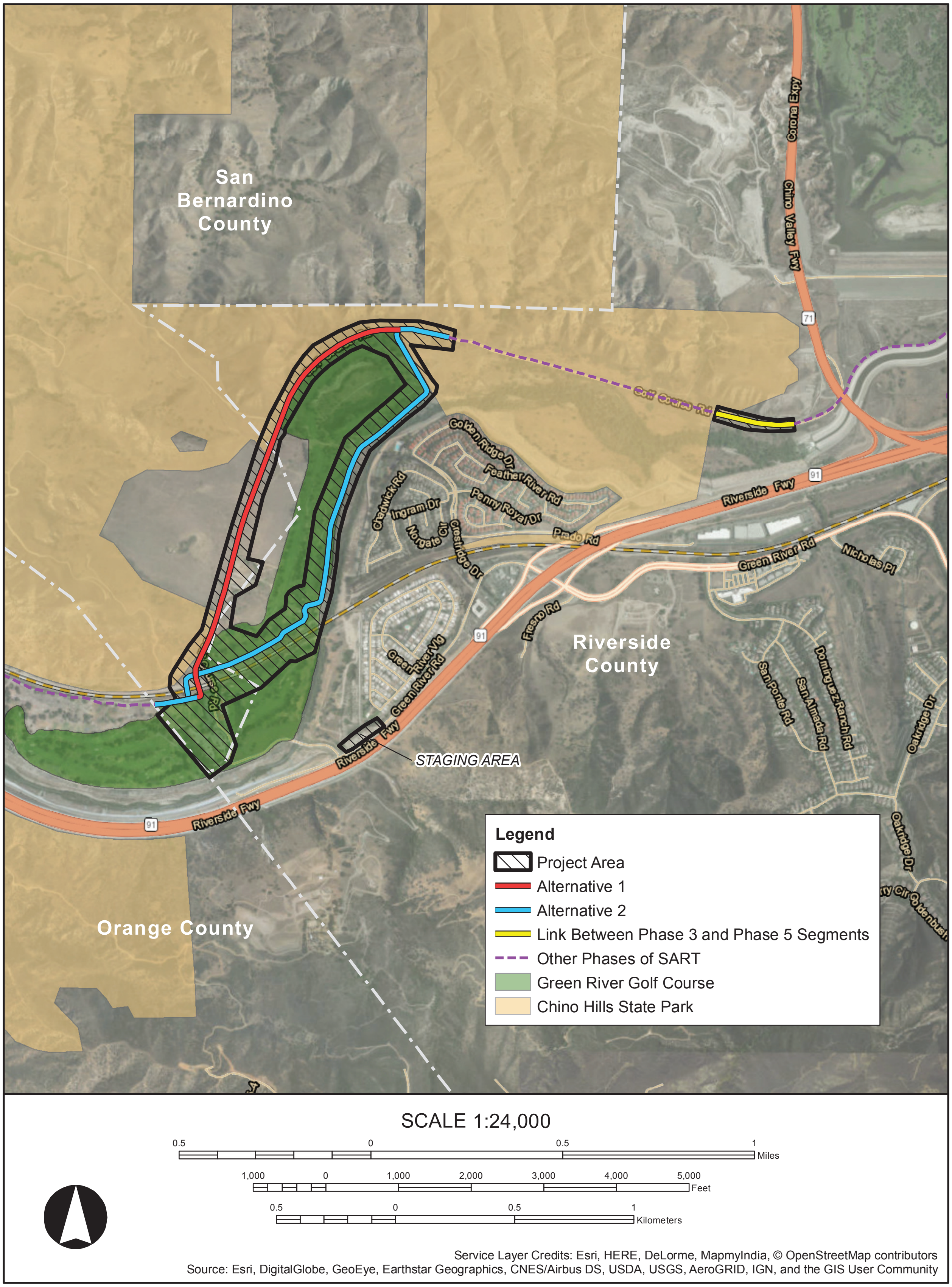

Figure 1-3 **Project details map.**

1.2 PURPOSE OF INVESTIGATION

This investigation is necessary for several reasons. The investigation aims to (1) identify the geologic units within the Project area and assess their paleontological resource potential; (2) determine whether the Project has the potential to adversely impact scientifically significant paleontological resources; (3) provide Project-specific management recommendations for paleontological resources, as necessary; and (4) demonstrate compliance with the CEQA.

1.3 REPORT ORGANIZATION

Chapter 1 has described the Project and defined the purpose of the investigation. Chapter 2 discusses the regulatory framework governing the Project. Chapter 3 presents the paleontological sensitivity criteria and resource guidelines used for this assessment. Chapter 4 provides the methods employed, and Chapter 5 describes the geology and paleontology of the Project area. The results of the museum records searches, fieldwork, and paleontological sensitivity assessment are presented in Chapter 6. Management recommendations can be found in Chapter 7, and references cited are listed in Chapter 8. Qualifications of key personnel are located in Appendix A.

2
REGULATORY ENVIRONMENT

Paleontological resources (i.e., fossils) are considered nonrenewable scientific resources because when they are destroyed, they cannot be replaced. As such, paleontological resources are afforded protection under various federal, state, and local laws. Construction of the Project requires a permit under Section 404 of the Clean Water Act (CWA) from the USACE. However, there are no applicable federal laws concerning paleontological resources under the CWA. Consequently, all resources are protected under CEQA for this Project.

2.1 STATE

California is among the states that protect significant paleontological resources. CEQA is the legal framework through which this protection is accomplished. Enacted in 1970, CEQA does not directly regulate land uses but instead requires state and local agencies within California to follow a protocol of analysis and public disclosure of environmental impacts of proposed projects, and adopt all feasible measures to mitigate those impacts.

2.1.1 California Environmental Quality Act

This Project is subject to Section 15002(a)(3) of the Guidelines for Implementation of CEQA (California Code of Regulations, Title 14, Chapter 3), which states one of the basic purposes of CEQA is the intention to "prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible." Therefore, CEQA requires detailed studies that analyze the environmental effects of a proposed project.

If a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. Specifically, in Section VII(f) of Appendix G of the CEQA Guidelines, the Environmental Checklist Form, the question is posed, "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" If paleontological resources are identified as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource. For this Project, the RCTC is the lead agency for compliance with CEQA.

2.1.2 CEQA Implementation

Guidelines for implementation of CEQA are codified in the California Code of Regulations (CCR), Title 4, Chapter 3, Sections 15000 et seq., which requires state and local public agencies to identify the environmental impacts of proposed discretionary activities or projects, determine if the impacts will be significant, and identify alternatives and mitigation measures that will substantially reduce or eliminate significant impacts to the environment. The various agencies within state government all have their own guidance documents to assist with CEQA compliance.

2.2 LOCAL

In addition to state-level implementing regulations, policies, and guidance, various counties and municipalities throughout California also have developed environmental goals, policies, and guidance that pertain to paleontological resources. For instance, and of relevance to the SART - Phase 6, the identification, protection, and preservation of significant paleontological resources are addressed within the general plans of all three counties as well as the City of Corona. The following sections list all relevant goals, objectives, and policies (in geographical order, west to east).

2.2.1 Orange County

The *General Plan, Chapter VI: Resources Element* (County of Orange, 2013:VI-123 – VI-124) includes the following two goals with objectives and policies that cover paleontological resources:

Goal 1: To raise the awareness and appreciation of Orange County's cultural and historic heritage.

- **Objective 1.2:** Work through the Orange County Historical Commission in the areas of history, paleontology, archaeology, and historical preservation.

Goal 2: To encourage through a resource management effort the preservation of the county's cultural and historic heritage.

- **Objective 2.2:** Take all reasonable and proper steps to achieve the preservation of archaeological and paleontological remains, or their recovery and analysis to preserve cultural, scientific, and educational values.

Paleontological Resources Policies:

1. To identify paleontological resources through literature and records research and surface surveys.
2. To monitor and salvage paleontological resources during the grading of a project.
3. To preserve paleontological resources by maintaining them in an undisturbed condition.

The *Resources Element* also includes a map of the county, which shows general districts that are paleontologically sensitive (County of Orange, 2013: Figure VI-9, VI-113).

2.2.2 San Bernardino County

The *General Plan, Section V – Conservation Element* (URS Corporation, 2014:V-18–V-21; V-43; V-49) covers paleontological resources under the following countywide conservation (CO) goal and policy as well as mountain region (M/CO) and desert region (D/CO) specific goals:

GOAL CO 3: The County will preserve and promote its historic and prehistoric cultural heritage.

- **Policy CO 3.4:** The County will comply with Government Code Section 65352.2 (SB 18) by consulting with tribes as identified by the California Native American Heritage Commission on all General Plan and specific plan actions. Paleontological resources are addressed specifically under items 4-6 of the Program for this policy:

4. In areas of potential but unknown sensitivity, field surveys prior to grading will be required to establish the need for paleontologic monitoring.

5. Projects requiring grading plans that are located in areas of known fossil occurrences, or demonstrated in a field survey to have fossils present, will have all rough grading (cuts greater than 3 feet) monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Fossils include large and small vertebrate fossils, the latter recovered by screen washing of bulk samples.

6. A report of findings with an itemized accession inventory will be prepared as evidence that monitoring has been successfully completed. A preliminary report will be submitted and approved prior to granting of building permits, and a final report will be submitted and approved prior to granting of occupancy permits. The adequacy of paleontologic reports will be determined in consultation with the Curator of Earth Science, San Bernardino County Museum.

GOAL M/CO 4: Protect cultural and paleontological resources within the Mountain Region.

GOAL D/CO 6: Protect cultural and paleontological resources within the Desert Region.

The County of San Bernardino does not have a readily available paleontological sensitivity map, although the county recommends preparation of a Paleontologic Resources (PR) Overlay, as detailed in County of San Bernardino (2018:2-135–2-137). This PR Overlay will be applied to areas where paleontological resources are known to occur or are likely to be present, as indicated by fossil locality records from the San Bernardino County Museum (SBCM), University of California Museum of Paleontology (UCMP), and the Natural History Museum of Los Angeles County (NHMLAC). Projects proposed within the PR Overlay must be evaluated under the following procedures and conditions:

a) **Field survey before grading.** In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

b) **Monitoring during grading.** A project that requires grading plans and is located in an area of known fossil occurrence within the overlay, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential for fossil resources.

c) **Recovered specimens.** Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

d) **Identification and curation of specimens.** Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

e) **Report of findings.** Qualified paleontologic personnel shall prepare a report of findings with an appended itemized list of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

f) **Mitigation financial limits.** In no event shall the County require the applicant to pay more for mitigation as required by Subsections (b), (c), and (d), above within the site of the project than the following amounts:

1) One-half of one percent of the projected cost of the project, if the project is a commercial or industrial project;

2) Three-fourths of one percent of the projected cost of the project for a housing project consisting of one unit; and

3) If a housing project consists of more than one unit, three-fourths of one percent of the projected cost of the first unit plus the sum of the following:
   A. $200 per unit for any of the next 99 units;
   B. $150 per unit for any of the next 400 units; and
   C. $100 per unit for units in excess of 500.

2.2.3 Riverside County

There are four policies covering paleontological resources within Riverside County's *General Plan*, *Multipurpose Open Space (OS) Element* (County of Riverside, 2015a:OS-51):

- **OS 19.6:** Whenever existing information indicates that a site proposed for development has high paleontological sensitivity as shown on Figure OS-8, paleontological resource impact mitigation program (PRIMP) shall be filed with the Riverside County Geologist prior to site grading. The PRIMP shall specify the steps to be taken to mitigate impacts to paleontological resources.

- **OS 19.7:** Whenever existing information indicates that a site proposed for development has low paleontological sensitivity as shown on Figure OS-8, no direct mitigation is required unless a fossil is encountered during site development. Should a fossil be encountered, the Riverside County Geologist shall be notified and a paleontologist shall be retained by the project proponent. The paleontologist shall document the extent and potential significance of the paleontological resources on the site and establish appropriate mitigation measures for further site development.

- **OS 19.8:** Whenever existing information indicates that a site proposed for development has undetermined paleontological sensitivity as shown on Figure OS-8, a report shall be filed with the Riverside County Geologist documenting the extent and potential significance of the paleontological resources on site and identifying mitigation measures for the fossil and for impacts to significant paleontological resources prior to approval of that department.

- **OS 19.9:** Whenever paleontological resources are found, the County Geologist shall direct them to a facility within Riverside County for their curation, including the Western Science Center in the City of Hemet.

A coarse-grained paleontological sensitivity map of Riverside County is included in the OS Element, which indicates the sensitivity rankings across the ground surface based on the county's adopted system (County of Riverside, 2015a:Figure OS-8, OS-55; refer to Chapter 3 for the ranking system).

2.2.4 City of Corona

Located within Riverside County, the City of Corona includes the following goal and policies regarding paleontological resources under the Historic Resources section of its *General Plan* (EIP Associates, 2004:115–116):

Goal 4.3: Recognize the importance of archeological and paleontological resources and ensure the identification and protection of those resources within the City of Corona.

- **Policy 4.3.1:** Compile and maintain an inventory of all known archeological and paleontological resources within the City and the Sphere of Influence, and identify areas of cultural and resource sensitivity for future study in conjunction with development proposals.

- **Policy 4.3.7:** Paleontological resources found prior to or during construction shall be evaluated by a qualified paleontologist, and appropriate mitigation measures applied, pursuant to Section 21083.2 of CEQA, before the resumption of development activities. Any measures applied shall include the preparation of a report meeting professional standards, which shall be submitted to the Riverside County Museum of Natural History.

The City of Corona's General Plan does not include a paleontological sensitivity map or specific criteria for evaluating sensitivity.

3
PALEONTOLOGICAL RESOURCE ASSESSMENT GUIDELINES

Protection of paleontological resources requires assessment of the potential for geologic units to yield significant paleontological resources that could be directly or indirectly impacted or destroyed during Project development, and the formulation and implementation of management measures to mitigate these impacts.

3.1 DEFINITION OF PALEONTOLOGICAL RESOURCES AND SIGNIFICANCE CRITERIA

Paleontological resources are defined by the Society of Vertebrate Paleontology (SVP, 2010) as fossils and fossiliferous deposits. Fossils are the evidence of once-living organisms as preserved in the rock record. They include both the lithified remains of ancient plants and animals and the traces thereof (trackways, imprints, burrows, etc.). In general, the SVP (2010) considers fossils to be greater than 5,000 years old (older than Middle Holocene[1]) and to typically be preserved in sedimentary rocks, although certain volcanic rocks and low-grade metamorphic rocks may be fossiliferous if formed under certain conditions.

Well-preserved and identifiable individual fossils are considered significant paleontological resources if they are a type specimen, rare, a complete specimen, or part of an important diverse fossil assemblage. Of particular importance are fossils found in situ, or undisturbed from their primary geologic context. These fossils are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes, including investigation into paleoenvironments and paleoclimates (Scott and Springer, 2003; SVP, 2010). Among the various types of fossils, intact and in situ vertebrate fossils are usually assigned a greater significance than other types as they are comparatively rare. Consequently, more attention tends to be placed on the recovery of vertebrate fossils than other types.

3.2 PROFESSIONAL STANDARDS AND CLASSIFICATION OF PALEONTOLOGICAL RESOURCE SENSITIVITY

Most professional paleontologists in California adhere to guidelines set forth by the SVP (2010), unless others are available. The SVP's guidelines establish detailed protocols for the assessment of the paleontological sensitivity of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development (SVP, 2010).

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[1] Middle Holocene: extends from 8,200 to 4,200 years ago in the Holocene Epoch of the Quaternary Period, covering approximately the past 11,700 years (Cohen et al., 2019); the Quaternary Period also includes the older Pleistocene Epoch, which lasted from approximately 2.6 million years ago to approximately 11,700 years ago (Cohen et al., 2019).

Baseline information gathered during a paleontological resource assessment is used to assign the paleontological sensitivity of the geologic unit(s) (or members thereof) exposed at or distributed across the ground surface of a project area, in addition to those thought to be beneath a project area at depth. It should be noted that surface geology is not always indicative of subsurface geology or the potential for paleontological resources. For instance, an area whose surface geology is mapped as non-fossiliferous sediments may cover fossil-rich Pleistocene sediments at depth. Also, an area mapped as granite, devoid of fossils, may be covered by fossil-rich Pleistocene sediments. Thus, actual paleontological sensitivity across a project area ultimately can be determined only through a combination of desktop and field efforts. The SVP uses the following scale to rank a geologic unit's sensitivity or potential for significant paleontological resources:

> **High Potential:** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rocks temporally or lithologically suitable for the preservation of fossils (e.g., Middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than Late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.
>
> **Undetermined Potential:** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist (Project Paleontologist) to specifically determine the paleontological resource potential of these rock units is required before a Paleontological Resource Impact Mitigation Program (PRIMP) can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
>
> **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e.g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
>
> **No Potential:** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous

rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources (SVP, 2010).

Riverside County has developed a similar classification system for evaluating paleontological sensitivity and mitigating paleontological resources. However, only a portion of the Project area occurs in Riverside County, while another occurs in San Bernardino County, which has not developed such a system. Therefore, this PRA utilizes the SVP (2010) criteria for consistency throughout the Project (see Table 3-1 for a comparison with Riverside County):

Table 3-1
Paleontological Sensitivity Classifications

Sensitivity/Potential		**Criteria[1]**	**Mitigation Recommendations[2]**
County of Riverside	**SVP**		
N/A	No Potential	Rock units that have no potential for paleontological resources are those that are formed under or exposed to immense heat and pressure, such as high-grade metamorphic rocks and plutonic igneous rocks.	No mitigation required.
Low	Low	Rocks units from which few fossils have been recovered or are generally unsuitable for preservation of fossils are considered to have a low potential. These units typically yield fossils only on rare occasions and under unusual circumstances (e.g., basalt flows, recent colluvium, etc.).	Mitigation is not typically required; however, if an unanticipated paleontological resource is encountered, a qualified professional paleontologist (Project Paleontologist) may need to evaluate the resource to consider mitigation.
Undetermined	Undetermined	In some cases, available literature on a particular rock unit will be scarce and a determination of whether or not it is fossiliferous or potentially fossiliferous will be difficult to make. Under these circumstances, further study is needed to determine the unit's paleontological resource potential.	A field survey is required to further assess the unit's paleontological potential. The survey may provide data for development of a Paleontological Resource Impact Mitigation Program (PRIMP) prior to construction.
High A High B	High	Rock units from which vertebrate or significant specimens of other fossil types have been recovered are considered to have a high potential. Rock units with high potential also may include rock units that are temporally or lithologically suitable for the preservation of fossils (e.g., Middle Holocene and older, argillaceous and carbonate-rich paleosols, fine-grained marine sandstones, etc.).	Typically, a field survey, PRIMP, and onsite construction monitoring will be required. Any significant specimens discovered during monitoring will need to be prepared, identified, and curated into a museum. A final report documenting the significance of the finds will also be required.

Sources: County of Riverside (2015b) and SVP (2010)
[1] Criteria based on County of Riverside (2015b) and SVP (2010)
[2] Recommendations based on SVP (2010)

4
METHODS

This PRA was completed through a combination of desktop research and fieldwork. The purpose of the desktop studies was to identify the geologic units in the Project area and to determine whether previously recorded fossil localities occur either within the Project area or within the same geologic units elsewhere. The purpose of the fieldwork was to confirm or refute the results of the desktop studies. The results of both desktop studies and fieldwork are important for assessing paleontological potential at unknown depths within the boundaries of the Project area.

4.1 LITERATURE REVIEW AND RECORDS SEARCHES

Chemical and physical weathering processes often cause the breakdown of bedrock, which results in natural materials from which a soil can be created through the process of pedogenesis (Boggs, 2012). Although many factors govern the thickness of the soil, it typically obscures the underlying geologic deposits. Intact and in situ paleontological resources are not found in the soil layer. Therefore, in order to ascertain whether a particular project area has the potential for significant subsurface paleontological resources, it is necessary to review relevant scientific literature to determine the underlying geology and stratigraphy of the area. Furthermore, in order to delineate the boundaries of paleontological sensitivity, it is necessary to determine the extent of the entire geologic unit because paleontological sensitivity is not limited to surface exposures of fossil material. Æ reviewed several preliminary and published geologic maps of the Project area and vicinity, as well as pertinent geological and paleontological literature of the region.

To supplement information obtained from the literature review, Æ conducted searches of museum repositories for fossil localities within and near the Project area. Æ first requested a search of vertebrate paleontology records maintained by the NHMLAC (McLeod, 2019). Only NHMLAC vertebrate paleontology records were searched rather than all the museum's paleontology collections, because geologic units near the Project area are more conducive to the preservation of vertebrate fossils than significant invertebrate, plant, or trace fossils. Æ then completed a search of the online database of the UCMP (2019), which lists locality records from across California for all types of fossilized biota.

4.2 FIELDWORK

Prior to the field surveys, Æ examined recent aerial photographs of the entire Project area in Google Earth to determine likely locations of geologic outcrops and potential survey routes. Æ then conducted two field reconnaissance surveys for the Project. The first survey was conducted for Alternatives 1 and 2, and the proposed staging area on July 17, 2019. Æ completed the second survey for the segment between SART - Phase 5 and SART - Phase 3 on September 20, 2019. The purpose of these surveys was to confirm the presence/absence of exposed fossils on the ground surface and to evaluate geologic exposures for their potential to yield subsurface fossil material. The surveys consisted of a combination of close visual inspection and spot-checking to inspect the ground surface for evidence of paleontological resources while using a

Global Positioning System (GPS) Trimble Geo XH to navigate throughout the Project area and collect field data for subsequent Geographic Information System (GIS) mapping, if needed.

Close visual inspection was conducted only in the few portions of the Project area where the ground surface was visible or where erosion and grading had exposed native sediments or underlying geologic formations. Specifically, these locations were at the central portion of Alternative 1; at the base of a hill in the northwest margin of Alternative 1; in the floodplain at the north end of Alternative 2; and at the base of a hill at the south end of Alternative 2. Æ also closely inspected a well-exposed river terrace just outside of the Project area to the north of the segment between SART - Phase 5 and Phase 3. Spot-checking was conducted for the remainder of the Project area in which the ground surface had been disturbed previously by landscaping, especially within the Golf Course, or was obscured by dense vegetation at the time of Æ's survey.

Æ's field paleontologist kept notes on the geology and sedimentology encountered and took photographs to document the surveys. Observed fossils, if any, were field-documented and not collected.

4.3 KEY PERSONNEL

Æ's Paleontology Program Manager, Dr. Amy Ollendorf, served as Principal Investigator for the Project and oversaw each task required for the production of this PRA, including quality control. Æ's Paleontology Supervisor, Chris Shi, served as Project Paleontologist and was the author of this report. Cari Inoway completed GIS mapping in close consultation with Shi and Ollendorf. Æ field paleontologist Ken Moslak conducted both field reconnaissance surveys.

Dr. Ollendorf has over 35 years of environmental compliance experience across the United States and abroad. She also has interdisciplinary graduate degrees involving geology and a bachelor's degree in geology, all of which focused on paleontological subject matter. Mr. Shi has a graduate degree in geology with an emphasis in paleontology, and 10 years of paleontological field experience including 3 years of paleontological monitoring experience in California. Mr. Moslak possesses familiarity and proficiency with cartography, mammalogy, geomorphology, and stratigraphy of California, and has more than 30 years of experience as an archaeological and paleontological field technician. Qualifications for key personnel can be found in Appendix A.

5
GEOLOGY AND PALEONTOLOGY

5.1 REGIONAL GEOLOGY

The Project area is within the northern portion of the Peninsular Ranges Geomorphic Province, which extends 125 miles south from the Transverse Ranges through the Los Angeles Basin to Baja California. A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and tectonic history (American Geological Institute, 1976). The Peninsular Ranges comprise a series of mountain ranges separated by northwest-trending valleys formed from faults branching from the San Andreas Fault (Norris and Webb, 1976; California Geological Survey, 2002). The mountain ranges are bounded to the east by the Colorado Desert and range in width from 30 to 100 miles (Norris and Webb, 1976). The Project area is situated at the southeast corner of the Whittier Fault Zone in the Los Angeles Basin with the foot of the Santa Ana Mountains approximately half a mile to the south-southeast (Morton et al., 2006).

The basement rocks in this region are part of a large assemblage known as the Peninsular Ranges Assemblage. Rocks of the assemblage date from the Paleozoic[2] to the present, with most of the assemblage represented by the Mesozoic-age[3] Peninsular Ranges batholith, as well as pre-batholithic metasedimentary and metavolcanic rocks into which the batholith was emplaced (Jahns, 1954). Cenozoic[4] sedimentary rocks ranging from the Paleocene to the present form thick deposits that rest unconformably above the basement rocks. West of the Project area, the Puente Hills expose folded and faulted Neogene marine sedimentary rocks of the Los Angeles Basin, with up to 8,200 meters of Middle[5] and Late Miocene-age[6] rocks partially equivalent to strata from which most of the petroleum of the Los Angeles Basin has been produced (Durham and Yerkes, 1964; Yerkes et al., 1965).

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[2] Paleozoic Era: Approximately 541 to 252 million years ago, subdivided into six periods—Cambrian (541–485 million years ago), Ordovician (485–444 million years ago), Silurian (444–419 million years ago), Devonian (419–359 million years ago), Carboniferous (359–299 million years ago), and Permian (299–252 million years ago) (Cohen et al., 2019).

[3] Mesozoic Era: Approximately 252 to 66 million years ago, subdivided into three periods—Triassic (252–201 million years ago), Jurassic (201–145 million years ago), and Cretaceous (145–66 million years ago) (Cohen et al., 2019).

[4] Cenozoic Era (formerly Tertiary): 66 million years ago to present, subdivided into three periods—Paleogene (66–23 million years ago), Neogene (23–2.6 million years ago), and Quaternary (2.6 million years ago to present). The Paleogene Period is subdivided into the Paleocene, Eocene, and Oligocene epochs; the Paleocene Epoch lasted from approximately 66 to 56 million years ago, the Eocene Epoch lasted from approximately 56 to 34 million years ago, and the Oligocene Epoch lasted from approximately 34 to 23 million years ago. The Neogene Period is subdivided into the Miocene and Pliocene epochs; the Miocene Epoch lasted from approximately 23 to 5.3 million years ago and the Pliocene Epoch lasted from approximately 5.3 to 2.6 million years ago. The Quaternary Period is subdivided into the Pleistocene and Holocene epochs; Pleistocene Epoch, or last Ice Age, lasted from approximately 2.6 million to 11,700 years ago when the Holocene Epoch began (all dates according to Cohen et al., [2019]).

[5] Middle Miocene: Approximately 16 to 11.6 million years ago (Cohen et al., 2019).

[6] Late Miocene: Approximately 11.6 to 5.3 million years ago (Cohen et al., 2019).

5.2 GEOLOGY AND PALEONTOLOGY OF THE PROJECT AREA

The Project area has been mapped at various scales:

- **1:250,000** – Santa Ana Sheet (Rogers, 1965; and references therein)
- **1:100,000** – Santa Ana and San Bernardino Quadrangles (Morton et al., 2006; and references therein)
- **1:24,000** – Yorba Linda and Prado Dam Quadrangles (Dibblee and Ehrenspeck, 2001)

Rogers (1965) is part of the *Geologic Atlas of California* series published between 1958 and 1969, which provides the first complete, consistent view of the geology of California (California Department of Conservation, 2019). These compilations adopt a single set of map symbols to correlate potentially equivalent geologic units by defining the units only by geologic time, rather than by both time and lithology. Dibblee and Ehrenspeck (2001) and Morton et al. (2006) utilize information provided by Rogers (1965) or sources referenced within, as well as information from more recent studies and original field data to further refine the geology within their specific regions. This PRA is largely based on the interpretations of Morton et al. (2006) as the most recent published map, although Dibblee and Ehrenspeck (2001) are discussed where interpretations may differ.

According to Morton et al. (2006), the surficial geology of the Project area consists mostly of Quaternary alluvial and fluvial deposits along the west bank of the Santa Ana River with some exposures of the Puente Formation and undifferentiated Topanga Group in the hills of the northeast, northwest, and southwest of the Project area, as well as recent landslide deposits at the foot of the southwest hill (Figure 5-1).

5.2.1 Topanga Group (Tt)

The Topanga Group (Tt: Morton et al., 2006) is a Middle Miocene unit consisting mostly of marine sandstone and conglomerate with local volcanic rocks. In general, the Topanga Group is fossiliferous and the various occurrences in the Los Angeles Basin can be correlated biostratigraphically (Yerkes and Campbell, 1979). While most fossils documented from the Topanga Group are common marine invertebrates and foraminifera, rare specimens of shark and cetacean have been reported as well (Rugh, 2016).

The group was originally designated by Kew (1923) as the Topanga Formation to refer to undifferentiated sedimentary rocks above the Early Miocene Vaqueros Formation but below the Late Miocene Modelo Formation within the Los Angeles Basin. Noting the wide variety of lithologies, Yerkes and Campbell (1979) revised the nomenclature to include Conejo Volcanics in the newly named "Topanga Canyon Formation" on the basis of type-strata of the original Topanga Formation in the Santa Monica Mountains. Other investigators subsequently recognized several additional rock members, and Morton et al. (2006) most recently propose four members at the formational rank in the vicinity of the Project:

(1) Buzzard Peak Conglomerate (Ttbp)—well-indurated, sandy conglomerate, coarse-grained pebbly sandstone, and rare silty beds. This is the lowest unit of the Topanga Group. Surface exposures have a maximum thickness of 600 meters, but the base does not crop out. A limited

Figure 5-1 Geologic units in the Project area.

faunal assemblage suggests this unit's age falls in the Middle Miocene Luisian and Relizian Stages of Kleinpell (1938).

(2) Bommer Formation (Ttb)—gray to brownish-gray, thick-bedded, medium- to coarse-grained sandstone and interbedded fine-grained sandstone and siltstone. All of the rocks are locally conglomeratic. Middle Miocene *Turritella oyacana* fossils are documented throughout the unit at the type location in the San Joaquin Hills.

(3) Los Trancos Formation (Ttlt)—pale gray to brownish-gray, thin- to medium-bedded siltstone and fine-grained sandstone. Up to 945 m thick, this geologic unit includes some interbedded medium- to coarse-grained sandstone and shale beds. Foraminifera indicate a correlation to the Middle Miocene Relizian Stage of Kleinpell (1938).

(4) Paulerino Formation (Ttp)—mainly a poorly exposed sequence of interbedded sandstone, siltstone and breccia; some of the sandstone includes tuffaceous beds and the breccia is restricted to discrete beds. Maximum thickness is about 380 meters. Fossils suggest correlation to the lower part of the Middle Miocene Luisian or Relizian Stages of Kleinpell (1938). According to Morton et al. (2006), a whole-rock potassium-argon age of 15.8 ±1.3 million years was obtained on andesite at the base of this formation.

In addition to these four members, Morton et al. (2006) recognize undifferentiated rocks of the Topanga Group on the north and west flanks of the Santa Ana Mountains that form clear contacts with the underlying Sespe-Vaqueros Formations and the overlying Puente Formation. It is roughly equivalent to the Topanga Sandstone (Ttp) as mapped by Dibblee and Ehrenspeck (2001). The undifferentiated Topanga Group (Tt) as mapped by Morton et al. (2006) is exposed in the hills near the southwest end of the Project area. The base of this unit consists of a well-cemented conglomerate bed 2 to 9 meters in thickness. Above this are medium- to coarse-grained sandstone beds with occasional fine-grained sandstone and siltstone; these reach a maximum thickness of 689 meters. The undifferentiated unit preserves some of the index fossils, including *Turritella ocoyana, Turritella. cf. T. ocoyana topangensis, T. temblorensis, Leptopecten andersoni, Chione temblorensis, Crassostrea cf. titan subtitan, Vertipecten nevadanus* (Morton et al., 2006), and limited foraminifera are questionably assigned to the Middle Miocene Relizian Stage of Kleinpell (1938).

5.2.2 Puente Formation (Tpsc, Tpsq)

The Late Miocene to Early Pliocene[7] Puente Formation (Tp: Morton et al., 2006) was named by Eldridge and Arnold (1907) for a very thick sequence of sandstone, siltstone, and shale beds that reaches a maximum thickness of almost 4,000 meters in the Puente Hills in eastern Los Angeles County, although the members become virtually indistinguishable westward toward the central part of the Los Angeles Basin. The unit includes foraminifera of the Mohnian and Delmontian stages of Kleinpell (1938).

English (1926) first subdivides the formation into three lithological units south of the Puente Hills, which Daviess and Woodford (1949) later expand upon and add a fourth member from the

[7] Early Pliocene: Approximately 5.3 to 3.6 million years ago (Cohen et al., 2019).

type area in the Puente Hills. Schoellhamer et al. (1954) first formalized the subdivisions and added member names. As described in Morton et al. (2006), the constituent members from oldest to youngest are:

(1) La Vida Member (Tplv)—primarily siltstone and subordinate sandstone, and locally includes porcellaneous siltstone or shale and a few beds of vitric tuff. Siltstone in the unit is light gray to black, massive to well-bedded, and generally friable. Weathered surfaces are typically white or pale gray. Rocks in this member have yielded widespread fish remains, abundant foraminifera, local phosphate nodules, and sparse limy siltstone. Interbedded sandstone ranges from 2 centimeters to over 1 meter in thickness. Foraminifera of the Mohnian Stage (Late Miocene) of Kleinpell (1938) have been reported for the La Vida Member.

(2) Soquel Member (Tpsq)—Late Miocene sandstone and siltstone, although sandstone is predominant. The sandstone is mainly of gray to yellowish-gray, massive to well-bedded, medium- to coarse-grained, poorly sorted interbedded with matrix-supported pebbly sandstone. Many sandstone beds are graded, and locally the unit is conglomeratic. The lower part commonly includes ellipsoidal calcite-cemented concretions that range in size from 30 centimeters to 1.5 meters in diameter. Near the Project area, the member is approximately 2,000 feet thick (Durham and Yerkes, 1964). Fossils from this member include index foraminifera such as *Bulimina uvigerinaformis* and *Bolivina hughesi*, as well as corals, mollusks, and rarely, sharks and other marine vertebrates.

(3) Yorba Member (Tpy)—a succession of Late Miocene white to gray, thin-bedded, micaceous and siliceous siltstone and sandy siltstone, which includes beds of fine-grained sandstone and white to pale gray limy concretions and concretionary beds. In the eastern Puente Hills, the upper part of the Yorba Member exhibits large matrix-supported boulders in relatively fine-grained rocks.

(4) Sycamore Canyon Member (Tpsc)—lithologically variable laterally and composed of pale gray, thick-bedded to massive, medium- to coarse-grained, friable sandstone; pale gray, thin-bedded, siliceous siltstone; pale gray, poorly-bedded siltstone; and brownish-gray, massive conglomerate. This member is approximately 3,500 to 3,600 meters thick near the Project area (Durham and Yerkes, 1964). Fossils are scarce, with reports of Late Miocene to Early Pliocene index foraminifera, including *Bolivina hughesi*, *Gyroidina rotundimargo*, and other species (Yerkes, 1972).

The Puente Formation is generally considered to be coeval and sometimes equivalent to the Late Miocene part of the Monterey Formation. For instance, Dibblee and Ehrenspeck (2001) elevated the Sycamore Canyon Member to the formation rank and considered the Yorba, Soquel, and La Vida Members to be subdivisions of the Monterey Formation. However, Morton et al. (2006) recognized lithological distinctions between the Puente and Monterey formations, particularly in the San Joaquin Hills, and does not consider these units to be equivalent.

According to Morton et al. (2006), the Soquel (Tpsq) and Sycamore Canyon (Tpsc) Members are exposed at the ground surface in the Project area. Specifically, they occur in only two small portions of the Project area—along the hills in the northwest (Tpsq) and the northeast end (Tpsc). These are roughly equivalent to the Soquel Sandstone Member (Tmss) of the Monterey

Formation and the Sycamore Canyon Formation (Tscs) as mapped by Dibblee and Ehrenspeck (2001).

5.2.3 Older Quaternary Deposits (Qvoa, Qoa)

According to Morton et al. (2006), older Quaternary deposits partially cover exposures of the undifferentiated Topanga Group in the far southwestern portion of the Project area and the Soquel Member of the Puente Formation in the northwestern portion. The sediments covering the Topanga Group consist of very old axial-channel deposits from valley streams during the Early to Middle Pleistocene[8] (Qvoa). These are largely sandy in composition (i.e., arenaceous, “a”) with scattered gravel and pebble layers and some silt and clay. The sediments typically are well-consolidated to moderately to well-indurated, reddish-brown, and are highly pigmented in upper parts. The sediments overlying the Soquel Member consist of old axial-channel deposits from valley streams during the Middle to Late Pleistocene[9] (Qoa). These include moderate- to well-consolidated silt, sand, and gravel. Some layers exhibit moderate- to well-developed pedogenic soils. The older surficial sediments (Qoa) of Dibblee and Ehrenspeck (2001), which are elevated dissected remnants of alluvial gravel, sand, and silt, are lithologically and stratigraphically equivalent to the very old axial-channel deposits (Qvoa) of Morton et al. (2006), as they are similarly mapped above the Topanga Sandstone (Ttp), though Dibblee and Ehrenspeck (2001) do not include any deposits equivalent to the old axial-channel deposits of Morton et al. (2006) near the Soquel Sandstone Member (Tmss).

Pleistocene-age deposits similar to those mapped in the Project area have yielded scientifically significant plant, invertebrate, and vertebrate fossils throughout Orange, San Bernardino, and Riverside counties (Reynold and Reynolds, 1991; Long, 1993; Scott et al., 1997).

5.2.4 Younger Quaternary Deposits (Qyf, Qya, Qw, Qls)

Younger Quaternary deposits cover most of the ground surface of the Project area (Morton et al., 2006). These can be divided into two groups: deposits from the Late Pleistocene to Holocene and very recent deposits from the Late Holocene.[10] The Late Pleistocene to Holocene deposits include young alluvial-fan deposits (Qyf) and axial-channel deposits (Qya). As mapped by Morton et al., 2006, alluvial-fan deposits occur along a portion of the west margin of the Project area and in the proposed staging area bordering SR 91. Generally, the sediments consist of unconsolidated to moderately consolidated silt, sand, pebbly cobbly sand, and boulders with slightly to moderately dissected surfaces (Morton et al., 2006). In the region of the Project area, most of these sediments are arenaceous, though the sediments near SR 91 include a high proportion of gravel (i.e., gravelly sand, “ga”). Young axial-channel deposits from earlier streams blanket much of the valley floor and are the most widespread sediments in the Project area, according to the map by Morton et al. (2006). In general, these deposits include slightly to moderately consolidated silt, sand, and gravel deposits (Morton et al., 2006). Like the alluvial-fan deposits, the axial-channel deposits in the region are mostly arenaceous. Dibblee and

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[8] Early to Middle Pleistocene: 2.6 million to 126,000 years ago (Cohen et al., 2019).
[9] Middle to Late Pleistocene: 126,000 to 11,700 years ago (Cohen et al., 2019).
[10] Late Holocene: 4,200 years ago to present (Cohen et al., 2019).

Ehrenspeck (2001) do not differentiate between alluvial-fan and axial-channel deposits, but their alluvial gravel, sand, and silt of valleys and floodplains (Qa) are partially equivalent.

Late Holocene deposits include very young wash deposits (Qw) and landslide deposits (Qls). The wash deposits are mapped by Morton et al. (2006) along portions of the east margin of the Project area and are described as unconsolidated sands and gravels in active washes, ephemeral river channels of axial-valley streams, and in channels on active surfaces of alluvial fans. In the Project area, they are arenaceous and represent recent deposits of the Santa Ana River (Morton et al., 2006). Landslide deposits are mapped at the foot of the southwest hill and consist of chaotically mixed soil and rubble from debris slides and rock slumps (Morton et al., 2006). Dibblee and Ehrenspeck (2001) include gravel and sand of the Santa Ana River (Qg) equivalent to the very young wash deposits of Morton et al. (2006) and also include these in place of the latter's young axial-channel deposits in the segment between SART - Phase 5 and SART - Phase 3. They do not map any landslide deposits near the Project area.

Pleistocene- and older Holocene-age deposits may potentially preserve significant fossils, but deposits less than 5,000 years old are unlikely to preserve them, as they are generally too young for the fossilization process to occur (SVP, 2010).

6
RESULTS AND ANALYSIS

This chapter reports the results of the desktop studies and field investigations completed for this Project and the assignment of SVP sensitivity rankings to the geologic units observed in the Project area or suspected to lie beneath the Project area at unknown depths.

6.1 MUSEUM RECORDS SEARCHES

The NHMLAC search did not yield any fossil localities within the Project area, although several localities are reported from the same sedimentary units that occur in the Project area, including the Topanga Formation (Group), Puente Formation, and older Quaternary deposits (McLeod, 2019). Table 6-1 summarizes the NHMLAC search results. In terms of localities in the Topanga Group, the closest to the Project area is LACM 6292 to the south-southwest between the Peters Canyon Reservoir and Santiago Reservoir. The next closest are LACM 3891, 4008, and 4009 slightly farther to the southwest of the Project area in the El Modena foothills.

The closest localities from the Puente Formation are LACM 7373 through 7381, which occur north-northwest of the Project area, to the east of Bane Canyon and north of Slaughter Canyon. The next closest are LACM 6307 through 6336, which occur slightly farther to the northwest and north of Bane Canyon. LACM 7674 is immediately west of these, while LACM 7266 through 7284 occur to the north and northeast, respectively. Lastly, LACM 7503 is farther to the west, southwest of Los Serranos and just north of Vellano Club Drive.

Four nearby localities are reported from older Quaternary deposits—LACM 1207, just east of the northernmost portion of the Project area on the northwest side of Corona, west of Cota Street between Railroad Street and Harrington Street; LACM 7508, northwest of the Project area in the uppermost reaches of Soquel Canyon; and LACM 7268 and 7271, north-northwest of the Project area and just south of Los Serranos.

Table 6-1
NHMLAC Vertebrate Localities Reported Near the Project Area

Locality No.	Geologic Unit	Age	Taxa
LACM 6292	Topanga Formation (Topanga Group)	Middle Miocene	• smoothhound shark (*Mustelus*)
LACM 3891, 4008, 4009	Topanga Formation (Topanga Group)	Middle Miocene	• desmostylian (*Desmostylus*) • sirenian (Dugongidae) • whales (Cetacea)
LACM 7373-7381	Puente Formation	Late Miocene	• herring (*Ganolytes cameo*) • cod (*Eclipes*) • lanternfish (Myctophidae) • jack (Carangidae) • croaker (*Lompoquia*) • mackerel (*Scomber*) • deep sea smelts (Bathylagidae)

Table 6-1
NHMLAC Vertebrate Localities Reported Near the Project Area

Locality No.	Geologic Unit	Age	Taxa
			• hatchetfish (*Argyropelecus*)
LACM 6307-6336	Puente Formation	Late Miocene	• herring (*Ganolytes cameo, Xyne grex*) • cod (*Eclipes*) • mora (Moridae) • lanternfish (Myctophidae) • jacks (*Decapterus, Pseudoseriola*) • snake mackerel (*Thyrsocles kriegeri*) • croaker (*Lompoquia*) • mackerel (*Sarda*) • grouper (Serranidae) • deep sea smelt (Bathylagidae) • salmon (*Oncorhynchus*) • rockfish (Scorpaenidae) • viperfish (*Chauliodus eximius*) • hatchetfish (*Argyropelecus*) • sea lion (*Pithanotaria*) • rorqual whale (Balaenopteridae) • porpoise (Phocoenidae) • sperm whale (*Scaldicetus*)
LACM 7674	Puente Formation	Late Miocene	• basking shark (*Cetorhinus*) • grunion (Atherinidae) • herring (*Ganolytes cameo, Xyne grex*) • cod (*Eclipes*) • scad (*Decapterus*) • snake mackerel (*Thyrsocles kriegeri*) • croaker (*Lompoquia*) • bonito (*Sarda*) • mackerel (*Scomber*) • slickhead (Alepocephalidae) • deep sea smelt (Bathylagidae) • rockfish (Scorpaenidae) • viperfish (*Chauliodus eximus*) • dolphin (Delphinoidea) • rorqual whale (Balaenopteridae)
LACM 7266-7284	Puente Formation	Late Miocene	• herring (*Ganolytes cameo, Xyne grex*) • cod (*Eclipes*) • lanternfish (Myctophidae) • jack (*Pseudoseriola*) • snake mackerel (*Thyrsocles*) • croaker (*Lompoquia*) • mackerel (*Sarda, Scomber*) • deep sea smelts (Bathylagidae)
LACM 7503	Puente Formation	Late Miocene	• dolphin (*Atocetus*)
LACM 1207	Older Quaternary deposits	Pleistocene	• deer (*Odocoileus*)
LACM 7508	Older Quaternary deposits	Pleistocene	• ground sloth (*Nothrotheriops*) • horse (*Equus giganteus*)

Table 6-1
NHMLAC Vertebrate Localities Reported Near the Project Area

Locality No.	Geologic Unit	Age	Taxa
LACM 7268, 7271	Older Quaternary deposits	Pleistocene	• horse (*Equus*)

Source: McLeod (2019)

Following these results, McLeod (2019) suggests shallow excavations into younger Quaternary deposits exposed throughout most of the Project area are unlikely to encounter significant vertebrate fossils. However, deeper excavations in those portions that extend into older Quaternary deposits, as well as any excavations into the Topanga Group and Puente Formation, may well encounter significant fossil vertebrate remains. Any substantial excavations in the Project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains uncovered while not impeding development. McLeod (2019) also recommends sediment samples to be collected and processed to determine the potential for small-sized fossils within the Project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

The UCMP's online database lists numerous fossil localities from Orange, San Bernardino, and Riverside counties. However, no localities are specified from the Topanga Group, Puente Formation, or Pleistocene deposits within a 10-mile radius of the Project area.

6.2 FIELD RESULTS

Approximately 90 percent of the ground surface of the Project area has been disturbed previously by bulldozing, grading, and landscaping for the Golf Course (Figure 6-1). Additionally, intact subareas have relatively poor ground visibility due to dense vegetation, particularly in the Alternative 1 portion of the Project area (Figure 6-2). Despite this, Æ observed surficial deposits and/or exposures of the following mapped geologic units from Morton et al. (2006): the Soquel and Sycamore Canyon Members of the Puente Formation (Tpsq, Tpsc), the young axial-channel deposits (Qya), young alluvial-fan deposits (Qyf), and the very young landslide deposits (Qls). Æ was not able to confirm the presence or absence of the Topanga Group (Tt) or the older Quaternary deposits (Qvoa, Qoa), and did not observe the very young wash deposits (Qw).

No paleontological resources were observed within the Project area during the surveys. However, one resource was observed just outside the Project area north of the segment between SART - Phase 5 and Phase 3 (see the following section).

6.2.1 Puente Formation

Exposures of the Soquel and Sycamore Canyon Members of the Puente Formation were documented during the field surveys. Colluvial deposits eroded from the Soquel Member were seen at the foot of the hill in the northwest margin of Alternative 1 (Figure 6-3). These are coarse, poorly-sorted sands with varying proportions of subangular to well-rounded gravels and cobbles with some boulders up to 30 centimeters in diameter.

Figure 6-1 View of driving range at the south end of Alternative 2 showing heavy landscaping; facing north.

Figure 6-2 Dense vegetation in the central portion of Alternative 1; facing northeast.

Figure 6-3 Colluvium eroded from the Soquel Member of the Puente Formation at the foot of the northwest hill of Alternative 1; facing north.

Tilted beds of the Sycamore Canyon Member were seen on the hillside bordering the northwest margin of Alternative 1, although these were not closely investigated since they were outside the Project area and difficult to access due to high vegetation (Figure 6-4). In contrast to the Soquel Member, colluvial deposits of the Sycamore Canyon Member were not observed in the Project area, where they are mapped in the northernmost margin of Alternative 2. However, they were seen in an accessible, well-exposed river terrace just north of the Project area bordering the segment between SART - Phase 5 and Phase 3. The deposits were eroded from the adjacent hillside in which the member was also observed, and they consist of finely bedded, friable, water-laid siltstones and fine sandstones without gravels. Examination of the river terrace yielded a broken piece of a trace fossil, possibly a clay-filled rodent burrow or root cast, measuring a total of 13 centimeters long by 3 to 3.5 centimeters wide (Figure 6-5). One crystal of selenite was also found in the colluvial skree of the terrace. The occurrence of selenite crystals, which form in alkaline lake muds and clay beds, indicates a highly favorable depositional environment for fossil preservation.

6.2.2 Young Quaternary Deposits

Young axial-channel deposits constitute much of the reworked sediments that make up the Golf Course, with the upper meter of sediments landscaped and planted in sod (see Figure 6-1). Undisturbed, native axial-channel deposits were observed at the ground maintenance compound in the west-central portion of the Project area (Figure 6-6). The sediments here consist of moderately-sorted sands with silt and small pebbles up to 4 centimeters in diameter. Young alluvial-fan deposits in the west-central portion of the Project area are largely obscured by dense vegetation and, as a result, were not investigated closely (Figure 6-7).

Figure 6-4 Tilted beds of the Sycamore Canyon Member of the Puente Formation in the hills bordering the northwest margin of Alternative 1; facing northwest.

Figure 6-5 Broken piece of a clay-filled rodent burrow or root cast (above) and selenite crystal (below) from the exposed river terrace north of the segment between SART - Phase 5 and Phase 3.

Figure 6-6 Exposed young axial-channel deposits at the central portion of Alternative 1; facing north-northeast.

Figure 6-7 View of dense vegetation growth over young alluvial-fan deposits in the central portion of Alternative 1; facing west-northwest.

Landslide deposits were observed at the south end of the Project area and include poorly-sorted, angular gravels and cobbles in muddy matrix (Figure 6-8). Some of these deposits had been bulldozed and reworked to pave the staging area near SR 91. In addition to the mapped geologic units, Æ noted former railroad grades that are now roads with imported gravel fill (Figure 6-9).

Figure 6-8 Very young landslide deposits exposed at the southwest end of Alternative 2.

Figure 6-9 Existing road of old railroad grade seen from the north end of Alternative 1; facing west-southwest.

6.3 DETERMINATION OF PALEONTOLOGICAL RESOURCE POTENTIAL WITHIN THE PROJECT AREA

Using information obtained from the desktop research and the field investigations, Æ assigned sensitivity rankings in accordance with SVP (2010). Æ's delineations are based on a combination of three factors: (1) resource potential of geologic units found at the ground surface, (2) resource potential of geologic units thought to be present at unknown depths, and (3) likelihood of encountering those subsurface geologic units. Æ's proposed distribution of paleontological sensitivity within the Project area is shown in Figure 6-10.

Æ assigns a High Sensitivity to three elevated portions of the Project area where the Topanga Group (Tt), Puente Formation (Tpsq, Tpsc), and older Quaternary deposits (Qvoa, Qoa) are mapped at the ground surface (Morton et al., 2006). These are near the southwest and northwest hills of Alternative 1 and the hill at the north end of Alternative 2. Although the Topanga Group was not observed during Æ's field surveys, the NHMLAC reports numerous fossil localities from its occurrences in addition to occurrences of the other units near the Project area (McLeod, 2019). These museum records do not specify the subunits within the Topanga Group and Puente Formation that yielded the fossils; however, significant fossils have been reported in published literature from both units throughout their geographical extents.

Æ did not observe deposits of the Sycamore Canyon Member of the Puente Formation within the Project area. Instead, similar deposits were observed just outside the Project area in a nearby river terrace. Close investigation of this terrace yielded one paleontological resource. The occurrence of selenite in these sediments indicates a depositional environment conducive to fossil preservation. Therefore, these finds may be significant, as they suggest the Sycamore Canyon Member may be more fossiliferous than previously thought, since the member is typically known from the literature to preserve scarce fossil foraminifera and little else. While the deposits as mapped at the north end of Alternative 2 were not confirmed, they may be still be present, possibly in the shallow subsurface, and can potentially preserve similar paleontological resources.

No resources were observed in the Soquel Member, though this geologic unit is known from the literature to be abundantly fossiliferous. As such, Project-related excavations into these deposits could impact significant paleontological resources.

While older Quaternary deposits are sporadically fossiliferous throughout Southern California, the presence of nearby localities from the NHMLAC records suggests these types of deposits also potentially preserve fossils in the vicinity. Additionally, they overlie the Topanga Group and Puente Formation at unknown depths, and the contacts among them are mapped within the Project area. Both the County of Orange (2013) and County of Riverside (2015b) support this assessment by indicating these elevated terrains are paleontologically sensitive.

Æ assigns a Low Sensitivity to the remainder of the Project area, which is composed of low-lying land where the younger Quaternary deposits (Qyf, Qya, Qw, Qls) are exposed. Portions of the Project area where unit Qyf is exposed are overgrown with thick vegetation, suggesting the presence of soil over the geologic unit to an unknown depth. Much of the ground surface where unit Qya is mapped has been disturbed previously for development of the Golf Course to at least 3 feet bgs. The presence of soil and previous disturbance suggests intact and significant fossils are unlikely to be preserved within the top few feet. Also, the upper, Holocene-age layers of these units may be too young to preserve fossils. Units Qw and Qls are similarly too young. The paleontological sensitivity maps from the County of Orange (2013) and County of Riverside (2015b) both support this assessment.

Figure 6-10 Paleontological sensitivity of the Project area.

7
RECOMMENDATIONS

Æ's literature review indicates the presence of several fossiliferous geologic units within the Project area, namely the Topanga Group, Puente Formation, and older Quaternary deposits. The NHMLAC museum records search yielded nearby fossil locality records from all of these units. During the field survey, Æ observed exposures of the Puente Formation and noted much of the Project area is disturbed from development of the Golf Course. Æ also observed one paleontological resource from sediments eroded from the Sycamore Canyon Member of the Puente Formation just outside the Project area. From these desktop and field efforts, Æ assessed the paleontological resource potential of the Project area and assigned sensitivity rankings across the Project area (SVP, 2010).

The paleontological sensitivity of the Project area includes subareas ranked as High and Low Sensitivity. The present study therefore indicates Project-related construction activities may potentially impact significant paleontological resources. Æ recommends mitigation measures for adequate protection or salvage of significant paleontological resources to subareas determined to have High Sensitivity. The following recommendations are based on guidelines specified by the SVP (2010).

7.1 WORKER'S ENVIRONMENTAL AWARENESS PROGRAM

Prior to the start of construction, all field personnel should be briefed during a Worker's Environmental Awareness Program (WEAP) regarding the types of fossils that could be found in the Project area and the procedures to follow should paleontological resources be encountered. This training should be accomplished at the pre-grade kick-off meeting or morning tailgate meeting and should be conducted by a Project Paleontologist who meets the SVP (2010) qualifications standards or his/her representative. Specifically, the training should provide a description of the fossil resources that may be encountered in the Project area, outline steps to follow in the event that a fossil discovery is made and provide contact information for the Project Paleontologist and on-site monitor(s). The training should be developed by the Project Paleontologist and may be conducted concurrent with other environmental training (e.g., biological, cultural, and natural resources awareness training, safety training, etc.).

7.2 PALEONTOLOGICAL MITIGATION MONITORING

Prior to the commencement of ground-disturbing activities, a Project Paleontologist should be retained to prepare and implement a PRIMP for the Project. The Project's PRIMP should develop mitigation measures based on the assigned sensitivity rankings as well as the proposed depths of ground disturbance throughout the Project area, as near-surface geologic units are well documented while geologic units at greater depth (i.e., 4 feet or greater bgs) remain undocumented. Based on the proposed Project's excavation depths, Æ's recommended approach to mitigation monitoring for the Project are summarized and shown in Figure 7-1:

Figure 7-1 Monitoring recommendations.

- **High Sensitivity:** Full-time monitoring is recommended for disturbance at 4 feet or greater bgs.
- **Low Sensitivity:** Spot-check monitoring is recommended for disturbance at 4 feet or greater bgs.

Although typically not required for monitoring, subareas of Low Sensitivity may be evaluated by spot-check monitoring for the presence of High Sensitivity geologic units at depth at the discretion of the Project Paleontologist. In particular, the proposed excavations up to 40 feet bgs for the bridge locations should be spot-checked, as these may encounter High Sensitivity geologic units at depth. If encountered, these locations should be elevated to High Sensitivity. Monitoring should not be required for shallow excavations less than 4 feet bgs in areas of previous disturbance or as determined by the Project Paleontologist. In areas of High Sensitivity, monitoring efforts can be reduced or eliminated at the discretion of the Project Paleontologist if no fossil resources are encountered after 50 percent of the excavations are completed.

Monitoring should include the visual inspection of excavated or graded areas, trench sidewalls, spoils, and any other disturbed sediment. In the event that a paleontological resource is discovered, either the paleontologist or approved on-site monitor will have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and collected. Additionally, bulk sediment samples from geologic units with High paleontological sensitivity should be collected and processed to determine the presence of small-fraction fossils.

7.3 FOSSIL PREPARATION, CURATION, AND REPORTING

Any significant fossils collected during fieldwork will be prepared in a properly equipped paleontology laboratory to a point ready for curation. Preparation will include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossils specimens will be identified to the lowest taxonomic level, cataloged, analyzed, and prepared for curation. Assuming landowners concur and will sign a Deed of Gift Form, fossil specimens will be submitted for permanent curation in a museum repository approved by the RCTC, such as the Western Science Center in Hemet. The cost of curation is assessed by the repository and is the responsibility of the Project proponent.

At the conclusion of laboratory work and curation, the paleontological contractor will prepare a final report to describe the results of the paleontological inventory and evaluation. The report will include an overview of the Project area geology and paleontology, a description of the field and laboratory methods, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, and recommendations. If fossils will be donated for permanent curation, a copy of the report will be submitted to the curation institution along with the fossil assemblage.

8
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APPENDIX A

Qualifications of Key Personnel

AMY L. OLLENDORF

Managing Principal/Paleontology Program Manager

Education

Postdoctoral Research Associate, 2006–2007, World Heritage Studies, University of Minnesota

Ph.D., Ancient Studies,1993, University of Minnesota

M.S., Ancient Studies, 1986, University of Minnesota

B.S., Anthropology (with honors) and Geology, 1983, Beloit College

Registrations/Certifications

- Registered Professional Archaeologist 12588
- Licensed Professional Geologist, Minnesota #30084 (6/98–6/18)

Professional Experience

2018–present, Managing Principal/ Paleontology Program Manager, Applied EarthWorks, Inc.

2015–2018, 2005–2008, President and Senior Project Manager, ALO Environmental Associates LLC

2006–2015, Program Manager, Cultural Heritage Planning and Management, AECOM

2003–2005, Director, Cultural Resources Management, Peterson Environmental Consulting, Inc.

2000–2003, Director, Cultural Resources Management, HDR Engineering, Inc.

1996–2000, Director, Cultural Resources Management, Braun Intertec Corporation, Inc.

1994–1996, Statewide Inventory Coordinator, Minnesota State Historic Preservation Office

Summary of Qualifications

Dr. Ollendorf has more than 35 years of experience in cultural heritage, geoarchaeology, paleoecology, paleontology, and environmental compliance at the global, national, tribal, state, and local levels. She meets the US Secretary of the Interior's qualifications standards for principal investigator in prehistoric archaeology and history; she is also Æ's principal investigator on a CA statewide Paleontological Resource Use Permit for paleontology from the US Bureau of Land Management (BLM) for 2018–2021.

Dr. Ollendorf has supervised and/or participated in archaeological, historical, architectural history, and paleontological services, tribal negotiations, and agency coordination throughout her career. She also has managed EISs and EAs. Her project experience includes work in 35 states, including Southern California, and other western states, and abroad on a wide range of client projects across many different industry sectors.

During her career, Dr. Ollendorf has written or overseen many hundreds of compliance reports in addition to having published multiple articles in peer-reviewed professional journals and presented to a wide variety of audiences, including professional peers.

Selected Project Experience

Fresno Meat-Rendering Plant, City of Fresno, Fresno County, California. Paleontology Program Manager (2019–present). Overseeing completion of paleontological preconstruction paleontological survey of 10 acres and letter report. Paleontologically sensitive geologic units include Pleistocene nonmarine and Quaternary non-marine alluvial fan deposits. Completing for CEQA compliance (City). Working closely with paleontology staff (Chris Shi). Client: Darling Ingredients, Inc.

Santa Margarita Ranch Agricultural Subdivision Project, San Luis Obispo County, California. Paleontology Program Manager (2019–present). Overseeing preparation and completing QA/QC of paleontological resource impact mitigation program (PRIMP). Will oversee and pre-construction worker environmental awareness program (WEAP) training, paleontological resource monitoring, and reporting. Paleontologically sensitive geologic units include Monterey, Santa Margarita, and Paso Robles Formations and older Quaternary alluvium. Completing for CEQA compliance (County). Working closely with paleontology staff (Chris Shi). Client: Kirk Consulting for Santa Margarita Ranch, LLC.

Fairmead Landfill Expansion, City of Chowchilla, Madera County, California. Paleontology Program Manager (2019–present). Overseeing pre-construction WEAP training and construction monitoring over the 23-acre Project area immediately adjacent to the paleontologically diverse Fairmead Locality (Pleistocene, Irvingtonian). Also will oversee

Professional Experience (continued)

1993–1994, Staff Archaeologist, Institute for Minnesota Archaeology

1991–1993, Independent Contractor—Paleoecology

1990, Co-Director, Geoarchaeological Field School & Geoarchaeologist, Southern Illinois University-Edwardsville

1987–1990, Graduate Research Assistant, Limnological Research Center, University of Minnesota, Minneapolis

1984–1987, Graduate Research Assistant, Archaeometry Laboratory, University of Minnesota, Duluth

1983–1984, University of Maryland Research Assistant, Crustal Dynamics Project, Geology & Geophysics Branch, NASA Goddard Space Flight Center, Greenbelt, Maryland

1987, 1984, Assistant Geoarchaeologist, Tel Miqne Excavations, ASOR-Albright Institute, Jerusalem, Israel

1983, Summer Intern, US Bureau of Land Management, Phoenix District, Arizona

1983, Teaching Assistant – Evolution of the Earth, Beloit College Geology Department

1983, Research Assistant – Palynomorphs (Acritarchs), Beloit College Geology Department

Selected Project Experience (continued)

post-construction monitoring report. Paleontologically sensitive geologic units include Modesto, Riverbank, and Turlock Lake Formations. Completing for CEQA compliance (County). Working closely with paleontology staff (Chris Shi, Blake Bufford, and Michael George). Client: County of Madera.

Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California. Paleontology Program Manager (2019–present). Overseeing preparation and providing QA/QC of paleontological resource sections of the Program Environmental Impact Report (PEIR) for the Port Master Plan Update (PMPU) for CEQA compliance. Paleontologically sensitive geologic units include Pleistocene-age sedimentary deposits of the continental shelf and possibly also Late Pleistocene- to Holocene-age young alluvium. Working closely with paleontology staff (Chris Shi). Client: Leidos for Port of Long Beach.

First Street Village Development, Burbank, Los Angeles County, California. Paleontology Program Manager (2019–present). Overseeing pre-construction WEAP training and paleontological resource construction monitoring for CEQA compliance (City). Working closely with paleontology staff (Chris Shi). Client: First Street Village LLC to City of Burbank.

Biola University North Dorm Project: Tennis Courts and Wastewater Treatment Area Expansion, La Mirada, Los Angeles County, California. Paleontology Program Manager (2019–present). Overseeing preparation and providing QA/QC of paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units include older Quaternary alluvium. Working closely with paleontology staff (Chris Shi, Aimee Montenegro). Client: Biola University to City of La Mirada.

Bellota-Warnerville 230 kV Reconductoring Project, San Joaquin and Stanislaus Counties, California. Paleontology Program Manager (2019–present). Completed paleontology sections of draft Proponent's Environmental Assessment (PEA); also oversaw preparation and completed QA/QC of field survey and Paleontological Field Survey Report (PFSR) for CEQA compliance for the 23-mile-long project. Paleontologically sensitive geologic units include the Modesto, Riverbank, Turlock Lake, Mehrten Formations and possibly also the Laguna Formation. Worked closely with paleontology staff (Chris Shi and Richard Serrano). Client: Stantec for California Public Utilities Commission (CPUC).

CEMEX Rockfield Modification Project, City of Fresno, Fresno County, California. Paleontology Program Manager (2019–present). Oversaw preparation and completed QA/QC of paleontological technical memorandum for expansion of current aggregate mining and processing operations at quarry and plant sites within a 490.5-acre Project area. Paleontologically sensitive geologic units include the Modesto, Riverbank, Turlock Lake, Tulare Formations. Completed for NEPA and CEQA compliance. Worked closely with paleontology staff

Other Paleontological Research

Ph.D. Dissertation

Changing Landscapes in the American Bottom (USA): An Interdisciplinary Investigation with an Emphasis on the Late-Prehistoric and Early-Historic Periods. Advisor: Herbert E. Wright, Jr.

M.S. Thesis

A Study of Phytoliths from Philistine Levels at Tel Miqne (Ekron), Israel. Advisor: George R. Rapp, Jr.

B.S. Theses

The High Diversity of the Mazon Creek Biota: The Result of Excellent Preservation in a Deltaic Environment. Advisor (Geology): Carl Mendelson.

The Role of Man in the Pleistocene Extinction of Large Mammals. Advisor (Anthropology): Daniel Shea.

Selected Project Experience (continued)

Rados Heacock Environmental Project, City of Moreno Valley, Riverside County, California. Paleontology Program Manager (2019–present). Oversaw preparation and completed QA/QC of paleontological technical memorandum for construction of two new industrial buildings on 37.12 acres of vacant land. Completed for CEQA compliance (County). Paleontologically sensitive Pleistocene-age alluvial deposits are located in the Project area. Worked closely with paleontology staff (Scott Rohlf). Client: Albert A. Webb Associates, Inc.

City of Fresno Cannabis Ordinance Environmental Impact Report, Fresno County, California. Paleontology Program Manager (2019–present). Oversaw preparation and completed QA/QC of paleontological technical memorandum to assist with evaluation of the proposed regulation and permitting of commercial cannabis activities with a focus on land-use areas within the City capable of supporting cultivation, distribution, manufacturing, testing, and retail facilities with an 800-foot buffer from other cannabis retailers, schools, daycare centers, and other youth facilities. Paleontologically sensitive geologic units include the Modesto, Riverbank, Tulare, and Turlock Lake formations. Completed for CEQA compliance (City). Worked closely with paleontology staff (Scott Rohlf). Client: Quad Knopf, Inc.

Interstate 10 Eastbound Truck Climbing Lane Improvement Project, City of Yucaipa, San Bernardino County and City of Calimesa, Riverside County, California. Paleontology Program Manager (2019–present). Oversaw preparation and completed QA/QC of paleontological technical memorandum for improvements to a total of 3 miles of existing 6-lane eastbound I-10 by adding a truck-climbing lane (TCL) from the 16th Street Overcrossing Bridge to 0.2 mile east of the County Line Road Undercrossing Bridge by paving the existing median. Paleontologically sensitive geologic units include the San Timoteo Formation and Pleistocene-age alluvial deposits, and possibly also the pre-Pliocene Mill Creek Formation/Potato Sandstone. Completed for NEPA and CEQA compliance (Caltrans and San Bernardino County Transportation Authority). Worked closely with paleontology staff (Chris Shi). Client: HDR.

Pacific Gas & Electric (PG&E) Groundwater Remediation, Hinkley, San Bernardino County, California. Paleontology Program Manager and Project Manager (2018–present). Over a multi-year period, completing Release-To-Construction (RTC) project-by-project reviews for cultural and paleontological resource management. Tasks include assessing project areas for sensitivity for cultural and paleontological resources, previously surveyed areas, and recorded locations of cultural resources. Also overseeing cultural and paleontological construction monitoring on a project-by-project basis. Requires project-specific reporting, annual reporting, regular client communication, and coordination with cultural and paleontological staff. Paleontologically sensitive geologic units include Pleistocene alluvium and Middle to Late Pleistocene lacustrine deposits associated with Pluvial Harper Lake.

Selected Project Experience (continued)

Reports to date include Paleontological Resource Monitoring Report: Installation of Extraction Well 66 (EX-66); Cultural and Paleontological Resources Findings Report: Installation of monitoring Well 44S (SC-MW-44S); and 2018 Annual Report—all co-authored with Chris Shi. Completing for CEQA compliance. Client: Arcadis for PG&E.

Highpark Development Project (formerly Ponte Vista) in San Pedro, City of Los Angeles, Los Angeles County, California. Paleontology Program Manager and Project Manager (2018–present). Æ provided multi-year paleontological monitoring during construction of 676 homes on 61.5 acres. Paleontologically sensitive geologic units include the San Pedro Formation and the Palos Verde Sand. By winter 2018, Æ paleontological monitors had documented 26 paleontological localities and recovered 27 large vertebrate specimens along with over 4,000 pounds of additional bulk matrix which yielded thousands of scientifically significant invertebrate fossils and more than 25 small-fraction vertebrate specimens. Æ has processed the fossil specimens for permanent curation at the Natural History Museum of Los Angeles County and is preparing a final paleontological monitoring report for compliance with the CEQA (City). Final deliverables will be produced and submitted after Æ has received a fully executed Deed of Gift Form from the land developer. Oversaw final fossil preparation and providing QA/QC of monitoring report. Working closely with paleontology staff (Chris Shi). Client: Harridge Development Group (formerly iStar Financial).

Madera Travel Center at Avenue 17 and Highway 99 Interchange, Madera County, California. Paleontology Program Manager (2018–present). Co-authored draft Paleontological Resource Mitigation Plan (PRMP) for commercial development of approximately 50 acres. Paleontologically sensitive geologic units include the Modesto, Riverbank, and Turlock Lake Formations, and possibly also an unnamed Pleistocene nonmarine sedimentary unit. Oversaw WEAP training and overseeing paleontological resource monitoring for construction. Worked closely with paleontology staff (Scott Rohlf, Chris Shi, and Christopher Shea). Completed for CEQA compliance (City). Client: Love's Travel Stops & Country Stores to Madera County.

500 MW Athos Renewable Energy Project, Riverside County, California. Paleontology Program Manager and Project Manager (2018–2019). Overseeing preparation and providing QA/QC of all paleontological resources tasks. For CEQA compliance (County), Project Area on private and state lands consisted of 3,662-acres, including a 11.1-mile-long by 200-foot-wide generation-tie transmission line corridor and access roads. Desktop study included the Project Area plus a 5-mile-wide buffer (Study Area). Supervised completion of paleontological work plan, reconnaissance-level pedestrian field survey for paleontological resources in addition to paleontological observations of geotechnical trenching, Paleontological Identification Report (PIR), and PRIMP. For NEPA compliance, oversaw Paleontology Resource Assessment (PRA), Potential Fossil Yield Classification (PFYC), and BLM Fieldwork Authorization Request for proposed project components on BLM lands. Paleontologically sensitive geologic units include moderately bedded Pleistocene nonmarine alluvial gravels and sands, reddish paleosols, and the Pinto Formation. Working closely with paleontology staff (Chris Shi and Scott Rohlf). Client: IP Athos, LLC and Aspen Environmental Group.

Central Coast Oil and Gas Leasing and Development, California. Principal Investigator (2018–2019). Updated paleontology sections of Affected Environment, Environmental Consequences, and References Cited chapters as well as updated the Administrative Record for seven alternatives covered in the Resource Management Plan Amendment/FEIS on public lands and split mineral estate lands administered by the US Bureau of Land Management (BLM) across approximately 284,000 acres of surface estate and 793,000 acres of federal mineral estate (12 counties). Utilized BLM's Potential Fossil Yield Classification (PFYC) system for 31 paleontologically significant geologic units. Completed for NEPA (BLM) and CEQA compliance (California Department of Conservation, Division of Oil, Gas, and Geothermal Resources for CEQA). Client: Aspen Environmental Group for BLM.

Southern California Logistics Center Project, Victorville, San Bernardino County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of PRA and review of the paleontological resource section of the PEIR for the Victorville Airport for CEQA compliance. Paleontologically sensitive

Selected Project Experience (continued)

geologic units include Pleistocene-age or older alluvial deposits. Worked closely with paleontology staff (Chris Shi). Client: Michael Baker for City of Victorville.

5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of WEAP training, and paleontological resource monitoring, and oversaw reporting for CEQA compliance. Paleontologically sensitive geologic units include older Quaternary alluvial deposits, but no paleontological resources were observed during construction monitoring. Worked closely with paleontology staff (Chris Shi, Jorge Mendieta). Client: Parkco Building Company.

Duke Perry Street & Barrett Avenue Project in the City of Perris, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for construct an industrial warehouse and paved parking lot on approximately 7.25 acres. Recommended the creation of a PRIMP since the project area was ranked High B for paleontological sensitivity with nearby Pleistocene vertebrate fossil localities recorded in alluvial deposits similar to those in the Project area. Worked closely with paleontology staff (Chris Shi). Completed for CEQA compliance. Lead agency: City of Perris. Albert A. Webb Associates for Duke Realty. Complete, January 2019.

Cannabis Cultivation Warehouse on Assessor's Parcel 314-160-004, City of Perris, Riverside County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for development of 0.93 acres of vacant land. Recommended the creation of a PRIMP since the older Quaternary alluvial deposits in the project area are ranked High B for paleontological sensitivity with nearby Pleistocene vertebrate fossil localities recorded in alluvial deposits similar to those in the Project area. Worked closely with paleontology staff (Chris Shi). Completed for CEQA compliance. Client: Richard Park.

LA Water Wheel Project, Los Angeles County, California. Paleontology Program Manager (2019). Oversaw preparation and completed QA/QC of paleontological technical memorandum for the plan to divert waters from the Los Angeles River to irrigate nearby public parks, and will assist City of Los Angeles with Mitigated Negative Declaration (MND) for CEQA compliance. Paleontologically sensitive geologic units include Pleistocene-age alluvial deposits and the Miocene-age Monterey Formation. Client: Ruth Villalobos & Associates for City of Los Angeles.

State Route (SR) 86/Avenue 50 New Interchange Project, City of Coachella, Riverside County, California. Third Party Senior Reviewer (2018). Reviewed/rewrote Affected Environment, Environmental Consequences, and Avoidance Minimization, and/or Mitigation Measures paleontology chapters and References Cited chapter (of the Initial Study/EA written by Michael Baker International). Paleontologically sensitive geologic units include Late Quaternary Period lacustrine deposits associated with ancient Lake Cahuilla. Completed for NEPA, NHPA, Section 4(f), and CEQA compliance. Client: TranSystems Corporation to Caltrans, District 8.

Menifee Town Center—Parcels 13, 14, and 15 Development Project, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of PRIMP covering 13-acre project area. Paleontologically sensitive geologic units include Middle to Late Pleistocene alluvial fan deposits. Worked closely with paleontology staff (Scott Rohlf and Chris Shi). Completed for CEQA compliance. Client: Kristoff Commercial Real Estate to City of Menifee.

Rose II Residential Development Project, Romoland, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of PRIMP covering subdivision of 45.6 acres. Worked closely with paleontology staff (Chris Shi). Paleontologically sensitive geologic units include Middle to Late Pleistocene alluvial fan deposits. Completed for CEQA compliance. Client: Pacific Communities Builder, Inc. to County of Riverside.

Sycamore Hills Distribution Center, City of Riverside in Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of Paleontological Resource Assessment covering commercial development of 47.85 acres. No paleontologically sensitive geologic units. Worked closely

Selected Project Experience (continued)

with paleontology staff (Chris Shi). Completed for CEQA compliance. Client: Ruth Villalobos & Associates, Inc. to County of Riverside.

Temescal Valley Riverside Clinic Investors IV, LLC Project, South of the City of Corona, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of letter report for paleontological resource mitigation monitoring during construction in the 12.5-acre project area. Paleontologically sensitive geologic units include the Vaqueros and Sespe Formations, but no paleontological resources observed during construction monitoring. Worked closely with paleontology staff (Chris Shi). Completed for CEQA compliance. Client: Riverside Clinic Investors IV, LLC to County of Riverside.

39527 Colleen Way Mixed-Use Development Project, City of Temecula, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of letter report for paleontological resource mitigation monitoring during construction in the 5.3-acre project area. Paleontologically sensitive geologic units include the Pauba Formation, but no paleontological resources observed during construction monitoring. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance. Client: Courie Construction to County of Riverside.

Beach Club Development, Thermal, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of technical memorandum for development of 240 acres of vacant land. Recommended mitigation measures since project area is in High paleontological sensitivity. Paleontologically sensitive geologic units include Late Quaternary Period lacustrine deposits associated with ancient Lake Cahuilla. Worked closely with paleontology staff (Chris Shi and Niranjala Kottachchi). Completed for CEQA compliance. Client: Albert A. Webb Associates to County of Riverside.

500 kV Ten West Link Transmission Connection, Maricopa County, Arizona to Riverside County, California. Paleontology Program Manager and Project Manager (2018). Oversaw preparation and completed QA/QC of PRA for the entire 114-mile-long preferred alignment and alternatives. Utilized BLM's PFYC system. Paleontologically sensitive geologic units include Paleozoic sedimentary rocks, Bouse and Chemehuevi Formations, Bullhead Alluvium and Older Quaternary Alluvium (e.g., Palo Verde Alluvium); and Cenozoic sedimentary rocks have Unknown Potential. Worked closely with paleontology staff (Scott Rohlf, Chris Shi, and Christopher Shea). Completed for NEPA and CEQA compliance. Client: DCR Transmission LLC to BLM and California Public Utilities Commission (CPUC).

Talavera Pipeline Replacement, City of Indio, Riverside County, California. Paleontology Program Manager (2018). Total project length: 5.7 miles. Oversaw preparation and completed QA/QC of paleontological resource technical memorandum for CEQA compliance. Paleontologically sensitive geologic units include Older Quaternary Alluvium. Worked closely with paleontology staff (Scott Rohlf, Christopher Shea, Chris Shi). Client: Albert A. Webb Associates to Coachella Valley Water District.

Blythe Airport Perimeter Fence Project, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of paleontological resource technical memorandum on approximately 700 acres. Paleontologically sensitive geologic units include Late to Middle Pleistocene Old Terrace Deposits, and possibly also Middle to Early Pleistocene Very Old Alluvial Deposits at depth. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for NHPA and CEQA compliance. Client: Mead & Hunt to Federal Aviation Administration (FAA) and Riverside County Economic Development Agency.

Madison Avenue Improvements Project, City of Murrieta, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of the PRA, including identification survey for the Project and Constraints Analysis for the Warm Springs Creek Bridge Crossing for CEQA compliance. Paleontologically sensitive geologic units include Young Surficial Deposits, especially pre-Holocene, and Very Old Surficial Deposits, including the Pauba Formation. Worked closely with paleontology staff (Scott Rohlf and Chris Shi). Client: Kleinfelder to City of Murrieta Public Works & Engineering.

Selected Project Experience (continued)

Duke Development on the Northwest Corner of Alabama Street & Palmetto Avenue, City of Redlands, San Bernardino County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of paleontological resource technical memorandum on approximately 55 acres. Paleontologically sensitive geologic units include Late to Middle Pleistocene alluvial deposits (e.g., Very Old Axial-Channel deposits). Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Completed for CEQA compliance. Client: Albert A. Webb Associates to County of San Bernardino.

I-10 Monroe Interchange Project, Riverside County, California. Paleontology Program Manager (2018). Oversaw preparation and completed QA/QC of PIR for CEQA compliance. Included paleontological field surveys of two design alternatives over a total of approximately 73 acres. Paleontologically sensitive geologic units include Quaternary, especially pre-Holocene, fluvial deposits and possibly also Lake Cahuilla lacustrine deposits at depth. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Client: Michael Baker to Caltrans, District 8.

Water-Main Replacement Project along the San Gorgonio River, City of Banning, Riverside County, California. Paleontology Program Manager (2018). Total project length: 6.5 miles. Oversaw paleontological spot-check monitoring and reporting for water mainline replacement on private lands for CEQA compliance. Paleontologically sensitive geologic units include San Timoteo Formation and Quaternary older alluvium, but no paleontological resources were observed during construction monitoring. Worked closely with paleontology staff (Scott Rohlf and Christopher Shea). Will also oversee full-time monitoring and reporting in high-sensitivity areas on US Forest Service (USFS) lands for compliance with the Omnibus Public Land Management Act. Client: Aspen Environmental Group to City of Banning Public Works Department.

De Anza Sewer Force Main Project, City of San Jacinto, Riverside County, California. Paleontology Program Manager (2018). Total project length: 7,500 linear feet. Oversaw creation of informational brochure for construction-worker sensitivity training for Worker Environmental Awareness Program (WEAP) compliance. Also oversaw coordination and completion of spot-check monitoring. Completed senior review and QA/QC for paleontology mitigation monitoring letter report. Paleontologically sensitive geologic units include older Quaternary deposits, but no paleontological resources were observed during construction monitoring. Worked closely with paleontology staff (Christopher Shea). All completed for CEQA compliance. Client: HELIX to Eastern Municipal Water District.

Sixth Street Park, Arts, River & Connectivity (PARC) Improvements, City of Los Angeles, Los Angeles County, California. Paleontology Program Manager (2018). Completed QA/QC of paleontological resource technical memorandum for CEQA compliance. Paleontologically sensitive geologic units include Middle to Late Pleistocene alluvial deposits, Late Miocene- to Early Pliocene-age Puente Formation, and Early Pliocene- to Early Pleistocene-age Fernando Formation. Worked closely with paleontology staff (Scott Rohlf). Client: GPA Consulting to City of Los Angeles Bureau of Engineering.

Hay Lake and McFarland Parcels Land Exchange, Cook and St. Louis Counties, Minnesota. Principal Investigator (2010). Researched and summarized Existing Conditions of paleontological resources for DEIS. Completed for NEPA compliance. Client: PolyMet Mining to USFS, Superior National Forest.

Collaborative Research: Deltaic Resilience and the Genesis of Mesopotamian Cities (Iraq) Project. Phytolith Analyst (2014). Completed phytolith analysis and reporting about mudbrick samples from the archaeological site of Ur after overseeing chemical processing. Client: Dr. Jennifer Pournelle, Principal Investigator, University South Carolina Research Foundation.

Geological Background Research for the Naval Industrial Reserve Ordnance Plant (NIROP) Superfund Cleanup Project, City of Fridley, Hennepin County, Minnesota. Staff Geologist (2014). Compiled and examined boring logs and identified stratigraphic contacts for 3D modeling at the 83-acre site located about 700 feet east of the Mississippi River. Research completed for compliance with the US Clean Water Act (CWA). Client: US Navy.

Selected Project Experience (continued)

Multiple Projects as Independent Contractor. Paleoecologist (1991–1993). Distinguished the post-contact cultural horizon using pollen analysis for Dr. Daniel Engstrom (University of Minnesota) and Minnesota Pollution Control Agency (MPCA) for projects in Lake St. Croix (MN-WI border) and Duluth-Superior Harbor (MN-WI border). Collected modern pollen samples and made reference slides of Upper Midwest pollen taxa for Dr. Greg McDonald (Cincinnati Museum of Natural History & Science, Ohio). Processed sediment samples from the Island of Madeira and analyzed phytoliths for Dr. Glenn Goodfriend (Carnegie Institution, Washington, D.C.).

Geoarchaeological Field School at Cahokia Mounds State Historic Site (UNESCO World Heritage Site), Collinsville, Illinois. Co-Director (1990). Lectured on paleoecological research and geoarchaeology, led wetland-coring & laboratory activities, participated in remote sensing field and laboratory activities. Co-Director: Dr. Rinita Dalan.

Limnological Research Center, University of Minnesota, Minneapolis. Graduate Research Assistant (1987–1990). Conducted analyses of pollen and other appropriate material from lake-sediment and peat cores. Supervisors: Dr. Herbert Wright, Jr. and Dr. Linda Shane.

Archaeometry Laboratory, University of Minnesota, Duluth. Graduate Research Assistant (1984–1987). Conducted sediment grain-size analyses, processed and identified phytoliths and pollen, assisted in publication, obtained literature about sediment studies, performed various office duties. Supervisor: Dr. George (Rip) Rapp, Jr.

Crustal Dynamics Project, Geology & Geophysics Branch, NASA Goddard Space Flight Center, Greenbelt, Maryland. University of Maryland Research Assistant (1983–1984). Correlated geologic features with satellite magnetic anomalies (MAGSAT) and researched the crustal structure and composition of each feature for Principal Investigator (Dr. Herbert Frey).

Tel Miqne (Ekron) Excavations, American Schools of Oriental Research, Israel. Assistant Geoarchaeologist and Project Archaeologist (1984, 1987). Assisted the Project Geoarchaeologist (Dr. Arlene Rosen) in all phases of field and laboratory studies during spring-summer excavations. **1987 season** involved all phases of grain-size studies, including collection, processing, microscopic analysis, and data analysis; also assisted with on-site geological problems and flotation procedures. **1984 season** involved assistance with wadi stratigraphy studies, on-site geological problems, flotation procedures, and grain-size analyses.

Selected Publications

Ollendorf, Amy L., 1994, New Paleoecological Data Pertaining to the Late Holocene in the American Bottom, USA. *Program and Abstracts of the 13th Biennial Meeting of the American Quaternary Association,* University of Minnesota, Minneapolis, p. 236.

Ollendorf, Amy L., 1993, Review of R.R. Brooks and D. Johannes, *Phytoarchaeology,* Portland, OR: Dioscorides Press. *American Antiquity* 58(4):763–764.

Ollendorf, Amy L., 1993, Toward a Classification Scheme of Sedge (Cyperaceae) Phytoliths, In G. Rapp, Jr. and S.C. Mulholland, eds., *Phytolith Systematics: Emerging Issues.* Plenum Press, pp. 91–111.

Mulholland, Susan C., Rapp, George Jr., Ollendorf, Amy L., and Regal, R., 1990, Variation in Phytolith Assemblages within a Population of Corn (cv. Mandan Yellow Flour), *Canadian Journal of Botany* 68:1638–1645.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1988, Phytolith Analysis as a Means of Plant Identification: *Arundo donax* and *Phragmites communis*. *Annals of Botany* 61:209–214.

Selected Publications (continued)

Mulholland, Susan C., Rapp, George Jr., and Ollendorf, Amy L., 1988, Variation in Corn Phytolith Assemblages. *Canadian Journal of Botany* 66:2001–2008.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1987, Phytoliths from Some Israeli Sedges. *Israel Journal of Botany* 36:125–132.

Ollendorf, Amy L., Mulholland, Susan C., and Rapp, George Jr., 1987, A New Apparatus for the Digestion of Plants in Phytolith Analysis. *Phytolitharien Newsletter* 5(1):13–16.

Ollendorf, Amy L., 1986, Tel Miqne, Israel—Phytoliths from Philistine Levels. *Old World Archaeology Newsletter* 10(2):16.

Ollendorf, Amy L., 2000, "Pollen Analysis." Assisted Dr. Edward Cushing (Univ. of MN) by helping train health professionals during weekend seminar sponsored by Multidata Corporation. **Invited.**

Ollendorf, Amy L., 1999, "Pollen Analysis." Assisted Dr. Edward Cushing (Univ. of MN) by helping train health professionals during weekend seminar sponsored by Multidata Corporation. **Invited.**

Ollendorf, Amy L., 1997, "Sneezing, Wheezing, and the Study of Fossil Pollen: What this Allergenic Material Can Tell Us About the Past." Guest lecture at the *Annual Meeting of the Materials Information Society—Minnesota Chapter of the American Society of Metallurgists International,* Minneapolis, Minnesota. **Invited.**

Ollendorf, Amy L., 1997, "Paleoecological Research at Cahokia." Guest lecture for *Minnesota Archaeology Week and Hamline University Anthropology Club,* St. Paul, Minnesota. **Invited.**

Ollendorf, Amy L., 1994, "New Paleoecological Data Pertaining to the Late Holocene in the American Bottom, USA." *Program and Abstracts of the 13th Biennial Meeting of the American Quaternary Association*, University of Minnesota, Minneapolis, p. 236.

Ollendorf, Amy L., 1993, "Paleoecology and Culture Change in the American Bottom, USA." *58th Annual Meeting of the Society for American Archaeology,* St. Louis, Missouri.

Ollendorf, Amy L., 1993, "Recent Paleoecological Doctoral Research in the American Bottom." Guest lecture in the *Illinois State Museum Lunchtime Lecture Series,* Springfield, Illinois. **Invited.**

Ollendorf, Amy L., 1991, "The Decline of the Mississippian Occupation of Cahokia: An Interdisciplinary Investigation of Landscape Changes in the American Bottom (USA)." *24th Annual Chacmool Conference,* University of Calgary, Alberta, Canada.

Ollendorf, Amy L. and Wright, H.E. Jr., 1989, "Landscape Changes Associated with Urbanization in Temperate Europe." *1st Joint Archaeological Congress*, Baltimore, Maryland. **Invited.**

Ollendorf, Amy L., 1988, "Comparison of Sedge Phytoliths from Widely Separated Geographic Areas, With an Emphasis on Israel." *3rd Annual Phytolith Workshop,* University of Missouri-Columbia.

Ollendorf, Amy L., 1986, "Phytoliths from Philistine Occupation Surfaces at Tel Miqne (Ekron), Israel." *51st Annual Meeting of the Society for American Archaeology,* New Orleans, Louisiana.

Applied EarthWorks Inc.

CHRISTOPHER SHI

Associate Paleontologist

Education

Ph.D., Geology (studies), 2012-2016

M.S., Geology, University of California, Los Angeles, 2011

B.S., Biology, University of Minnesota, Minneapolis, 2006

Professional Experience

2018–present, Associate Paleontologist, Applied EarthWorks, Inc., Pasadena, California

2016–2018, Paleontological Field Technician, Applied EarthWorks, Inc., Pasadena, California

2017–2018, Lead Paleontology Monitor, Rincon Consultants, Los Angeles, California

2008–2009, Instructor, Mad Science of Minnesota, St. Paul

Other Paleontological Research

Ph.D., Geology Studies. Proposed dissertation topic: *Establishing a link between the trend in changing seawater chemistry and the evolution of the first animals that built shells and skeletons from calcium carbonate during the Cambrian explosion*. Advisor: Bruce N. Runnegar.

M.S. Thesis. *Demonstrating the application of confocal laser scanning microscopy in the characterization of a fossil fern from the Eocene*. Advisor: J. William Schopf.

Summary of Qualifications

Mr. Shi is a paleontologist and geologist with more than 10 years of experience in paleontology, evolutionary biology, mineralogy, and sedimentary geology, and meets the Society of Vertebrate Paleontology's (SVP) standards for a qualified professional paleontologist. He has a background in plant and invertebrate taphonomy, and his master's thesis focused on the characterization of fossilized Eocene ferns using a novel three-dimensional imaging technique. Additionally, Mr. Shi spent several years working toward a Ph.D. in geology with research focused on the link between the trend in changing seawater chemistry and the evolution of the first animals to develop shells from calcium carbonate during the Cambrian explosion.

Mr. Shi completes various tasks within the Paleontology Program of Applied EarthWorks. As the Paleontology Supervisor, he coordinates and schedules paleontological monitors throughout AE's 5 offices. In the field, Mr. Shi's responsibilities include stratigraphic analyses, geological and paleontological data collection, bulk-sediment sampling, and documentation of fossil localities. In the lab, Mr. Shi's identifies, analyzes, and prepares collected fossils for permanent curation. Mr. Shi also regularly completes paleontological desktop literature and map reviews and coordinates with various paleontology curators for museum records searches; authors paleontology monitoring plans, inventory and evaluation reports, resource impact management plans, and worker environmental awareness training materials. In the past, Mr. Shi served as Æ's lead monitor on a number of construction monitoring projects for transportation, land development, water, and power generation projects.

Project Experience

Santa Ana River Trail – Phase 6 Project, City of Corona, Orange, San Bernardino, and Riverside Counties, California. Associate Paleontologist (2019). Oversaw ground-reconnaissance field surveys. Completing combined paleontological identification report (PIR) and paleontological evaluation report (PER) for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and Monterey, Topanga, and Sespe Formations. Client: Michael Baker for Caltrans/Riverside County Transportation Commission, Riverside County Regional Parks and Open-Space District, County of San Bernardino, and Orange County Public Works.

Sun Lakes Boulevard Realignment Project, City of Banning, Riverside County, California. Associate Paleontologist (2019). Completing paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Albert A. Webb Associates for City of Banning.

Project Experience
(continued)

Pacific Gas & Electric Groundwater Remediation, San Bernardino County, California. Associate Paleontologist (2018-2019). Completed and oversaw paleontological resource monitoring for installation of a groundwater extraction well. Completed a cultural and paleontological finding report and a paleontological monitoring report for project components in 2018 for CEQA compliance. Completed 2018 annual report, and will oversee all project field components for the approximately 30,000-acre groundwater remediation area. Completing paleontological monitoring report for groundwater injection well pilot test. Paleontologically sensitive geologic units: Pleistocene alluvium and lacustrine deposits. Client: Arcadis for PG&E.

Darling Ingredients, Inc. Rendering Plant Relocation Project, City of Fresno, Fresno County, California. Associate Paleontologist/Project Manager (2019). Oversaw ground-reconnaissance field survey. Completing field survey report for CEQA compliance. Paleontologically sensitive geologic units: Modesto and Riverbank Formations. Client: Darling Ingredients for City of Fresno.

Franklin County Water District Wastewater Collection and Treatment Improvements Project, Franklin-Beachwood, Merced County, California. Associate Paleontologist (2019). Completing paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Modesto and Riverbank Formations. Client: Quad Knopf for Franklin County Water District.

San Bernardino County Region Operations and Maintenance Project, San Bernardino County, California. Associate Paleontologist (2019). Completed ground-reconnaissance field survey for Rialto Feeder Station of programmatic environmental impact report (PEIR) for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Dudek for Metropolitan Water District of Southern California.

Development of the Jacqueline Cochran Regional Airport, Thermal, Riverside County, California. Associate Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: Lake Cahuilla beds. Client: Mead & Hunt for Riverside County Economic Development Agency Aviation Division.

Fairmead Landfill Expansion, City of Chowchilla, Madera County, California. Associate Paleontologist/Project Manager (2019). Created informational brochure for worker environmental awareness program (WEAP) training, and oversaw WEAP training and pre-construction field survey. Overseeing paleontological resource monitoring for construction and identification of fossil specimens for CEQA compliance. For: 23-acre landfill. Paleontologically sensitive geologic units: Modesto, Riverbank, and Turlock Lake Formations. Client: County of Madera.

Project Experience
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Madera Travel Center at Avenue 17 and Highway 99 Interchange, Madera County, California. Associate Paleontologist/Project Manager (2018-2019). Co-authored and reviewed paleontological resource impact mitigation program (PRIMP), conducted WEAP training, and oversaw paleontological resource monitoring for construction. Completing paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Modesto, Riverbank, and Turlock Lake Formations. Client: Love's Travel Stops and Country Stores for County of Madera.

Biola University North Dorm Project: Tennis Courts and Wastewater Treatment Area Expansion, City of La Mirada, Los Angeles County, California. Associate Paleontologist/Project Manager (2019). Oversaw archaeological and paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Biola University.

Bellota-Warnerville 230 kV Reconductoring Project, San Joaquin and Stanislaus Counties, California. Associate Paleontologist (2019). Conducted ground-reconnaissance field survey of private lands for reconductoring of a 23-mile-long transmission line. Completed paleontological field survey report (PFSR) for CEQA compliance. Will oversee paleontological resource monitoring for construction. Paleontologically sensitive geologic units: Modesto, Riverbank, Turlock Lake, and Mehrten Formations. Client: Stantec for California Public Utilities Commission (CPUC).

I-10 Eastbound Truck Climbing Lane Improvements Project, City of Yucaipa, San Bernardino County and City of Calimesa, Riverside County, California. Associate Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and San Timoteo Formation. Client: HDR for Caltrans and San Bernardino Transportation Authority.

CEMEX Rockfield Modification Project, Fresno County, California. Associate Paleontologist (2019). Completed paleontological technical memorandum for CEQA and federal compliance. Paleontologically sensitive geologic units: Modesto, Riverbank, Turlock Lake, and Tulare Formations. Client: Buada Associates for U.S. Army Corps of Engineers and CPUC.

Santa Margarita Ranch Agricultural Subdivision Project, San Luis Obispo County, California. Associate Paleontologist (2019). Completing PRIMP and WEAP training brochure for development of 1,500-acre residential and agricultural development. Will oversee WEAP training and paleontological resource monitoring of construction for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and Paso Robles, Santa Margarita, and Monterey Formations. Client: Kirk Consulting for Santa Margarita Ranch, LLC.

Port of Long Beach Master Plan Update, City of Long Beach, Los Angeles County, California. Associate Paleontologist (2018-2019). Completed paleontological resource section of the PEIR for Port of Long Beach construction improvements and additions for CEQA compliance.

Project Experience
(continued)

Participated in conference call with the Port of Long Beach regarding paleontological mitigation measures. Paleontologically sensitive geologic units: Pleistocene alluvium and continental shelf deposits. Client: Leidos for City of Long Beach.

Southern California Logistics Center Project, City of Victorville, San Bernardino County, California. Associate Paleontologist (2019). Completed paleontological resource assessment report (PRA) of PEIR for the Victorville Airport for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene and older alluvium. Client: Michael Baker for City of Victorville.

Menifee Town Center – Parcels 13, 14, and 15 Development Project, City of Menifee, Riverside County, California. Associate Paleontologist/Project Manager (2018-2019). Completed PRIMP and will oversee paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Kristoff Commercial Real Estate for City of Menifee.

First Street Village Development, City of Burbank, Los Angeles County, California. Associate Paleontologist/Project Manager (2019). Will oversee WEAP training and paleontological resource monitoring for construction for CEQA compliance. Client: First Street Village, LLC for City of Burbank.

5401 Telegraph Road Parking Structure, City of Commerce, Los Angeles County, California. Associate Paleontologist/Project Manager (2019). Conducted WEAP training, oversaw archaeological and paleontological resource monitoring for construction, and completed archaeological and paleontological monitoring reports for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium (no resources found). Client: Parkco Building Company.

California Flats Solar Project, Monterey County, California. Associate Paleontologist (2018-2019). Oversaw paleontological resource monitoring for construction for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium, Paso Robles Formation, Pliocene marine deposits. Client: First Solar.

500 mW Athos Renewable Energy Project, Riverside County, California. Associate Paleontologist (2018-2019). Completed various steps for CEQA and federal compliance for construction of a 3,600-acre solar farm. CEQA compliance: oversaw ground-reconnaissance field survey of private lands, completed field observations of geotechnical test trenches for presence/absence of subsurface paleontological resources, co-authored PIR, and completed PRIMP. Federal compliance: completed ground-reconnaissance field survey of federal lands and completed PRA. Will oversee paleontological resource monitoring for construction. Paleontologically sensitive geologic units: Pleistocene alluvium and Pinto Formation. Client: Aspen Environmental Group for IP Athos.

Project Experience
(continued)

Assessor's Parcel 360-130-003, City of Menifee, Riverside County, California. Associate Paleontologist (2019). Completed updates for PRA following design changes for CEQA and federal compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Albert A. Webb Associates for JPN Corporation.

LA Water Wheel Project, Los Angeles County, California. Associate Paleontologist (2019). Completed paleontological technical memorandum for the plan to divert waters from the Los Angeles River to irrigate nearby public parks, and will assist City of Los Angeles with Mitigated Negative Declaration (MND) for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and Monterey Formation. Client: Ruth Villalobos & Associates for City of Los Angeles.

Highpark (Ponte Vista) Development Project in San Pedro, City of Los Angeles, Los Angeles County, California. Associate Paleontologist (2017-2019). 2017: Completed construction monitoring, fossil identification, bulk sediment sampling, stratigraphic analysis, and geological data collection. 2018-2019: Completed preparation of fossils for museum curation. Completing paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: San Pedro Formation and Palos Verdes Sand. Client: Harridge Development Group (2018-2019); iStar Financial (2017-2018).

Duke Perry Street and Barrett Avenue Project, City of Perris, Riverside County, California. Associate Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Albert A. Webb Associates for City of Perris.

Cannabis Cultivation Warehouse on Assessor's Parcel 314-160-004, City of Perris, Riverside County, California. Associate Paleontologist (2018-2019). Completed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Richard Park for City of Perris.

Talavera Pipeline Replacement Project, City of Indio, Riverside County, California. Associate Paleontologist (2018-2019). Completed review of technical memorandum, created informational brochure for WEAP, and conducted WEAP training for CEQA compliance. For: 5.7-mile-long pipeline replacement. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Albert A. Webb Associates for Coachella Valley Water District.

Rose II Residential Development Project, Romoland, Riverside County, California. Associate Paleontologist (2018). Completed PRIMP for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: Pacific Communities Builder, Inc.

Sycamore Hills Distribution Center, City of Riverside, Riverside County, California. Associate Paleontologist (2018). Completed ground-reconnaissance field survey and PRA for CEQA compliance. Paleontologically sensitive geologic units: none. Client: Ruth Villalobos & Associates for March Joint Powers Authority and KB Development.

Project Experience
(continued)

Temescal Valley Riverside Clinic Investors IV, LLC Project, South of the City of Corona, Riverside County, California. Associate Paleontologist (2018). Completed paleontological monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Vaqueros and Sespe Formations (no resources found). Client: Riverside Medical Clinic Investors IV, LLC for County of Riverside.

Beach Club Development, Thermal, Riverside County, California. Associate Paleontologist (2018). Co-authored and reviewed paleontological technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene lacustrine deposits. Client: Albert A. Webb Associates for County of Riverside.

I-10 Monroe Interchange Project, City of Indio, Riverside County, California. Associate Paleontologist (2018). Completed museum records search, online research, coordination of ground-reconnaissance field survey, and co-authorship of PIR-PER for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene fluvial and lacustrine deposits. Client: Michael Baker for Caltrans.

I-215 University Parkway Interchange Improvement Project, City of San Bernardino, San Bernardino County, California. Associate Paleontologist (2018). Completed updates for PIR-PER following design changes for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium. Client: HDR for Caltrans.

Madison Avenue Improvements Project, City of Murrieta, Riverside County, California. Associate Paleontologist (2018). Completed museum records search, online research, paleontological technical memorandum, ground-reconnaissance field survey, and PRA for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and Pauba Formation. Client: Kleinfelder for City of Murrieta.

Water-Main Replacement Project along the San Gorgonio River, City of Banning, Riverside County, California. Associate Paleontologist (2018). Completed review of paleontological resource monitoring report for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and San Timoteo Formation (no resources found). Client: Aspen Environmental Group for City of Banning.

Blythe Airport Perimeter Fence Project, Riverside County, California. Associate Paleontologist (2018). Completed museum records and online research for NEPA and CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and terrace deposits. Client: Mead & Hunt for Caltrans.

De Anza Sewer Force Main Project, City of San Jacinto, Riverside County, California. Associate Paleontologist (2018). Created informational brochure for WEAP for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium (no resources found). Client: HELIX for Eastern Municipal Water District.

Project Experience
(continued)

Ten West Link 500 kV Transmission Project, Riverside County, California, Yuma and Maricopa Counties, Arizona. Associate Paleontologist (2018). Completed research and co-authorship of PIR of 114-mile-long preferred alignment corridor and alternatives for CEQA and federal compliance. Paleontologically sensitive geologic units: Pleistocene alluvium, Palo Verde Alluvium, Bullhead Alluvium, Bouse Formation, Chemehuevi Formation, and Paleozoic sedimentary rocks. Client: DCR Transmission, LLC for BLM.

Sixth Street Park, Arts, River & Connectivity (PARC) Improvements Project, City of Los Angeles, Los Angeles County, California. Associate Paleontologist (2018). Completed review of technical memorandum for CEQA compliance. Paleontologically sensitive geologic units: Fernando and Puente Formations. Client: GPA Consulting for City of Los Angeles.

Sampson Road Improvements Project in San Pedro, City of Los Angeles, Los Angeles County, California. Lead Paleontology Monitor (2017). Managed WEAP for all construction crews on site. Completed construction monitoring, fossil identification, sample collection, stratigraphic analysis, and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: San Pedro Sand and Timm's Point Silt. For: urban and infrastructure development project spanning 400 acres. Client: Jones & Stokes.

The Grove Project, City of Scotts Valley, Santa Cruz County, California. Lead Paleontology Monitor (2017). Completed construction monitoring and geologic data collection for CEQA compliance. For: 4.32-acre-lot cleared for the construction of residential units. Paleontologically sensitive geologic units: Purisima, Santa Cruz Mudstone, and Santa Margarita Formations. Client: City Ventures.

Crowder Canyon (SR 138) Paleontological Mitigation Project, San Bernardino County, California. Paleontological Field Technician (2017). Completed construction monitoring, fossil identification, stratigraphic analysis, and geologic data collection for CEQA compliance. Paleontologically sensitive geologic units: Pleistocene alluvium and Crowder Formation. For: 1.7-mile-long state route realignment. Client: Caltrans, District 8.

Malibu Wastewater Treatment Facility, City of Malibu, Los Angeles County, California. Paleontological Field Technician (2017). Completed construction monitoring and geologic data collection for CEQA compliance. For: 4.8-acre-lot cleared for the installation of the facility. Paleontologically sensitive geologic units: Sespe Formation. Client: Myers-Banicki for City of Malibu.

Relevant Publications

Shi, C. S. 2013. Use of Confocal Laser Scanning Microscopy for Studies in Paleobotany: Documentation of Stem Anatomy of the Eocene Fern *Dennstaedtiopsis aerenchymata* (Dennstaedtiaceae). LAP LAMBERT Academic Publishing: 88 p.

Shi, C. S., J. W. Schopf, A. B. Kudryavtsev. 2013. Characterization of the stem anatomy of the Eocene fern *Dennstaedtiopsis aerenchymata* (Dennstaedtiaceae) by use of confocal laser scanning microscopy. American Journal of Botany, Vol. 100, No. 8: p. 1626-1640.

Zheng, J., W. Zhuang, N. Yian, G. Kou, H. Peng, C. McNally, D. Erichsen, A. Cheloha, S. Herek, C. Shi, and Y. Shi. 2004. Classification of HIV-1 mediated neuronal dendritic and synaptic damage using Multiple Criteria Linear Programming. Neuroinformatics, Vol. 2, No. 3: p. 303-326.