

K. CULTURAL AND PALEONTOLOGICAL RESOURCES

This section, which evaluates the project's potential impacts to cultural and paleontological resources, is based on *A Cultural and Paleontological Resources Study for the Benicia Business Park*, prepared by LSA Associates, Inc. in December 2006 and *Benicia Business Park Cultural Resources Assessment, Benicia, Solano County, California*, prepared by Ric Windmiller, R.P.A. in November 2006. These reports are available for review at the City of Benicia Planning and Building Department.

Cultural resources are sites, buildings, structures, objects, and districts that have traditional or cultural value for the historical significance they possess. Paleontological resources, as a subset of cultural resources, represent the significant fossilized remains of prehistoric plant and animal life.¹

The first part of this section describes the methods of the cultural resources analysis, summarizes the regulatory framework for cultural resources at the project site, and presents a brief project site historical overview. The second part of this section describes the methods of the paleontological resources analysis, summarizes the legislative framework for paleontological resources at the project site, and presents a brief project site geological setting. The third part of this section analyzes the potential for impacts resulting from project implementation, and, where appropriate, provides mitigation measures to reduce such impacts to less-than-significant levels.

1. Cultural Resources

This section describes the environmental baseline for cultural resources at the project site and begins with a brief summary of the regulatory framework that applies to cultural resources. Following this, the methods and results of the cultural resources research are described. Finally, a brief overview of the project site's prehistoric, ethnographic, and historical setting is presented.

a. Regulatory Framework. The California Environmental Quality Act, the California Register of Historical Resources, and the City of Benicia General Plan set forth regulations for the protection of cultural resources, as described below.

(1) California Environmental Quality Act. The California Environmental Quality Act (CEQA) requires that effects to cultural resources by discretionary projects be considered in the planning process. The blanket CEQA term used for significant cultural resources is "historical resource," which is defined as any resource that is:

- 1) Eligible for listing on the California Register of Historical Resources (California Register); or
- 2) Listed in a local register of historical resources (as defined at Public Resources Code [PRC] §5020.1(k)); or
- 3) Identified as significant in a historical resource survey meeting the requirements of PRC §5024.1(g); or
- 4) Determined to be a historical resource by a project's lead agency (California Code of Regulations [CCR] Title 14 §15064.5(a)).

¹ Society for Vertebrate Paleontology, 1995. Conformable Impact Mitigation Guidelines. *Society for Vertebrate Paleontology News Bulletin* 163: January.

CEQA regulations state that: “A project with an effect that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment” (14 CCR §15064.5(b)).

CEQA also applies to archaeological sites (14 CCR §15064.5(c)). CEQA requires a lead agency to determine if an archaeological cultural resource fits into one of three legal categories (14 CCR §15064.5(c)(1-3)). A lead agency applies a two-step screening process to determine if an archaeological cultural resource meets the definition of a historical resource, a unique archaeological resource, or neither. Prior to considering potential impacts, the lead agency must determine whether an archaeological cultural resource meets the definition of a historical resource in 14 CCR §15064.5(c)(1). If the archaeological cultural resource meets the definition of a historical resource, then it is treated like any other type of historical resource in accordance with 14 CCR §15126.4. If the archaeological cultural resource does not meet the definition of a historical resource, then the lead agency applies the second screen to determine if the resource meets the definition of a unique archaeological resource as defined in PRC §21083.2(g). Should the archaeological cultural resource meet the definition of a unique archaeological resource, then it must be treated in accordance with PRC §21083.2. If the archaeological cultural resource does not meet the definition of a historical resource or an archaeological resource, then effects to the resource are not considered significant effects on the environment (14 CCR §15064.5(c)(4)).

(2) California Register of Historical Resources. The California Register of Historical Resources (California Register) is a guide to cultural resources that must be considered when a government agency undertakes a discretionary action subject to CEQA. The California Register helps government agencies identify, evaluate, and protect California’s historical resources², and indicates which properties are to be protected from substantial adverse change (PRC §5024.1(a)). Any resource listed in, or eligible for listing in, the California Register is to be considered during the CEQA process.³

A cultural resource is evaluated under four California Register criteria to determine its historical significance. A resource must be significant at the local, State, or national level in accordance with one or more of the following criteria:

- 1) Is associated with events that have made a significant contribution to the broad pattern 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.

In addition to meeting one or more of the above criteria, the California Register requires that sufficient time must have passed to allow a “scholarly perspective on the events or individuals associated with the resource.” Fifty years is used as a general estimate of the time needed to

² California Office of Historic Preservation, 2001, p. 4. *California Register of Historical Resources: Q&A for Local Governments*. Technical Assistance Series No. 4. California Department of Parks and Recreation, Sacramento.

³ California Office of Historic Preservation, *Ibid.*, p. 4.

understand the historical importance of a resource (14 CCR §4852 (d)(2)). The State of California Office of Historic Preservation recommends documenting, and taking into consideration in the planning process, any cultural resource that is 45 years or older.⁴

The California Register also requires a resource to possess integrity, which is defined as “the authenticity of a historical resource’s physical identity evidenced by the survival of characteristics that existed during the resource’s period of significance. Integrity is evaluated with regard to the retention of location, design, setting, materials, workmanship, feeling, and association”.⁵

(3) City of Benicia General Plan. The City of Benicia General Plan contains goals, policies, and programs for the identification, preservation, and management of cultural resources. The bulk of the goals, policies, and programs pertinent to cultural resources as addressed in this section (buildings, sites, structures, objects, and districts) is contained in the Historic Resources section of the Community Identity element (Chapter 3). These goals, policies, and programs are listed below.

Historic Resources

- *Historic Preservation Goal 3.1:* Maintain and enhance Benicia’s historic character.
 - *Historic Preservation Policy 3.1.1:* Encourage reuse of historic buildings; if feasible, encourage relocation rather than demolition.
 - *Historic Preservation Policy 3.1.2:* Enhance the economic potential of historic and architectural assets.
 - *Historic Preservation Policy 3.1.3:* Preserve historic trees and landscapes.
 - *Historic Preservation Policy 3.1.6:* Promote restoration of public and privately-owned historic and architecturally significant properties.
- *Historic and Archeological Resources Goal 3.2:* Protect archaeological (including underwater) sites and resources.
 - *Historic and Archeological Resources Policy 3.2.1:* Ensure the protection and preservation of artifacts in known, and as yet unidentified, areas.
 - *Historic and Archeological Resources Program 3.2.B:* Refer development proposals that may adversely affect archaeological sites to the California Archaeological Inventory.
 - *Historic and Archeological Resources Program 3.2.D:* Require that all sites with archaeological resources likely to be disturbed by a proposed project be analyzed by a qualified archaeologist and an appropriate program developed to mitigate any impacts from the project.

b. Methods. The methods of this cultural resources analysis include a records search, field survey, consultation with potentially-interested parties, and historical evaluation. This work was conducted to: (1) identify cultural resources or cultural resource studies within or adjacent to the project site; and (2) gather the archaeological, ethnographic, and historical information necessary to prepare the cultural overview. Each task, along with its results, is described below.

⁴ California Office of Historic Preservation, 1995, p. 2. *Instructions for Recording Historical Resources*. Office of Historic Preservation, Sacramento.

⁵ California Office of Historic Preservation, 1999, p. 2. *California Register and National Register: A Comparison (for purposes of determining eligibility for the California Register)*. Technical Assistance Series No. 6. California Department of Parks and Recreation, Sacramento.

(1) **Records Search.** As part of background research, two records searches for the project area were conducted at the Northwest Information Center (NWIC) of the California Historical Resources Information System, Sonoma State University, in Rohnert Park, California. The NWIC, an affiliate of the State of California Office of Historic Preservation, is the official State repository of cultural resource records and reports for Solano County. LSA conducted a records search on August 26, 2005, and Ric Windmiller conducted a records search on August 21, 2006. No recorded cultural resources were identified in the project area by either records search.

(2) **Field Survey.** LSA archaeologists and Ric Windmiller conducted field surveys of the project area on October 19 and 21, 2005; and October 10 and 11, 2006. The field surveys identified a total of 14 cultural resources in the project area, consisting of abandoned ranch buildings, former ranch building locations, debris scatters, numerous depressions, a sand mine pit, rock alignments, several dams, a eucalyptus grove, and a dairy ranch district.

(3) **Consultation.** LSA and Ric Windmiller consulted with potentially interested parties in August 2005 and August 2006. In summary, LSA and Ric Windmiller contacted the Native American Heritage Commission (NAHC) in Sacramento to request a review of the NAHC's sacred lands file for any Native American cultural resources that might be affected by the proposed project. In response, the NAHC stated that no cultural resources listed in the sacred lands file are present in the project area, but also provided a list of Native American individuals and suggested that these individuals be contacted for information or concerns. Windmiller attempted to contact the Native Americans identified by the NAHC, but received no responses from those individuals.

In addition to contacting the NAHC, LSA contacted the following historical organizations for information or concerns about the proposed project area: the Solano County Historical Society; the Benicia Historical Society; and the Benicia Historical Museum and Cultural Foundation. The Solano County Historical Society and Benicia Historical Museum and Cultural Foundation did not respond with information or concerns about the project. The Benicia Historical Society stated that they have concerns regarding the possibility of prehistoric archaeological sites, as well as the possibility of historical archaeological sites associated with the Benicia Arsenal. The Benicia Historical Society requested that an archaeologist be present during project-related excavation, and requested that they be consulted regarding historical and archaeological issues, should any such issues arise during project construction.

(4) **Historical Evaluations.** Ric Windmiller evaluated the cultural resources identified in the project area to determine if they qualify as historical resources (defined at PRC §21084.1) or as archaeological resources (defined at PRC §21083.2(g)). Table IV.K-1 summarizes the resources and their legal status under CEQA.

Based on Ric Windmiller's evaluation and peer review analysis by LSA, one of the cultural resources identified in the project area qualifies as a historical resource under CEQA. This resource, field designation BBP-2, is a historical archaeological site near the intersection of Lake Herman Road and East 2nd Street.

BBP-2, which consists of two depressions and a scatter of historical archaeological materials, corresponds to the location of a house depicted on the 1898 *Karquines* United States Geological Survey (USGS) quadrangle.

Table IV.K-1: Cultural Resources at the Project Site

Resource Designation*	Description	California Register Eligibility	Historical or Archaeological Resource?
BBP-1	Sand pit	Not eligible	No
BBP-2	Site of former building	Eligible	Yes (historical resource)
BBP-3	Earthen dam	Not eligible	No
BBP-4	Earthen dam	Not eligible	No
BBP-5	Rock alignment	Not eligible	No
BBP-6	Ranch site, location of former buildings	Not eligible	No
BBP-7	Earth dam	Not eligible	No
BBP-8	Earthen dam	Not eligible	No
BBP-9	Eucalyptus grove	Not eligible	No
BBP-10	Barn (also part of BBP-12)	Not eligible	No
BBP-11	Barn (also part of BBP-12)	Not eligible	No
BBP-12	Ranch district (BBP-10 and -11)	Not eligible	No
BBP-13	Ranch site, location of former buildings	Not eligible	No
BBP-14	Ranch site, building foundations	Not eligible	No

* Note: No geographical identification is provided for the resource designations in order to protect prehistoric and historic resources.

Source: LSA Associates, Inc., 2006.

Based on archival map research and field observations, BBP-2 appears to represent the remnants of a single household occupation rather than several households over time. Historical land ownership maps suggest that the house shown on the 1898 *Karquines* USGS quadrangle was on land owned by a William Johns at that time. The date range of artifacts identified at BBP-2 generally correlate with the suggested date of Johns' association with the site. Because BBP-2 appears to represent a "single phase" of occupation, it has the potential to contain archaeological deposits associated with Johns' occupancy. Should such deposits exist and possess integrity, they may be eligible for listing in the California Register under Criterion D. Under Criterion D, a resource is eligible for listing if it "...has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation" (14 CCR §4852(b)(4)). The archaeological deposits that may exist at BBP-2 have the potential to yield information about a historical Benicia household. Such "single component" archaeological resources are of particular value in archaeological analysis as they may provide specific information about a site that has not been disturbed by subsequent uses. Such deposits may provide valuable information about the household's diet, health, life cycle, social status, and economic interactions. For these reasons, BBP-2 is considered eligible for listing in the California Register, and meets the definition of a historical resource under PRC §21084.1.

None of the archaeological or architectural elements of the other 13 cultural resources identified possess the significance or integrity necessary for listing in the California Register, and are not considered historical or archaeological resources under CEQA. All cultural resources were recorded on California Department of Parks and Recreation form 523 records and further documentation or study is not necessary.

c. Project Site Cultural Resources Setting. This section provides a cultural overview of the project site and vicinity. The overview briefly summarizes Benicia's history from about 12,000 years ago, when Native Americans first entered the area, to modern times.

(1) Prehistory and Ethnography. The Carquinez Strait area, including Benicia, was probably settled by native Californians between 12,000 and 6,000 years ago.⁶ The Paleo-Archaic-Emergent cultural sequence developed by David Fredrickson (1974) is commonly used to interpret the prehistoric settlement of Central California.⁷ The sequence is broken into three broad periods: the Paleoindian period (10,000-6000 B.C.); the three-staged Archaic period, consisting of the Lower Archaic (6000-3000 B.C.), Middle Archaic (3000-1000 B.C.), and Upper Archaic (1000 B.C.-A.D. 500); and the Emergent period (A.D. 500-1800).

The Paleoindian Period began with the first entry of people into California. These people probably subsisted mainly on big game and minimally processed plant foods, and had no trade networks. Current research, however, indicates that these people were more prone to living in one area, plant processing, and trading than previously believed. The Archaic Period is characterized by increased use of plant foods, elaboration of burial and grave goods, and increasingly complex trade networks. The Emergent Period is marked by the introduction of the bow and arrow, the ascendance of wealth-linked social status, and the elaboration and expansion of trade networks, signified in part by the appearance of clam disk bead money.⁸

(2) Ethnography. Prior to Euro-American contact, the project site was in the ethnographic territory of the Patwin. The Patwin spoke Southern Wintu, a branch of the Penutian language family. Patwin territory generally consisted of the southern Sacramento Valley from the town of Princeton south to San Pablo and Suisun bays. Politically, the Patwin were organized in tribelets, which consisted of a primary village and several outlying villages. Settlements were typically established along large watercourses, such as the Sacramento River and Cache and Putah creeks. Patwin structures were semi-subterranean and earth-covered constructions. These structures functioned as dwellings, menstrual huts, sweathouses, and ceremonial dance houses.⁹

The Patwin exploited a wide variety of terrestrial and marine plant and animal resources within their territory. Fishing was an important Patwin industry, with weirs and nets used to great advantage to harvest such Sacramento River fish as salmon, sturgeon, perch, chub, sucker, pike, trout, and steelhead. Mussels were also harvested from the river. Some of the animals taken for food and craft material included: tule elk, bear, antelope, ducks, geese, quail, and turtles. As with many other Native American cultures in California, acorns and seeds were harvested in seasonal rounds. Some of the seed crops included sunflower, alfalfaria, clover, bunchgrass, and wild oat. Other sources of plant food included buckeye, pinenuts, juniper berries, manzanita berries, blackberries, wild grapes, and tule roots.¹⁰

⁶ Moratto, Michael J., 1984, p. 76. *California Archaeology*. Academic Press, Orlando, Florida.

⁷ Fredrickson, David A., 1974. Cultural Diversity in Early Central California: A View from the North Coast Ranges. *Journal of California Anthropology* 1(1):41-54.

⁸ Moratto, Michael J., op. cit.

⁹ Johnson, Patti J., 1978. Patwin. In *California*, edited by Robert F. Heizer, pp. 350-360. Handbook of North American Indians, vol. 8, William J. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

¹⁰ Ibid.

The Patwin were accomplished craftspeople, creating a wide variety of garb and utilitarian items from surrounding plant and animal communities. Hemp was used for cordage; fibrous plants yielded material for coiled or twined baskets; bone, wood, and stone provided toolmaking materials; and tule reeds offered the means to construct boats for river and delta navigation.

The earliest historic records begin around 1800 with the Spanish mission registers of baptisms, marriages, and deaths of Indian neophytes. Spanish emissaries from Missions San Francisco de Asis, San Francisco Solano, and San Jose, actively proselytized the Patwin people, who were brought to live and work at the missions. The mission system was dissolved in the early 1830s, and by the 1860s, the few Patwin who had survived almost 100 years of epidemics and conflict with the Spanish, Mexican, and Euro-Americans, were either working as laborers for ranches or were placed on small reservations established by the United States government.¹¹

(3) Historic Period. Benicia was born from an agreement between Lieutenant Robert Stemple, a young Kentucky dentist, and Thomas Larkin, a prominent settler, to purchase a tract of land from General Mariano Vallejo. Completing the purchase in 1847, Stemple and Larkin established a settlement on the Carquinez Strait, naming it Benicia in honor of the General's wife. By the end of 1847, fifteen buildings, a wharf, and a hotel had been built, and Benicia began a new era of civil government.

Benicia's advantageous location on the Carquinez Strait offered a convenient and profitable shipment point for supplies and miners heading to the Sierran gold fields. Benicia's strategic importance as a trading center for the gold fields led the U.S. Army to build the Benicia Arsenal for defense against foreign incursions and Indian attacks. In 1850, the Pacific Mail and Steamship Company established a facility in Benicia to accommodate the increasing freight and mail traffic between California and the eastern United States. Industrial activity in Benicia increased as wharves were built to handle the ever-increasing flow of maritime commerce. As commerce and industry flourished, residents were drawn to Benicia, and in 1850 there were over 100 houses in the town.

Benicia's prominence is indicated by two governmental distinctions conferred upon it during California's early statehood. Benicia was one of the first two cities incorporated in California, and briefly served as the state capitol in 1853 and 1854. When Sacramento was selected as the permanent capitol, Benicia lost a measure of political influence, but retained a host of prominent citizens active in financial, social, and religious circles. Several religious schools were established in Benicia, and it became known as a refined, relatively quiet community, in contrast to California's rough-and-ready mining and ranching communities.

In the 1860s and 1870s, easy water access and the railroad were two important precursors to industrial development in Benicia. In 1879, Southern Pacific extended rail lines to Benicia's waterfront and began operation of the first railcar ferry west of the Mississippi River. The ferry operated from 1879 to 1930, and was a funnel point for freight from the east destined for San Francisco, as well as a means to ship finished products from Benicia to market.

¹¹ Ibid.

As Benicia's industries and waterfront grew, so did its economic base. The Hume Carquinez Packing Company began canning salmon in 1865, and continued in this capacity until a ban on commercial salmon fishing in inland waters limited supply in 1955. The tanning industry was even more visible and, due to Benicia's central location, more lucrative. In the late-19th and early-20th centuries, the mass production of leather products in the U.S. created a huge demand for tanned hides, and Benicia was the principal hide tanning center on the Pacific Coast. The hide tanning industry ceased in Benicia by 1930.

By 1872, the Goodyear family was the primary owner of the project site, although the Gulick, Vaughn, Roberts, and Foreman families also owned portions of the site. By 1890, the site was subdivided into smaller parcels owned by several families.

According to an 1896 USGS survey, there were four structures and one road (generally following the alignment of Reservoir Road) within the project site. A sand mine was operated on the project site between the 1940s and 1950s, although most of the site was used for agricultural activities, including dairying, grazing, and the raising of poultry or pigs. Remnants of historic agricultural activities on the site include the remains of a ranch (and dairy), the remains of a poultry or pig farm, earthen dams along intermittent drainages (which may have been constructed for flood-control and water reservoirs for livestock), and a eucalyptus grove.

2. Paleontological Resources

This section begins with a brief summary of the regulatory framework for paleontological resources at the project site. Following this, the methods and results of the paleontological resources analysis are described. Finally, a brief overview of the project site's geological setting is presented.

a. Regulatory Framework. Paleontological resources at the project site are addressed in relation to the California Environmental Quality Act, Public Resources Code §5097.5, and Society for Vertebrate Paleontology definitions. These policy documents are summarized below.

(1) California Environmental Quality Act. CEQA requires that a determination be made as to whether a project would directly or indirectly destroy a unique paleontological resource or site or unique geological feature (CEQA Appendix G(v)(c)). If an impact is significant, CEQA requires feasible measures to minimize the impact (CCR Title 14(3) § 15126.4 (a)(1)).

(2) Public Resources Code §5097.5. California Public Resources Code § 5097.5 prohibits excavation or removal of any "vertebrate paleontological site...or any other archaeological, paleontological or historical feature, situated on public lands, except with express permission of the public agency having jurisdiction over such lands." Public lands are defined to include lands owned by or under the jurisdiction of the State or any city, county, district, authority or public corporation, or any agency thereof. Section 5097.5 states that any unauthorized disturbance or removal of archaeological, historical, or paleontological materials or sites located on public lands is a misdemeanor.

(3) Society of Vertebrate Paleontology. The Society of Vertebrate Paleontology has identified vertebrate fossils and their immediate environmental context as significant nonrenewable

paleontological resources. Botanical and invertebrate fossils and assemblages may also be considered significant resources.¹²

b. Methods. The methods of this paleontological resources analysis included a fossil locality search, a literature review, and a field survey. This research was undertaken in order to identify paleontological studies and fossil localities (i.e., a location at which paleontological resources have been documented) at the project site, as well as to characterize the project site's geologic units and the types of fossils they may contain.

(1) Fossil Locality Search. A fossil locality search was conducted online on May 13, 2006, using the Berkeley Natural History Museums' online database, specifically the data from the University of California Museum of Paleontology, Berkeley.

No fossil localities are recorded within or directly adjacent to the project site. Two vertebrate fossil localities are recorded within 5 miles of the project site. These fossil localities produced significant vertebrate fossils from the same Pleistocene alluvium formation that underlies the project site. Another fossil locality, within 10 miles of the project site, produced 29 vertebrate specimens from tertiary bedrock, a type of bedrock that is also found at the project site.

(2) Literature Review. LSA reviewed paleontological and geological literature relevant to the project site and its vicinity. The literature review identified Pleistocene-aged alluvium, Eocene Domengine Sandstone, and Cretaceous Panoche Formation in and adjacent to the project site. These geologic formations are known to contain paleontological resources, indicating that the project site is sensitive for paleontological resources.

(3) Field Survey. On May 5, 2006, LSA conducted a pedestrian field survey of the project site. Exposed bedrock in and adjacent to the project site was examined. Areas of bedrock exposure occur at higher project area elevations, as well as in drainages in the eastern portion of the project site. No paleontological resources were identified by the field survey.

c. Geological Setting. The project site is on an upland area north of Downtown Benicia and southeast of Lake Herman, within the western coastal margin of the Coast Range Geomorphic Province of northern California, a geologically young and seismically-active region. This region is dominated by northwest-southeast trending low mountain ranges and intervening valleys. The project site overlies a north-south trending anticline (i.e., a convex-upward fold in the bedrock) along whose axis stratigraphic layers dip below the ground surface at 40 degrees to the west and 45 degrees to the east.

Four geologic units are exposed within the project site: the Panoche Formation; Domengine Sandstone; Older Alluvium; and Younger Alluvium. The Panoche Formation, the oldest bedrock unit at the project site, forms the core of the anticline and underlies all other geologic units at the project site. The Panoche Formation is overlain by undifferentiated Older Alluvium in the uplands of the project site. The Domengine Sandstone is isolated near the eastern border of the project site. Younger

¹² Conformable Impact Mitigation Guidelines Committee, 1995. Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontological Resources: Standards and Guidelines. *Society of Vertebrate Paleontology News Bulletin* 163:22-27.

Alluvium deposits are found along the drainages between hills, or as a thin layer along the flat portions of the project site. The project site's geological units are described below in stratigraphic sequence from youngest to oldest.

(1) Younger Alluvium (Holocene: 10,000 years ago – present). Holocene alluvium lies along creeks running through the center and along the western border of the project site. In the lower parts of the project site, this alluvium may form a thin layer over Older Pleistocene deposits. The Holocene alluvium consists of moderately to poorly bedded sand, gravel, silt and clay deposits. Because Holocene deposits are generally too young to contain fossils, this alluvium has a low paleontological sensitivity.

(2) Older Alluvium (Pleistocene: 2,000,000–10,000 years ago). Pleistocene alluvial deposits lie in the northwestern and southeastern corners of the project site. This alluvium consists of sand, silt, clay and gravel deposits that are usually capped by well-developed soils.¹³ Locally, these sediments contain invertebrate and extinct vertebrate fossils, many of which represent the Rancho-labrean (Late Pleistocene) land mammal age.^{14, 15} Significant Rancho-labrean vertebrate fossils include bison, mammoth, ground sloths, saber-toothed cats, dire wolves, cave bears, rodents birds, lizards and amphibians.^{16, 17, 18, 19} The University of California Museum of Paleontology database shows four vertebrate fossil localities from Pleistocene alluvium.

(3) Domengine Sandstone (Eocene: 55,000,000 – 35,000,000 years ago). Exposures of this formation are in a small area near the eastern border of the project site. The Domengine Sandstone is gray-weathered, locally cross bedded white sandstone that contains marine invertebrate fossils. The Domengine Sandstone contains the highest diversity of mollusks ever reported from the Pacific Coast.²⁰ Marine invertebrate fossils are also abundant in the calcareous sandstone concretions common to the lower part of the Domengine Sandstone.²¹

¹³ Graymer, R.W., D.L. Jones, and E.E. Brabb, 2002. *Geologic Map and Map Database of Northeastern San Francisco Bay Region, California*. United States Department of the Interior, U.S. Geological Survey.

¹⁴ Helley, E.J., and Graymer, R.W., 1997. *Quaternary geology of Contra Costa County, and surrounding parts of Alameda, Marin, Sonoma, Solano, Sacramento, and San Joaquin Counties, California: A digital database*. U.S. Geological Survey Open-File Report 97-98.

¹⁵ Bell, C.J., E.L. Lundelius, Jr., A.D. Barnosky, R.W. Graham, E.H. Lindsay, D.R. Ruez, Jr., H.S. Semken, Jr., S.D. Webb, and R.J. Zakrzewski, 2004. The Blancan, Irvingtonian, and Rancho-labrean Mammal Ages. In *Late Cretaceous and Cenozoic Mammals of North America*, Edited by M.O. Woodburne, pp. 232-314. Columbia University Press, New York.

¹⁶ Savage, Donald, 1951. Late Cenozoic Vertebrates of the San Francisco Bay Region. *University of California Publications Bulletin of the Department of Geological Sciences* 28(10):215-314.

¹⁷ Stirton, R.A., 1951. *Prehistoric Land Animals of the San Francisco Bay Region*. In *Geology Guidebook of the San Francisco Bay Counties: History, Landscape, Geology, Fossils, Minerals, Industry, and Routes to Travel*, prepared by Olaf P. Jenkins, pp. 177-186. Bulletin 154. State of California Division of Mines, San Francisco.

¹⁸ Helley et al., 1979.

¹⁹ Bell et al., 2004.

²⁰ Graymer, R. W., Jones, D. L., and Brabb, E. E., 2002. Geologic map and map database of the northeastern San Francisco Bay region: U. S. Geological Survey Miscellaneous Field Studies Map MF-2403.

²¹ Bailey, Thomas L., 1897. The geology of the Potrero Hills and Vacaville region, Solano County, California. In *Bulletin of the Department of Geological Sciences*. 19(15):324.

(4) **Panoche Formation (Cretaceous: 144,000,000 years ago – 65,000,000 years ago).** The project site is underlain by the interbedded sandstones, siltstones, and shales of the Cretaceous Panoche Formation.²² This bedrock is exposed throughout most of the project site but is often covered by a thin layer of younger colluvium, which are clayey deposits derived from weathering and down slope movement of rock and soil. Vertebrate fossils are rare in the Panoche Formation, consistent with deep-marine sediment deposition. The Panoche Formation contains a diverse assemblage of marine invertebrate fossils including numerous bival, gastropod, ammonite and scaphopod taxa.^{23, 24}

3. Impacts and Mitigation Measures

This section assesses potential impacts to cultural and paleontological resources that could result from project implementation. The first subsection describes the criteria of significance, which establish the thresholds for determining whether a project impact is significant. The following subsection describes potential cultural and paleontological impacts associated with the proposed project. Mitigation measures are provided, when necessary, to avoid or minimize impacts.

a. **Criteria of Significance.** Implementation of the proposed project would have a significant impact on cultural or paleontological resources if it would:

- Cause a substantial adverse change in the significance of a historical resource as defined in *CEQA Guidelines* Section 15064.5;
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to *CEQA Guidelines* Section 15064.5; or
- Disturb any human remains, including those interred outside of formal cemeteries.

b. **Impacts and Mitigation Measures.** This section analyzes the potential for project-related impacts to cultural and paleontological resources. Less-than-significant impacts are discussed first, followed by potentially significant impacts. Where appropriate, mitigation measures are recommended to reduce potentially significant impacts to a less-than-significant level.

(1) **Less-Than-Significant Impacts.** The project site contains several cultural resources that are not eligible for listing on the California Register and do not meet the CEQA definition of historical or archaeological resources. These resources, as identified in the *Benicia Business Park Cultural Resources Assessment* prepared by Ric Windmiller, include cultural resources BBP-1, -3, -4, -5, -6, -7, -8, -9, -10, -11, -12, -13, and -14. Therefore, impacts to these resources associated with project-related ground disturbance and construction activities would not be considered significant.

(2) **Significant Impacts.** Based on the nature of the project and the need for site clearance and grading, project implementation may result in potentially significant impacts to cultural and paleontological resources. Four types of potentially significant impacts could occur: (1) impacts to

²² Dibblee, T.W., 1980. *Preliminary geologic map of the Benicia quadrangle, Contra Costa and Solano Counties, California*: U.S. Geological Survey Open-File Report OF-80-400, scale 1:24,000.

²³ Bennison, op. cit.

²⁴ Elder, W.P., and Miller, J.W., 1993. Map and checklists of Jurassic and Cretaceous macrofossil localities within the San Jose 1:100,000 map sheet, California, and discussion of paleontological results: U.S. Geological Survey Open-File Report 93-503 map scale 1:100,000.

identified archaeological deposits; (2) disturbance of human remains; (3) impacts to paleontological resources; and (4) impacts to cultural and paleontological resource finds accidentally discovered during project activities. Each potential impact is described below.

Impact CULT-1: Ground-disturbing project construction could result in adverse impacts to cultural resource BBP-2 in the project area. (S)

Based on the proposed grading plan, cultural resource BBP-2 would be adversely affected by project implementation. BBP-2 consists of a historical archaeological site and could contain unidentified archaeological deposits associated with a late 19th/early 20th century household located near the historic town of Benicia. Such deposits, if intact, are likely to yield important information about the lifeways of such a historical household and, by extension, Solano County residents during this period. Therefore, BBP-2 is considered eligible for listing in the California Register, and is a historical resource as defined by CEQA (PRC §21084.1). The project could result in a substantial adverse change in the significance of BBP-2, which would be a significant impact to cultural resources. Implementation of one of the following two steps or elements would reduce this impact to a less-than-significant level:

Mitigation Measure CULT-1a: Lot plans for the project site shall be designed to avoid impacts to BBP-2. The design shall employ impact avoidance strategies as described in 14 CCR §15126.4(b)(3)(B)(2-3) by either: (1) incorporating BBP-2 and a 25-foot buffer around its known boundary in project area open space, thus providing for its protection from future ground disturbance; or (2) capping BBP-2 and a 25-foot buffer around its known boundary with at least two feet of chemically neutral fill devoid of cultural debris and a layer of geofabric between the fill and the surface of the site and buffer zone area. Prior to placing BBP-2 in open space or capping the deposit, archaeological boundary definition excavation shall be conducted to identify the limits of subsurface deposits and features and assist in establishing protective measures. If option #2 (capping) is selected, the location of BBP-2 and the 25-foot buffer shall be recorded on the tentative map prior to final permit approval, and no ground-disturbing construction shall occur below the depth at which the fill meets the original ground surface. (LTS)

OR

Mitigation Measure CULT-1b: In accordance with the recommendations presented the *Benicia Business Park Cultural Resources Assessment* (prepared by Ric Windmiller in November 2006), the following actions shall be taken prior to project construction if avoidance or capping as described in Mitigation Measure CULT-1a is not feasible. The applicant shall undertake archaeological excavation to document and analyze BBP-2. Should significant subsurface architectural features or archaeological deposits be encountered during the exploratory excavation, the applicant shall document such finds as necessary to recover a representative sample of the data that justify the California Register eligibility of BBP-2. The level of documentation necessary shall be determined in the field depending on the results of the initial exploratory excavation and based on the professional judgment of the archaeologist conducting the work. Documentation may include, but is not limited to: a detailed recording on California Department of Parks and Recreation form 523 Records and/or data recovery excavation. If data recovery excavation is the selected approach, the work shall satisfy the requirements and objectives of a research design prepared for the data recovery pursuant to 14 CCR §15126.4(b)(3)(C). Any

mitigation documentation shall be conducted by, or under the direction of, an archaeologist listed in the Register of Professional Archaeologists.²⁵ (LTS)

Impact CULT-2: Ground-disturbing project construction could disturb human remains, including those interred outside of formal cemeteries. (S)

Although the surveys of the project area conducted by LSA and Ric Windmiller did not identify evidence of human remains, there is a possibility that unidentified human remains exist in the project site. Construction of the proposed project would require soil excavation and grading for building foundations and utilities, an activity that has the potential to disturb human remains. Implementation of the following mitigation measure would reduce project-related impacts to human remains to a less-than-significant level:

Mitigation Measure CULT-2: Should human remains be encountered by project activities, construction activities shall be halted and the County Coroner notified immediately. If the human remains are of Native American origin, the Coroner shall notify the Native American Heritage Commission (NAHC) within 24 hours of this identification, and a qualified archaeologist shall be contacted to evaluate the situation. The NAHC will identify a Native American Most Likely Descendent (MLD) to inspect the site and provide recommendations for the proper treatment of the remains and associated grave goods. As part of the archaeological assessment, immediate consultation shall be undertaken with the City. The archaeologist shall recover scientifically-valuable information, as appropriate, and in accordance with the recommendations of the MLD.

Upon completion of such analysis and/or recovery, the archaeologist shall prepare a report documenting the methods and results of the investigation. This report shall be submitted to the City, the project applicant, and the NWIC. (LTS)

Impact CULT-3: Ground-disturbing project construction could result in significant impacts to paleontological resources. (S)

The Pleistocene alluvium, the Cretaceous Panoche Formation, and the Domengine Sandstone Formation that underlie the project area are highly sensitive for paleontological resources. If project ground-disturbing construction occurs below the approximately 2.5-foot-deep soil layer, significant paleontological resources may be adversely affected by such construction.

If project construction occurs below the approximately 2.5-3.5 foot deep soil layer, the following mitigation measure shall be implemented. This mitigation measure would reduce impacts to potential paleontological resources at the project site to a less-than-significant level.

Mitigation Measure CULT-3: A qualified paleontologist shall monitor initial project ground-disturbing construction below the soil layer (i.e., below the bottom of the soil layer approximately, which is approximately 2.5-3.5 feet below the original ground surface). The paleontologist shall then determine the appropriate level of monitoring needed based on the sensitivity of the area in which construction is occurring. Appropriate levels of monitoring may include continuous monitoring, periodic spot checks, or no further monitoring. Monitoring shall continue

²⁵ Archaeologists listed in the Register of Professional Archaeologists are identified by the use of RPA following their names.

in accordance with the recommendations of the paleontologist. The paleontological monitor must be empowered to halt construction activities at the location of a discovery to protect the find while it is being evaluated. If significant fossil resources are recovered, they shall be curated at an appropriate facility (e.g., University of California Museum of Paleontology).

Upon completion of paleontological monitoring, a report shall be prepared documenting the methods and results of the monitoring. The report shall be submitted to the project proponent and appropriate City agencies. (LTS)

Impact CULT-4: Ground-disturbing project construction could result in significant impacts to accidentally discovered cultural and paleontological resources. (S)

In the event that cultural or paleontological resources are accidentally discovered during project construction, the following two-part mitigation measure shall be implemented, as appropriate.

Mitigation Measure CULT-4a: If deposits of prehistoric or historical archaeological materials are encountered during project activities, all work within 25 feet of the discovery shall be redirected and a qualified archaeologist contacted to assess the find, record the find on Department of Parks and Recreation (DPR) Form 523 (at the discretion of the archaeologist), and make recommendations for the find's treatment. If feasible, such deposits shall be avoided by project activities. If avoidance is not feasible, the find shall be evaluated for its California Register eligibility. If the deposits are not eligible, avoidance is not necessary and work may continue in the area of the find. If the find is eligible, impacts to the find shall be mitigated. Mitigation may include, but is not limited to, data recovery excavation, artifact curation, report preparation, and information dissemination to the public.

Upon completion of the assessment and/or evaluation, the archaeologist shall prepare a report documenting the methods and results of the archaeological assessment/evaluation, and provide recommendations for the treatment of the find. The report should be submitted to the project sponsor, appropriate City agencies, and the Northwest Information Center (NWIC).

Mitigation Measure CULT-4b: If paleontological resources are discovered during project activities, all work within 25 feet of the discovery shall be redirected until a paleontological monitor has assessed the situation and made recommendations for their treatment. If feasible, the find shall be avoided by project activities. If avoidance is not feasible, the paleontological find shall be evaluated for its significance. If the find is not significant, avoidance is not necessary and work may continue in the area of the find. If the find is significant, impacts to the find shall be mitigated. Paleontological mitigation may include, but is not limited to, data recovery, fossil curation, and information dissemination to the public.

Upon completion of evaluation, as well as mitigation (if necessary), a report shall be prepared documenting the methods and results of the paleontological investigation. The report shall be submitted to the project sponsor and appropriate City agencies. (LTS)