PALEONTOLOGICAL RESOURCES ASSESSMENT

STRATFORD RANCH RESIDENTIAL DETENTION BASIN PROJECT

CITY OF PERRIS

COUNTY OF RIVERSIDE, CALIFORNIA

LSA

December 2014

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Prepared for:

Stratford Ranch Investors
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LSA Project No. SRA1401

Database Information:
Type of Study: Locality Search and Survey
Localities Recorded: None
USGS 7.5′ Quadrangle: *Perris, California*
Acreage: ~29.2 acres
Key Words: Holocene to Late Pleistocene Young Alluvial Valley Deposits, Early Pleistocene Very Old Alluvial Fan Deposits, Paleontologically Sensitive Sediments

LSA

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EXECUTIVE SUMMARY

LSA Associates, Inc. (LSA) conducted a paleontological resources assessment for the Stratford Ranch Residential Detention Basin Project (project), located in the City of Perris (City), County of Riverside, California. The proposed project involves the development of a regional detention basin in conjunction with the Perris Valley Storm Drain Channel as part of the City's master drainage plan. The regional basin will require the excavation of approximately 520,000 cubic yards of material that will be used as fill material on the proposed adjacent Stratford Ranch Residential Project (Tentative Tract Map [TTM] 36647 & TTM 36648). Excavation depths are expected to range from 8–12 feet (ft).This assessment included a locality search at the Division of Geological Sciences of the San Bernardino County Museum (SBCM), an examination of geologic maps and paleontological literature, and a field survey.

An examination of geologic maps indicated that the project area contains Holocene to Pleistocene Young Alluvial Valley Deposits and Early Pleistocene Very Old Alluvial Fan Deposits. In addition, because the project area has been previously developed, some portions of the project area may contain Artificial Fill, although these deposits are not mapped and their thickness is not known. No paleontological resources were observed during the field survey, and the locality search conducted at the SBCM for LSA in November 2011 for the parcel of land immediately to the north of the project area indicated that there are no known paleontological resources within an approximate 1-mile radius around the current project area. However, scientifically significant paleontological resources have been recovered from similar Pleistocene deposits elsewhere in Southern California and the Inland Empire, including from a locality within the Perris Valley Storm Channel.

Based on the results of the literature review and locality search, in the Young Alluvial Valley Deposits, only those sediments of Pleistocene age, which may be encountered below a depth of 5 ft in the project area, may contain scientifically important fossils. As such, the Young Alluvial Valley Deposits are considered to have no paleontological sensitivity from the surface to a depth of 5 ft and high sensitivity below that mark. The Early Pleistocene Very Old Alluvial Fan Deposits have high paleontological sensitivity, and Artificial Fill has no paleontological sensitivity.

LSA believes there is the potential to encounter paleontological resources during ground-disturbing activities that extend below a depth of 5 ft within the project area. In order to mitigate potential adverse impacts to nonrenewable paleontological resources, as required by California Environmental Quality Act Appendix G, Public Resources Code Section 5097.5, and the General Plan of the City, LSA recommends the following:

- A paleontologist should be hired to develop a Paleontological Resource Impact Mitigation Program (PRIMP) for this project. The PRIMP shall include the methods that will be used to protect paleontological resources that may exist within the project area, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading.

- Excavation and grading activities with a high paleontological sensitivity rating (Young Alluvial Valley Deposits below a depth of 5 feet [ft] from the surface and Early Pleistocene Very Old Alluvial Fan Deposits) should be monitored by a qualified paleontologist following a PRIMP. No monitoring is required for excavation activities in Artificial Fill.
- If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor should have the authority to temporarily redirect construction away from the area of the find in order to assess its significance.
- Collected resources should be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of an accredited scientific institution. At the conclusion of the monitoring program, a report of findings should be prepared to document the results of the monitoring program.
- In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist should be contacted to assess the find for significance. If determined to be significant, the fossil shall be collected from the field. In addition, if the find is located in sediments of Young Alluvial Valley Deposits shallower than a depth of 5 ft, the paleontologist shall make recommendations as to whether monitoring shall be required in these sediments on a full-time basis beginning at a shallower depth.

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INTRODUCTION

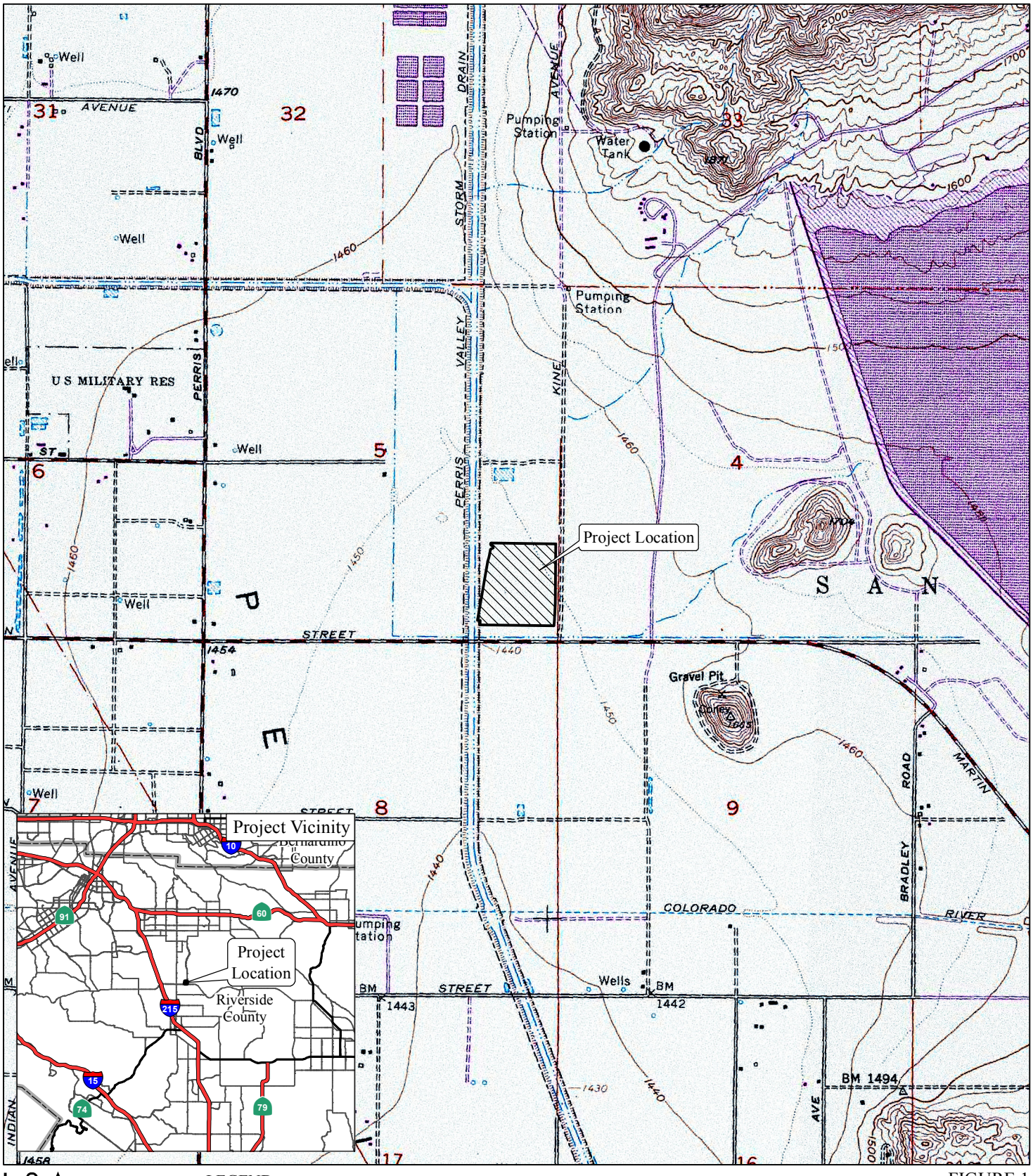
LSA Associates, Inc. (LSA) was retained by the Stratford Ranch Investors to prepare a paleontological resources assessment for the Stratford Ranch Residential Detention Basin Project (project) in the City of Perris (City), County of Riverside, (County), California. This assessment documents the potential for paleontological resources to occur within the project area and whether those resources will be affected by development of the project. The assessment was conducted pursuant to the California Environmental Quality Act (CEQA); the California Public Resources Code (PRC) Section 5097.5; the County General Plan (County of Riverside, 2003), and the Conservation Element of the City's Comprehensive General Plan (City of Perris, 2005). This assessment also followed guidelines established by the Society of Vertebrate Paleontology (SVP, 1995, 2010). According to these regulations and guidelines, if development of a project impacts significant paleontological resources, a plan must be developed and to mitigate those impacts.

PROJECT LOCATION

The proposed project covers a 29.2-acre (ac) rectangular parcel of land located north of the Ramona Expressway between the Perris Valley Storm Drain on the west and Evans Road on the east. The project area is depicted on the United States Geological Survey (USGS) *Perris, California* 7.5-minute topographic quadrangle (USGS, 1979) in the southeastern portion of Section 5; Township 4 South; Range 3 West, San Bernardino Baseline and Meridian (Figure 1).

PROJECT DESCRIPTION

The 29.2 ac site has been identified in the City's master drainage plan to be utilized as a regional detention basin in conjunction with the Perris Valley Storm Drain Channel. The regional basin will require the excavation of approximately 520,000 cubic yards of material that will be used as fill material on the proposed adjacent Stratford Ranch Residential Project (Tentative Tract Map [TTM] 36647 & TTM 36648). Excavation depths are expected to range from 8–12 feet (ft).



LSA

LEGEND

Project Location

FIGURE 1

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SOURCE: USGS 7.5' Quad - Perris (1979), CA

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Stratford Ranch Residential Detention Basin Project

Project Location and Vicinity

REGULATORY ENVIRONMENT

STATE REGULATIONS

Under State law, paleontological resources are protected by both CEQA and PRC Section 5097.5, both of which are discussed in more detail below.

California Environmental Quality Act (PRC 21000 et seq.)

The purpose of CEQA is to provide a statewide policy of environmental protection. As part of this protection, state and local agencies are required to analyze, disclose, and, when feasible, mitigate the environmental impacts of, or find alternatives to, proposed projects.

The *State CEQA Guidelines* (California Code of Regulations [CCR] 15000 et seq.) provide regulations for the implementation of CEQA and include more specific direction on the process of documenting, analyzing, disclosing, and mitigating environmental impacts of a project. To assist in this process, Appendix G of the *State CEQA Guidelines* provides a sample checklist form that may be used to identify and explain the degree of impact a project will have on a variety of environmental aspects, including paleontological resources (Section V[c]).

As stated in Section 15002(b)(1-3) of the *State CEQA Guidelines*, CEQA applies to governmental action, including activities that are undertaken by, financed by, or require approval from a governmental agency. Because this project requires approval by a governmental agency, CEQA regulations apply.

California Public Resources Code, Section 5097.5

This law protects historic, archaeological, and paleontological resources on public lands within California and establishes criminal and civil penalties for violations.

Specifically, PRC Section 5097.5 states:

> "(a) No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.
> (b) As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof."

Because this project involves public lands as defined in Section 5097.5(b), project proponents are required to comply with this regulation.

COUNTY OF RIVERSIDE POLICIES

The County General Plan (Riverside County, 2003) sets forth the goals, policies, and programs the County uses to manage future growth and land uses. Although the General Plan usually only applies to portions of the County that are unincorporated, this section is being included for completeness. Chapter 5 the Multipurpose Open Space Element of the General Plan contains the policies designed to protect paleontological resources within unincorporated areas of the County. The following policies contained in the General Plan of the County are designed to protect paleontological resources within the County:

- **OS 19.8.** Whenever existing information indicates that a site proposed for development may contain biological, paleontological, or other scientific resources, a report shall be filed stating the extent and potential significance of the resources that may exist within the proposed development and appropriate measures through which the impacts of development may be mitigated.
- **OS 19.9.** This policy requires that when existing information indicates that a site proposed for development may contain paleontological resources, a paleontologist shall monitor site grading activities, with the authority to halt grading to collect uncovered paleontological resources, curate any resources collected with an appropriate repository, and file a report with the Planning Department documenting any paleontological resources that are found during the course of site grading.
- **OS 19.10.** Transmit significant development applications subject to CEQA to the San Bernardino County Museum for review, comment, and/or preparation of recommended conditions of approval with regard to paleontological resources.

CITY OF PERRIS POLICIES

The Conservation Element of the City's Comprehensive General Plan (2030) (City of Perris, 2005) states that identification and preservation of significant fossils will be effected through Implementation Measure IV.A.4:

- **Measure IV.A.4:** In Area 1 and Area 2 shown on the Paleontological Sensitivity Map, paleontologic monitoring of all projects requiring subsurface excavations will be required once any excavation begins. In Areas 4 and 5, paleontologic monitoring will be required once subsurface excavations reach five feet in depth, with monitoring levels reduced if appropriate, at the discretion of a certified Project Paleontologist.

Based on the Paleontological Sensitivity Map in the Conservation Element of the City's Comprehensive General Plan (2030) (City of Perris 2005, Exhibit CN-7), the project is located within Area 4, which requires paleontological monitoring beginning at a depth of 5 ft beneath the surface.

SCIENTIFIC SIGNIFICANCE AND SENSITIVITY

Paleontological resources, or fossils, are the remains (such as bones, teeth, shells, leaves, or wood) and/or traces (such as tracks or burrows) of prehistoric animal and plant life. Fossils provide evidence of ancient organisms and document the patterns of organic evolution and extinction. If a paleontological resource cannot be avoided during construction, the scientific significance of the resource must be assessed before mitigation measures are proposed. The scientific significance or importance of a paleontological resource is based on various attributes of that resource, and definitions of scientific significance from the SVP and one additional source are included below.

SCIENTIFIC SIGNIFICANCE

The SVP provides the following definitions of scientific significance:

- **Scientifically Significant Paleontological Resources** are fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small; uncommon invertebrate, plant, and trace fossils; and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than approximately 5,000 radiocarbon years) (SVP, 2010).
- **A Scientifically Significant Fossiliferous Deposit** is a rock unit or formation that contains scientifically significant nonrenewable paleontological resources, here defined as comprising one or more identifiable vertebrate fossils, large or small; and any associated invertebrate and plant fossils, traces, and other data that provide taphonomic, taxonomic, phylogenetic, ecologic, and stratigraphic information (ichnites and trace fossils generated by vertebrate animals, e.g., trackways or nests and middens, which provide datable material and climatic information). Paleontological resources are considered to be older than recorded history and/or older than 5,000 years before the present (SVP, 1995).

Eisentraut and Cooper (2002) developed a useful analysis for judging whether fossils are scientifically significant by applying the criteria within the following categories:

- **Taxonomy:** Assemblages that contain rare or unknown taxa, such as defining new (previously unknown to science) species or that represent a species that is the first or has very limited occurrence within the area or formation.
- **Evolution:** Fossils that represent important stages or links in evolutionary relationships or that fill gaps or enhance underrepresented intervals in the stratigraphic record.
- **Biostratigraphy:** Fossils that are important for determining or confining relative geologic (stratigraphic) ages or for use in defining regional to interregional stratigraphic associations. These fossils are often known as biostratigraphic markers and represent plants or animals that existed for only a short and restricted period in the geologic past.

- **Paleoecology:** Fossils that are important for reconstructing ancient organism community structure and interpretation of ancient sedimentary environments. Depending on which fossils are found, much can be learned about the ancient environment from water depth, temperature, and salinity to what the substrate was like (muddy, sandy, or rocky) to even whether the area was in a high energy location like a beach or low-energy location like a bay. Even terrestrial animals can contain information about the ancient environment. For example, an abundance of grazing animals such as horses, bison, and mammoths suggest more of a grassland environment, while an abundance of browsing animals such as deer, mastodons, and camels suggest more of a brushy environment. Preserved parts of plants can also lend insight into what was growing in the area at a particular time. In addition, by studying the ratios of different species to each other's population densities, relationships between predator and prey can be determined.

  There is a complex but vital interrelationship among evolution, biostratigraphy, and paleoecology: biostratigraphy (the record of fossil succession and progression) is the expression of evolution (change in populations of organisms through time), which in turn is driven by natural selection pressures exerted by changing environments (paleoecology).

- **Taphonomy:** Fossils that are exceptionally well or unusually/uniquely preserved or are relatively rare in the fossil record. This could include preservation of soft tissues such as hair, skin, or feathers from animals or the leaves/stems of plants that are not commonly fossilized.

Summary of Scientific Significance

All vertebrate fossils that have contextual information, such as the location and geologic unit from which they were recovered, are considered scientifically significant, nonrenewable paleontological resources. Invertebrate and plant fossils as well as other environmental indicators associated with vertebrate fossils are considered scientifically significant. Certain invertebrate and plant fossils that are regionally rare or uncommon, or help to define stratigraphy, age, or taxonomic relationships are considered scientifically significant.

SENSITIVITY

Paleontological sensitivity refers to the potential to encounter significant paleontological resources in a given geologic unit. Decisions about how to manage paleontological resources must be based on the potential to encounter those resources as the actual situation cannot be known until excavation for the project is underway. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have potential for the presence of significant nonrenewable paleontological resources. Review of available literature may further refine the potential of each rock unit, formation, or facies. The SVP (2010) has four categories for sensitivity: high, low, no, and undetermined; while the City Planning Department (City of Perris, 2005) has only three categories of sensitivity: high, low, and undetermined. If a geographic area or geological unit is classified as having undetermined potential for paleontological resources, studies must be undertaken to determine whether that rock unit has a sensitivity of either high or low. The field survey may extend outside the defined project to areas where rock units are better exposed. The categories of paleontological potential are defined below:

- **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), some low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units 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). Paleontological potential consists of both (1) 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 (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that 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.

- **Low Potential:** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have a 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, fossils are only preserved in rare circumstances; 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 (e.g., 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 or impact mitigation measures relative to paleontological resources.
- **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 whether these rock units have high, low, or no potential to contain significant paleontological resources. A field survey by a qualified professional 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.

If an area is determined to have a high potential for containing paleontological resources, the SVP (2010) recommends that a program to mitigate impacts be developed. In areas of high sensitivity, a survey prior to excavation is also recommended to locate surface concentrations of fossils that might need special salvage methods.

Mitigation can be initiated prior to and/or during construction. As a practical matter, no consideration is generally afforded paleontological sites for which scientific importance cannot be demonstrated. If a paleontological resource assessment determines an area is insignificant or of low sensitivity, it is recommended that this conclusion be documented in the assessment report and in the project's environmental document in order to demonstrate compliance with applicable statutory requirements.

Summary of Sensitivity

A formation or rock unit has paleontological sensitivity or the potential for significant paleontological resources if it has previously produced, or has lithologies conducive to the preservation of, vertebrate fossils and associated or regionally uncommon invertebrate and plant fossils. All sedimentary rocks, except those younger than 11,000 years, certain extrusive volcanic rocks, and mildly metamorphosed rocks are considered to have potential for paleontological resources.

METHODS

LITERATURE REVIEW

The literature review included an examination of geologic maps of the project area and a review of relevant geological and paleontological literature to determine which geologic units are present within the project area and whether fossils have been recovered from those or similar geologic units elsewhere in the region. As geologic units may extend over large geographic areas and contain similar lithologies and fossils, the literature review includes areas well beyond the project area. The results of this literature review include an overview of the geology of the project area and a discussion of the paleontological sensitivity (or potential) of the geologic units within the project area.

LOCALITY SEARCH

The purpose of a locality search is to establish the status and extent of previously recorded paleontological resources within and adjacent to the study area for a given project. The results of a fossil locality search through the San Bernardino County Museum in November 2011 for a nearby project are applicable to this project, and a separate, additional locality search for this project was not necessary. This search identified any vertebrate localities in the SBCM records that exist within 1 mile (mi) of the project area in the same or similar deposits. When available, details of those localities, such as formation, rock type, depth, and species lists were also noted. The locality search results from Mr. Eric Scott, Curator of Paleontology at the SBCM, are summarized in the Results section and included in Appendix A.

FIELD SURVEY

The purpose of a field survey is to confirm the accuracy of the geologic mapping; relocate any known paleontological localities, if present; and identify any unrecorded paleontological resources exposed on the surface of a project area. In this way, impacts to existing, unrecorded paleontological material may be mitigated prior to the beginning of ground-disturbing activities and portions of the project area that are more likely to contain paleontological resources may be identified. On December 9, 2014, LSA Senior Cultural Resources Manager Riordan Goodwin, assisted by Gini Austerman, conducted a pedestrian survey of the entire 29.2 ac project area. All portions of the property were surveyed in systematic parallel transects spaced by approximately 50 ft. Special attention was paid to areas of exposed sediment such as graded cuts, as well as rodent burrows that help to expose subsurface conditions.

PROJECT PERSONNEL

Sarah Rieboldt, Ph.D., Senior Paleontological Resources Manager

Dr. Rieboldt received her Ph.D. in Paleontology from the University of California, Berkeley and has extensive experience surveying for and collecting paleontological resources; salvaging large fossil specimens; collecting bulk sediment samples; identifying, preparing, and curating fossil material; and writing paleontological assessment reports and final mitigation monitoring reports at the conclusion of construction projects. She has conducted paleontological and geological fieldwork in California, Nevada, Utah, Wyoming, Colorado, and Alabama and has five years of experience working with natural history collections in several museums (Field Museum of Natural History [Chicago], University of California Museum of Paleontology [Berkeley], and University of Colorado Museum of Natural History [Boulder]). As a geologist and paleontological consultant, Dr. Rieboldt has worked on many different projects, including carbon sequestration and astrobiology research programs funded by the United States Department of Energy (DOE) and National Aeronautic and Space Administration (NASA), respectively, as well as on projects for the State of California Department of Parks and Recreation (DPR), the California Department of Transportation (Caltrans), and various private developers in California, Nevada, and Utah.

Riordan Goodwin, Senior Cultural Resources Manager

Riordan Goodwin conducted the paleontological survey for this project. Mr. Goodwin is quite familiar with the project vicinity, having conducted the survey and archaeological testing on the adjacent Stratford Ranch Industrial project, the 80 ac Stratford Ranch Residential Project, and the Pelican Properties project located a short distance to the west. He has more than 20 years of paleontological and archaeological experience in Southern and Central California and has served as Field Supervisor/Coordinator, Lead Monitor, and/or Monitor on numerous projects. Mr. Goodwin is currently the laboratory manager in LSA's Riverside office. Since joining LSA, Mr. Goodwin has personally conducted and contributed to numerous Phase I assessments and Phase II excavations at the CEQA-level and National Environmental Protection Act (NEPA) level, and evaluations for projects varying in size from less than 1 ac to tracts as large as 20,000 ac, as well as expansive transportation improvements for paleontological and cultural resources. Surveys usually involve Global Positioning System (GPS) mapping, site and locality descriptions, and/or recordation, and occasionally have required limited surface collections.

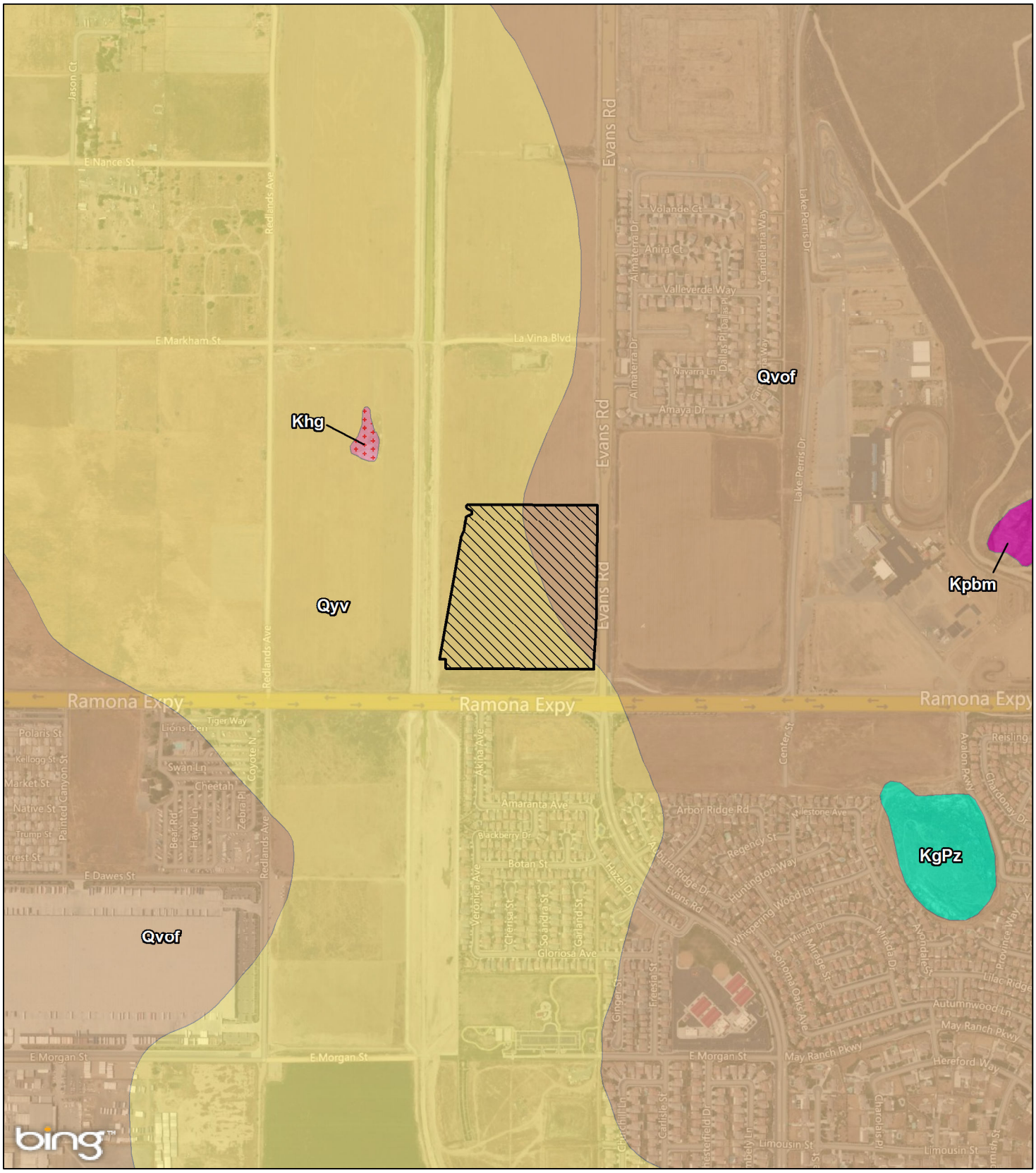
RESULTS

GEOLOGY

The project area is located at the northern end of the Peninsular Ranges Geomorphic Province, a 900- mi long northwest-southeast trending structural block that extends from the Transverse Ranges to the tip of Baja California and includes the Los Angeles Basin (California Geological Survey, 2002; Norris and Webb, 1976). The total width of this province is approximately 225 mi, extending from the Colorado Desert in the east, across the continental shelf to the Southern Channel Islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) in the west (Sharp, 1976). This region is characterized by a series of mountain ranges separated by northwest-trending valleys subparallel to faults branching from the San Andreas Fault. The geology of this province is similar to that of the Sierra Nevada, with granitic rock intruding into the older metamorphic rocks. It contains extensive pre-Cretaceous (more than 145 million years ago [Ma]) igneous and metamorphic rocks covered by limited exposures of post-Cretaceous (less than 65 Ma) sedimentary deposits (Norris and Webb, 1976).

Within this province, the project is located on the Perris Block, a fault-bounded structural block that extends from the southern foot of the San Gabriel and San Bernardino Mountains southeast to the vicinity of Bachelor Mountain and Polly Butte (Morton and Miller, 2006; Kenney, 1999). It is bounded on the northeast by the San Jacinto Fault and on the southwest by the Elsinore Fault Zone (Morton and Miller, 2006). Prior to the Late Pleistocene (126,000 years ago), the Perris Block was tectonically tilted eastward, elevating and exposing older granitic rocks on the west side (Jurupa Hills) and allowing Pleistocene sediments to accumulate on the east side, filling the eastern San Bernardino, Lakeview, Perris, and San Jacinto Valleys. The Perris Valley Storm Channel (PVSC), located along the project's eastern boundary, roughly follows the central path of the Perris Valley and connects to the San Jacinto River, a major river that drains the Perris Block, approximately 5 mi south of the project area.

At the surface of the project area, Morton (2003) and Morton and Miller (2006) mapped Holocene to Late Pleistocene (less than 126,000 years ago) Young Alluvial Valley Deposits in the western portion and Early Pleistocene (781,000–2.588 million years ago [Ma]) Very Old Alluvial Fan Deposits in the eastern portion. In addition, because the project area was previously developed for agricultural purposes, some portions may contain Artificial Fill; however, these deposits were not mapped by Morton (2003) or Morton and Miller (2006) and their thickness is not known. Figure 2 depicts the geologic units mapped at the surface within and surrounding the project area. All of the geologic units that may be encountered are described in more detail below.



LSA

LEGEND

Project Location

Geologic Units

Qyv - Young Alluvial Valley Deposits

Qvof - Very Old Alluvial Fan Deposits

Kbpm - Migmatic Rocks within Monzogranite of Bernasconi Pass

Khg - Heterogeneous Granitic Rocks

KgPz - Mixed Cretaceous and Paleozoic? Metamorphic and Granitic Rocks

FIGURE 2

Stratford Ranch Residential Detention Basin Project

Geology Map

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0 500 1000

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SOURCE: USGS 7.5' QUAD - PERRIS ('79); Morton (2003)

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Artificial Fill

Artificial Fill consists of sediments that have been removed from one location and transported to another location by human activity, rather than by natural means. The transportation distance can vary from a few feet to many miles. Composition is dependent on the source. Artificial Fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material.

Young Alluvial Valley Deposits

Young Alluvial Valley Deposits are generally found in valley floors and represent deposition by small streams flowing from the mountains and into the central portion of a valley. They often represent deposition during flood events. These deposits are mapped on the surface over the entire project area and consist of unconsolidated gray sand and silt that accumulated during the Holocene to Late Pleistocene (less than 126,000 years ago) (Morton, 2003; Morton and Miller, 2006).

Very Old Alluvial Fan Deposits

The Very Old Alluvial Fan Deposits formed during the Early Pleistocene (781,000–2.588 Ma) (Morton, 2003; Morton and Miller, 2006) from sediment carried by rivers and streams down the mountains and deposited at the mouths of canyons, along the sides of hills, and within the river and stream valleys. These deposits consist of predominantly of reddish-brown sand and are slightly to well consolidated (Morton, 2003). In some areas have been dissected by erosional gullies, and when not disturbed by agricultural activities show some soil development (Morton, 2003). These deposits are exposed on the surface in the eastern portion of the project area and may exist at depth below the Young Alluvial Valley Deposits.

PALEONTOLOGY

Artificial Fill

Artificial Fill may contain fossils, but these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study. As such, Artificial Fill has no paleontological sensitivity.

Young Alluvial Valley Deposits

Although the Holocene sediments in the Young Alluvial Valley Deposits may contain remains of plants and animals, generally not enough time has passed for the remains to have fossilized. In addition, these remains would be conspecific with modern species and, therefore, usually not considered to be scientifically significant. However, scientifically significant fossils are known from the older, Pleistocene sediments within these deposits. These fossils have been recovered during scientific research, as well as during excavations for roads, housing developments, and quarries in Southern California (Jefferson, 1991a, 1991b; McKinnon, 2009; Miller, 1971; Reynolds and Reynolds, 1991; Springer et al., 2009). The older deposits in this unit date to the end of the Rancholabrean North American Land Mammal Age (NALMA), which was named for the

Rancho La Brea fossil site in central Los Angeles and dates from 240,000 to 11,000 years ago. The presence of *Bison* defines the beginning of the Rancholabrean NALMA (Bell et al., 2004), but fossils from this time also include other large and small mammals, reptiles, fish, invertebrates, and plants. There is a potential to encounter these types of fossils in the older sediments within this unit below a depth of 5 ft. Any vertebrate, invertebrate, and plant fossils recovered would be considered scientifically significant because they would add to our understanding of the environment of this area over the last 126,000 years and the evolution of the animals and plants that lived here. Therefore, these deposits are assigned no paleontological sensitivity from the surface to a depth of 5 ft and a high sensitivity below that mark.

Very Old Alluvial Fan Deposits

The Very Old Alluvial Fan Deposits formed during the Early Pleistocene (781,000–2.588 Ma), an interval that spans two NALMAs: the Irvingtonian (240,000–1.8 Ma) and the Blancan (1.8–4.75 Ma). Fossils are known in similar Irvingtonian and Blancan deposits from excavations for roads, housing developments, and quarries, as well as scientific investigations within the Southern California area (Jefferson, 1991a, 1991b; Miller, 1971; Pajak et al., 1996; Reynolds and Reynolds, 1991; Springer et al., 2009). These fossils include mammoths, mastodons, horses, camels, saber-toothed cats, coyotes, deer, peccaries, and sloths, as well as smaller animals like rodents, rabbits, birds, reptiles, and fish. As such, these deposits are considered to have high paleontological sensitivity.

LOCALITY SEARCH

LSA is utilizing the results of the locality search conducted for the Stratford Ranch Industrial Project, which is located to the northwest of the current project area, because the results and recommendations are pertinent to the current project area. This locality search letter only discusses Pleistocene deposits within the subsurface because there are no exposures of this age within the Stratford Ranch Industrial project. However, the conclusions and recommendations made by the SBCM for subsurface Pleistocene deposits would also apply to the Pleistocene deposits found at the surface in the eastern portion of the current project area.

According to the locality search results letter from the SBCM dated November 22, 2011 (Appendix A), the SBCM examined the Regional Paleontologic Locality Inventory (RPLI) and does not have any recorded paleontological localities within the project area or within a 1 mi radius of the project area. The SBCM indicates that the Holocene Alluvial Valley Deposits exposed on the surface are too young to contain paleontological resources. However, The SBCM states that the early to middle Pleistocene alluvium present within the subsurface of the project has a high potential to contain nonrenewable paleontological resources and is assigned a high paleontological sensitivity. The SBCM indicates that similar older Pleistocene deposits have yielded significant fossils of plants and extinct animals from the Ice Age. These finds include mammoths, mastodons, ground sloths, dire wolves, short–faced bears, saber-toothed cats, large and small horses, large and small camels, and bison. However, the SBCM did not indicate how deeply beneath the surface these Pleistocene sediments may begin to be encountered.

Based on the high paleontological sensitivity of sediments located in the subsurface of the project, the SBCM recommends that a qualified vertebrate paleontologist be retained to develop a program to

mitigate impacts to paleontological resources. The mitigation program should be consistent with provisions of CEQA, any County regulations that apply, and guidelines of the SVP. The program should include monitoring within areas likely to contain paleontological resources, preparation of collected specimens to a point of identification, curation of any recovered resources into an accredited museum repository such as the SBCM, and preparation of a report of findings with an itemized inventory of collected specimens.

FIELD SURVEY

No paleontological resources were observed during the field survey. Ground visibility at the time of the survey was generally fair to poor, averaging around 50 percent over the project area. Visibility was limited in many areas by tumbleweeds, and given the recent rainy weather, some areas were barely dry enough to survey. Sediments exposed within the project area consisted of light brown sand and silt, consistent with Holocene and Pleistocene alluvial deposits.

SUMMARY

The results of the locality search and the field survey indicate that there are no known paleontological resources within the project area or within a 1 mi radius around the project. However, scientifically significant paleontological resources have been recovered elsewhere in the Inland Empire and Southern California from Late Pleistocene deposits similar to those in the subsurface within the project area. The Holocene to Late Pleistocene Young Alluvial Valley Deposits in the western portion of the project area have no paleontological sensitivity from the surface to a depth of 5 ft and high sensitivity below that mark. The Early Pleistocene Very Old Alluvial Fan Deposits have high paleontological sensitivity. Artificial Fill, which may be found in some portions of the project area, has no paleontological sensitivity.

RECOMMENDATIONS

Although no significant paleontological resources were identified directly within the project area by the locality search or during the field survey, the results of the locality search and literature review indicate that the project area contains deposits of high paleontological sensitivity. The Early Pleistocene Very Old Alluvial Fan Deposits in the eastern portion of the project area have high paleontological sensitivity, while the Holocene to Pleistocene Young Alluvial Valley Deposits in the western portion have no paleontological sensitivity from the surface to a depth of 5 ft and high paleontological sensitivity below that mark. The project area may also contain Artificial Fill, which has no paleontological sensitivity.

Because the project contains deposits with high paleontological sensitivity, there is a potential to encounter paleontological resources during ground-disturbing activities associated with this project. In order to mitigate potential adverse impacts to nonrenewable paleontological resources, as required by CEQA Appendix G, PRC Section 5097.5, and the General Plan of the City, LSA recommends the following procedures:

- A paleontologist should be hired to develop a Paleontological Resource Impact Mitigation Program (PRIMP) for this project. The PRIMP shall include the methods that will be used to protect paleontological resources that may exist within the project area, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of grading.
- Excavation and grading activities with a high paleontological sensitivity rating (Young Alluvial Valley Deposits below a depth of 5 feet [ft] and Very Old Alluvial Fan Deposits) should be monitored by a qualified paleontologist following a PRIMP. No monitoring is required for excavation activities in Artificial Fill.
- If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor should have the authority to temporarily redirect construction away from the area of the find in order to assess its significance.
- Collected resources should be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of an accredited scientific institution. At the conclusion of the monitoring program, a report of findings should be prepared to document the results of the monitoring program.
- In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and a paleontologist should be contacted to assess the find for significance; if determined to be significant, the fossil shall be collected from the field. In addition, if the find is located in sediments of Young Alluvial Valley Deposits shallower than a depth of 5 ft, the paleontologist shall make recommendations as to whether monitoring shall be required in these sediments on a full-time basis beginning at a shallower depth.

By following the above procedures, potential impacts to nonrenewable paleontological resources would be avoided.

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APPENDIX A

LOCALITY SEARCH RESULTS
SAN BERNARDINO COUNTY MUSEUM

22 November 2011

LSA Associates, Inc.
attn: Brooks Smith, Senior Cultural Resources Manager
20 Executive Park, Suite #200
Irvine, CA 92614

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, STRATFORD RANCH WAREHOUSE PROJECT, PERRIS REGION, RIVERSIDE COUNTY, CALIFORNIA**

Dear Mr. Smith,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named property north of the City of Perris, Riverside County, California. The study area is located in the eastern portion of section 5, Township 4 South, Range 3 West, San Bernardino Base and Meridian, as seen on the Perris, California 7.5' United States Geological Survey topographic quadrangle map (1967 edition, photorevised 1973).

Previous geologic mapping (Rogers, 1965; Morton, 2003) indicates that the proposed study area is located primarily upon subsurface early to middle Pleistocene alluvial fan deposits (= unit **$Qvof_a$**) overlain by a thin veneer of Holocene alluvial valley deposits (= **Qyv_{sa}**). The Holocene alluvium is too recently deposited to have potential to contain fossil resources, and so is assigned low paleontologic sensitivity. However, the older Pleistocene alluvial deposits have high potential to contain significant nonrenewable paleontologic resources, and so are assigned high paleontologic sensitivity. Similar older Pleistocene sediments throughout Riverside County and the Inland Empire have been reported to yield significant fossils of plants and extinct animals from the Ice Age (Jefferson, 1991; Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, short-faced bears, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Mapping by Morton (2003) also reveals the presence of a small surface outcrop of Cretaceous monzogranite (= unit **Kbpm**); this unit has no paleontologic sensitivity.

For this review, a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM was conducted by Mark R. Swift. The results of this search indicate that no previously-known paleontologic resource localities are recorded by the SBCM from within the study area, nor from within at least one mile in any direction.

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in conjunction with development may have high potential to adversely impact significant nonrenewable paleontologic resources present within the boundaries of the proposed Stratford Ranch development. A qualified vertebrate paleontologist must be retained to develop a program to mitigate impacts to such resources. This mitigation program should be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside and the proposed guidelines of the Society of Vertebrate Paleontology. This program should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. Based upon the results of this review, areas of concern include all previously-undisturbed sediments of fossiliferous Pleistocene older alluvium present within the boundaries of the property. Paleontologic monitors should 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 must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the potentially-fossiliferous units described herein are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

2. Preparation of 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 are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).

3. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). 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 such curation into an established museum repository has been fully completed and documented.

4. Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, will signify completion of the program to mitigate impacts to paleontologic resources.

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Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum