

Appendix I

Paleontological Resources Assessment
(December 6, 2018)



December 6, 2018

Ms. Thienan Pfeiffer
President
Glenn Lukos Associates, Inc.
29 Orchard
Lake Forest, California 92630
Transmitted via email to tly@welandpermitting.com

RE: Paleontological Resource Assessment for the Green Valley Specific Plan – Phase 2 Project, City of Perris, Riverside County, California

Dear Ms. Pfeiffer:

At the request of Glenn Lukos Associates, Inc., PaleoWest Archaeology conducted a paleontological resource assessment for the Green Valley Specific Plan – Phase 2 Project (Project) in the city of Perris, Riverside County, California. . This assessment included a fossil locality records search from the Natural History Museum of Los Angeles County, literature and map review to identify previous fossil discoveries within the geologic units located in the Project area, and determination of the paleontological sensitivity of the Project area. This technical memorandum is written in accordance with the guidelines set forth by the Society of Vertebrate Paleontology (SVP) (2010), serves to summarize the findings of this assessment, and will satisfy the review requirements of the California Environmental Quality Act (CEQA).

Project Description

The proposed Project consists of a multi-family and single-family residential development, along with a school site, park sites, a small commercial site, open space, road and other infrastructure necessary to support the development in Perris, California. The Project will involve excavation and grading for residential and commercial lots, a school site, utilities, roadways, and parkland. It is assumed that depth of excavation of all facilities directly associated with the proposed Project will not exceed 20 feet below current ground surface. The Project site is depicted within the U. S. Geological Survey (USGS) Romoland, California, 7.5-minute and Perris, California, 7.5-minute topographic quadrangles.

Regulatory Context

Paleontological resources are fossils, and are considered nonrenewable resources because they are irreplaceable once destroyed, or removed without proper scientific documentation. These scientific resources are listed under the California Environmental Quality Act (CEQA). *CEQA Guidelines*, Section V(c) of Appendix G provides an “Environmental Checklist Form”, consisting of a series of questions including one regarding to paleontological resources: “Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” To properly address this question, paleontological resources within the potential area of effect must first be identified. The SVP (2010) specifies the necessary attributes of a fossil resource as:

...fossils and fossiliferous deposits 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 or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).

Paleontological resources are also addressed under the Multipurpose Open Space Element of the Riverside County General Plan (2008), as well as the City of Perris General Plan. The Multipurpose Open Space Element of the Riverside County General Plan (2008), policies OS 19.8 and 19.9 states the following:

1. **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;
2. **OS 19.9:** 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 [County of Riverside Planning Department, 2008, p. OS-37].

The Conservation Element of the City of Perris General Plan (2005), Goal IV, Policy IV.A, Implementation Measure IV.A.4 supplements the County of Riverside's protocols with more specific mitigation measures regarding areas within the proposed Project area below:

Goal IV: Protection of historical, archaeological and paleontological sites.

Policy IV.A: Comply with state and federal regulations and ensure preservation of the significant historical, archaeological and paleontological resources.

Implementation Measure IV.A.4: In Area 1 and Area 2 shown on the Paleontological Sensitivity Map (Figure 1), 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.

The avoidance or mitigation of project impacts to paleontological resources routinely includes: (a) a characterization of the paleontological resources within the project area (b) an assessment to determine direct and indirect impacts resulting from the proposed action, and (c) a plan for and implementation of measures to avoid or, when avoidance is not possible, mitigate these impacts. Mitigation may include recovery and preservation of salvaged fossils along with contextual data in accredited institutions (SVP 2010). Mitigation guidelines established by SVP guidelines are often followed to achieve compliance with CEQA.

Legend

#1 - High Sensitivity:
Pleistocene older valley deposits

#2 - High Sensitivity:
Pleistocene older fan deposits

#3 - Low Sensitivity:
California batholith granitics
and tonalite

#4 - Low to High Sensitivity:
Younger alluvium overlying
older valley alluvium at depth

#5 - Low to High Sensitivity:
Younger alluvium overlying
older fan alluvium at depth

--- City Boundary

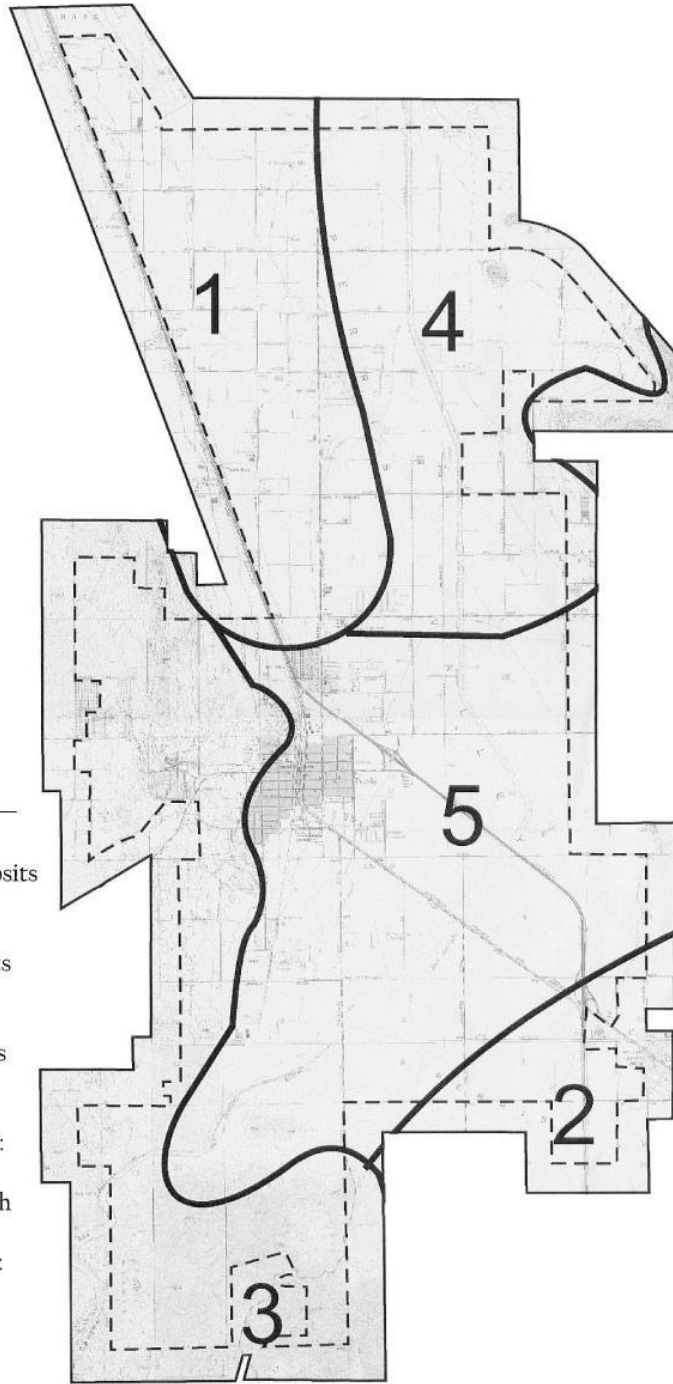


Figure 1: Paleontological Sensitivity (City of Perris. 2005)

Methodology

Determining the probability that a given project site might yield paleontological resources requires knowledge of local topography, as well as the geology and stratigraphy of the project area. This is achieved by a literature review and records search for fossil findings in the vicinity of the project area. This includes: 1) reviewing published and unpublished maps and reports; 2) consulting on-line databases; 3) seeking information regarding pertinent paleontological localities from local and regional records repositories, and 4) if necessary, conducting a reconnaissance site visit or paleontological resources field survey. For this Project, online databases, including the California Department of Conservation and Los Angeles County Museum, and published geologic, paleontological, and legal literature of the Project area were reviewed. Additionally, the Los Angeles County Museum of Natural History (LACM) was consulted for a museum records search; the search was conducted on July 13, 2018.

Many paleontologists in California assign categories of resource potential to subject geologic units as defined by the SVP (2010). These categories are high, low, undetermined, and no paleontological resource potential. Because there is no “moderate” sensitivity class, this system artificially forces a determination of either “high” or “low,” leading many paleontologists to assign “high” sensitivity to any area likely to yield fossils. Geologic units identified within the Project vicinity are nevertheless categorized according to this system since it is already codified (see Fig. 1). However, if it is needed to appropriately characterize the resource, this report will use the term “moderate” in a qualitative fashion to describe paleontological sensitivity.

Resource Context

The proposed project area lies in the Perris Plain, a region characterized by its unique topography and geology diagnostic of its respective landforms and diastrophic history (Woodford et al., 1971; California Geological Survey, 2002). The Perris Plain lies within the larger Peninsular Range physiographic province, stretch approximately 850 miles from the southern Transverse Ranges to the tip of Baja California (Norris and Webb 1990). Geophysically, the proposed Project area is located within the central part of the Perris Block, a relatively stable rectangular structural unit situated between the Elsinore and San Jacinto fault zones (Morton et al. 2003).

The geology near the Project area is characterized by Pleistocene sedimentary deposits and Quaternary alluvium overlying Mesozoic-age metasedimentary rocks intruded by Cenozoic igneous rocks (Morton and Miller 2006). Morton et al. (2003) mapped the surficial geology of the project area at a scale of 1:24,000, within portions of the Perris and Romoland USGS 7.5' quadrangles. They identify one geologic unit in the southeast corner: late to middle Pleistocene alluvial fan deposits composed of reddish brown, moderately well consolidated, poorly sorted gravel, sand, and clay. However, these alluvial fan deposits are not exposed within approximately the first 5 feet bgs (below ground surface) within portions of the Project area that have been previously disturbed (Soil Survey Staff 2003). The geology of the north and western sections of the proposed area is characterized by surficial Holocene alluvium (unconsolidated valley and wash deposits) overlying Pleistocene alluvial fan deposits at depth.

In addition, latest Pleistocene and Holocene fluvial deposits are likely to occur within approximately 1500 feet of the (now channelized) course of the San Jacinto River on the northwestern margin of the project area (Figure 2). In the very northwestern portion of the proposed Project area there are recent fluvial sediments deposits of the San Jacinto River. In the northern and central portions of the proposed Project area the surface deposits consist of younger Quaternary alluvium; alluvial fan deposits from the surrounding elevated terrain including the Bernasconi Hills to the northwest. In the southeastern portion of the proposed Project area there are surface deposits of older Quaternary Alluvium, derived as alluvial

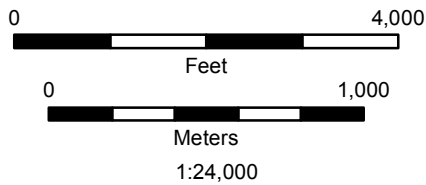
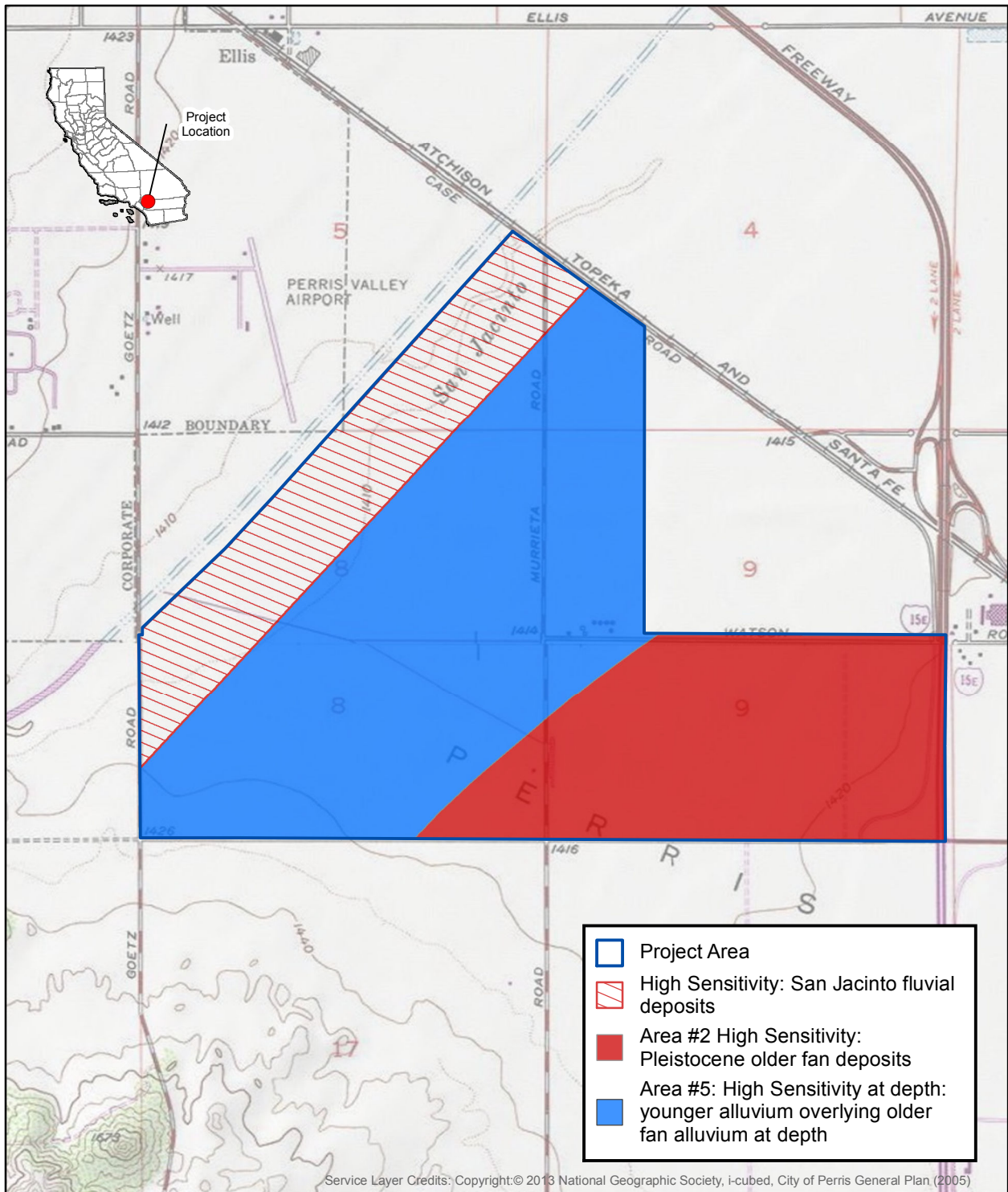


Figure 2
Paleontological Sensitivity Map

fan deposits from the mountains surrounding Railroad Canyon just to the south. These older Quaternary alluvial fan deposits are usually relatively coarse because they are close to the igneous and metamorphic source rocks. All of these alluvial fan deposits in this vicinity typically do not contain significant fossil remains in their uppermost strata, but they may overlie fine-grained, older Quaternary deposits at depth that may contain significant vertebrate fossils. In addition, older fluvial deposits of the San Jacinto River and its tributaries may also contain fossil resources at depth.

Paleontological Sensitivity

As mentioned above, paleontologists routinely follow the guidelines of the SVP (2010) in determining paleontological sensitivity and formulating mitigation recommendations for a given project. Analyzing information gathered during a paleontological resource assessment, the paleontological resource potential of the geologic unit(s) underlying a project area can be assigned to one of four categories defined by SVP (2010). These categories include high, undetermined, low, and no paleontological resource potential.

- **High Sensitivity:** All vertebrate fossils, as well as the respective stratigraphic units in which these vertebrate fossils were discovered, are considered as having significant scientific value; therefore, they are deemed highly sensitive. In areas of high sensitivity, full-time monitoring is recommended during any project-related ground disturbance.
- **Low Sensitivity:** Stratigraphic units that have yielded few fossils in the past, based upon review of available literature and museum collections records. Monitoring is usually not recommended nor needed during excavation within a stratigraphic unit of low sensitivity.
- **Undetermined Sensitivity:** In certain instances, the lack of available literature on a particular geologic unit will create difficulty in determining the strata's likelihood of yielding fossiliferous remains. Under these circumstances, further studies are required to assess the unit's paleontological resource potential (i.e., field survey). Once a reconnaissance survey of the area is completed, a qualified paleontologist will be able to determine the level of sensitivity of the stratigraphic unit in question.
- **No Sensitivity:** Sedimentary strata that is either too young (<10,000 years old) or too coarse-grained to preserve significant fossilized remains. High-grade metamorphic and plutonic igneous rocks normally do not contain fossils due to their high heat and pressure of formation below the surface of the Earth.

In addition, for the sake of this assessment moderately sensitive geological units will be identified when paleontological sensitivity is determined, but neither "low" nor "high" appear to be appropriate designations.

Museum Records Search Results

Records searches establish whether or not paleontological resources have previously been encountered within or near a proposed project area, or farther away but in the same geological or depositional context as the project area. Acquiring this information allows assessment of sensitivity, and from that a determination of the potential effects to local paleontological resources. The Los Angeles County Museum (LACM; McLeod 2018) determined that there are no previously recorded vertebrate fossil localities within the proposed Project boundaries; however the museum's search indicates that localities exist near the Project. Paleontological resources have been recovered from sedimentary deposits within the older Quaternary alluvial deposits similar to those that may occur subsurface in the proposed Project area. Localities just south/southwest, further southwest, and northeast of the proposed Project area yielded

fossil specimens from the late Pleistocene (126,000 to 120,000 years ago) sands including those of horse (*Equus*) and camel (*Camelops hesternus*). Elsewhere on the Perris Plain, deep excavations have revealed extensive fossiliferous deposits beneath a 15- to 80-foot thick mantle of late Pleistocene alluvium (Reynolds and Reynolds 1991; Anderson et al. 2002; Springer et al. 2009). The results of the museum records search are summarized below in Table 1.

Table 1
Vertebrate Localities Reported from within Older Quaternary Alluvium near the Project Area in the City of Perris, Riverside County

Locality No.	Geologic Unit	Age	Taxa
LACM 5168	Older Quaternary-age deposits	Pleistocene	<i>Equus</i> (extinct horse)
LACM (CIT) 572	Older Quaternary-age deposits	Pleistocene	<i>Equus</i> (extinct horse)
LACM 6059			<i>Camelops hesternus</i> (extinct camel)
LACM 4540	Older Quaternary-age deposits	Pleistocene	<i>Equus</i> (extinct horse)

Source: McLeod, 2018

Findings and Recommendations

Consistent with the SVP's (2010) sensitivity scale, the paleontological sensitivity of the proposed Project area was evaluated by a literature review, museum records search results, and a Paleontological Sensitivity map from the City of Perris General Plan (Figure 1; 2005). The older Quaternary deposits underlying the southwestern portion of the Project area are considered to have a high paleontological sensitivity at depth because they have yielded scientifically important paleontological resources (i.e. vertebrate fossils) throughout southern California (Springer et al., 2009).

According to the Paleontological Sensitivity map from the City of Perris General Plan (Figure 1), *Area 2*, encompasses the southeastern portion of the proposed Project area, and has exposures of older Pleistocene fan deposits (High Sensitivity); while the remainder of the Project area is within *Area 5* (Low to High Sensitivity) where paleontologically sensitive sediment lies at depth (Figure 2). In addition, within approximately 1500 feet of the current channelized course of the San Jacinto River, high sensitivity fluvial sediments may lie at depth of no more than 5 feet. Consequently, the entire proposed Project area is subject to Implementation Measure IV.A.4 of the City of Perris General Plan, which requires paleontological monitoring during ground-disturbing activities.

Excavations that extend down into the older and perhaps finer-grained sedimentary deposits, may encounter significant fossil vertebrate remains (McLeod 2018; Springer et al 2009), and monitoring of all ground-disturbing activities within *Area 2*, and within 1500 feet of the San Jacinto River Channel is recommended. Shallow excavations (less than 5 feet below ground surface [bgs]) within *Area 5* and away from the San Jacinto River channel, will not require monitoring. This younger surficial alluvium is unlikely to yield any significant paleontological resources (Figure 2). In addition, previously disturbed sediment throughout the proposed Project area will also not need monitoring (Figure 2). Any ground disturbances (i.e. excavation, trenching, and/or mass grading) below 5 feet bgs into undisturbed sediments within the proposed Project area should be monitored by a qualified paleontological monitor prepared to assess and then, if needed, quickly and professionally collect any fossils discovered minimizing to potential for construction delay. Sediment samples should also be collected and processed to for

microfossil analysis. If a fossil discovery were to occur during ground-disturbing activities, the professional paleontologist on call should examine the resource and, determine based on its scientific importance, if further mitigation is required. Construction would be required to avoid the site of discovery while this determination, and any necessary recovery, is taking place.

Mitigation and Monitoring Program

PR MM 1 – Worker’s Environmental Awareness Training. Prior to the start of the proposed Project activities, all field personnel will receive a worker’s environmental awareness training on paleontological resources. The training will provide a description of the fossil resources that may be encountered in the Project area, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist and on-site monitor(s). The training will be developed by the Project Paleontologist and may be conducted concurrent with other environmental training (e.g., cultural and natural resources awareness training, safety training, etc.).

PR MM 2 – Paleontological Mitigation Monitoring. Prior to the commencement of ground-disturbing activities, a qualified and professional paleontologist will be retained to prepare and implement a Paleontological Resource Mitigation Plan (PRMMP) for the proposed Project. The PRMMP will specify where and which activities require monitoring during ground-disturbing, and whether that monitoring should be full- or part-time (ie. “spot checking”). Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls, and of backdirt and spoils piles. If a paleontological resource is discovered, the monitor will coordinate with the construction manager for immediate diversion of construction activity away from the immediate vicinity of the fossil discovery until it is assessed for scientific significance. If recovery is necessary, the PRMMP will specify what measures can be taken to minimize impact to construction activities, and how paleontologists are to be protected during excavation activities.

The PRMMP will contain prescriptions for matrix screening to check for the presence of microfossils during monitoring. The PRMMP will specify the amount of bulk matrix samples to be taken for processing off site should microfossils be encountered. SVP (2010) guidelines recommend that, for each fossiliferous horizon or paleosol, a standard sample (4.0 cubic yards or 6,000 pounds) should be collected for subsequent wet-screening.

PR MM 3 – Fossil Preparation, Curation, and Reporting. Upon completion of construction-related ground disturbance, all fossils and fossiliferous sediment samples collected will be prepared to a point ready for curation into an accredited museum. The PRMMP will specify the level of preparation necessary. Following laboratory work, fossil specimens will be identified to the lowest taxonomic level feasible under non-museum conditions, cataloged, and prepared for curation. The PRMMP will specify the institution(s) and specific procedures necessary. At the conclusion of laboratory work and concurrent with museum curation, a Paleontological Mitigation Report (PMR) will be prepared describing the results of the paleontological mitigation efforts associated with the Project. The report will include a summary of the field and laboratory methods, an overview of the Project area geology, description of any fossil sites encountered, a specimen inventory and analysis of fossils recovered, and a copy of the submittal documentation to the repository. Copies of the PMR should be included with the submittal to the designated repository. The PRM and curation process should be completed within 60 days following end of monitorable ground disturbance.

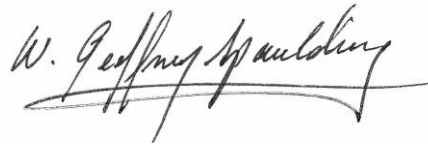
Application of these paleontological resources mitigation measures would result in the minimization of impacts to sensitive paleontological resources, and facilitate compliance with local as well as state-wide requirements.

It has been a pleasure working with you on this Project. If you have any questions, please do not hesitate to contact the PaleoWest Project Manager at rthomas@paleowest.com.

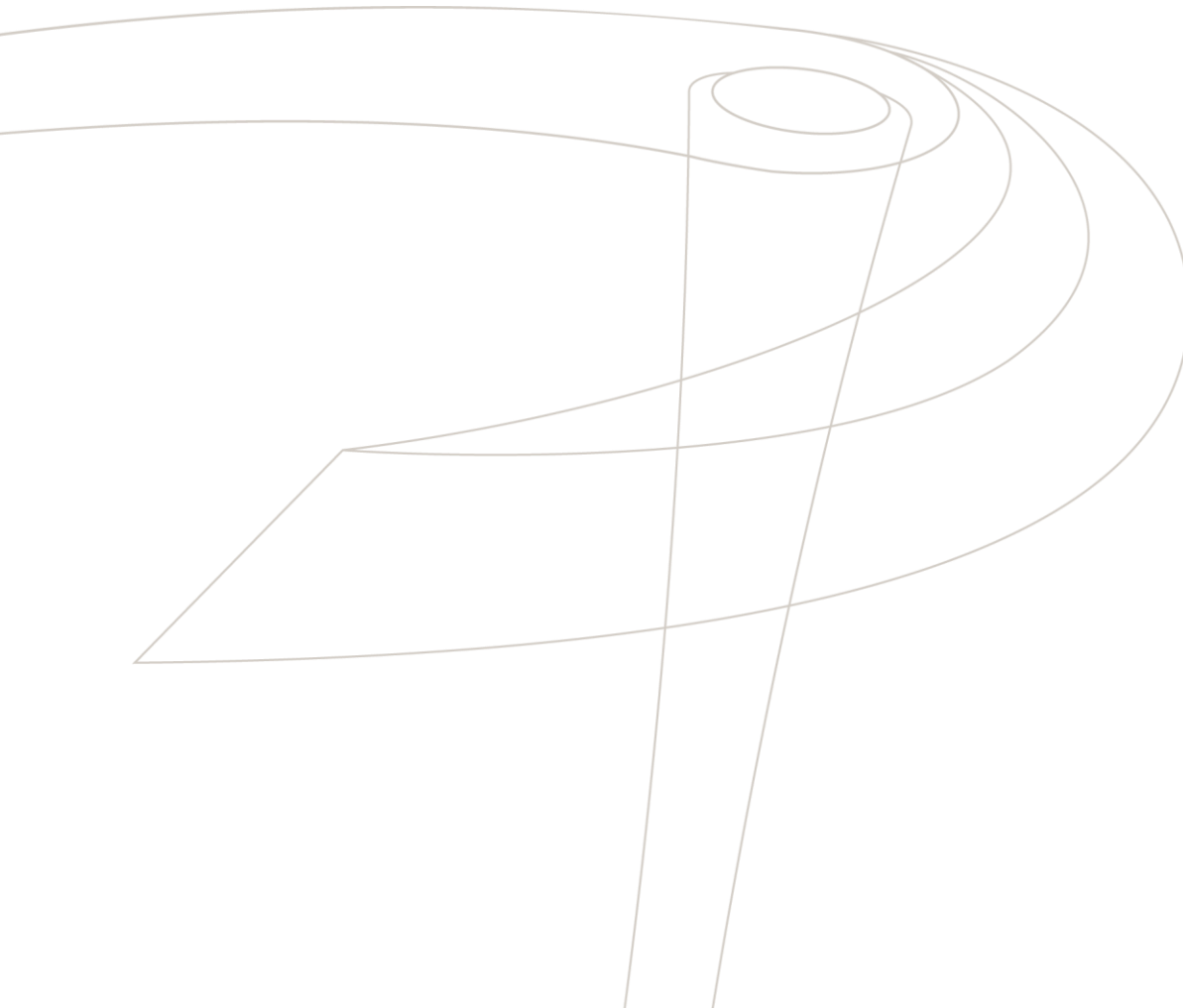
Sincerely,



Jorge Mendieta
Staff Paleontologist
PaleoWest Archaeology



W. Geoffrey Spaulding, Ph.D.
Lead Paleontologist
PaleoWest Archaeology



References

- Anderson, R. S., M. J. Power, S. J. Smith, K. Springer, and E. Scott. 2002. Paleocology of a Middle Wisconsin Deposit from Southern California. *Quaternary Research* 58: 310-317.
- Association of Environmental Professionals (AEP), 2012 *California Environmental Quality Act(CEQA) Statutes and Guidelines*. Electronic document, http://ceres.ca.gov/ceqa/docs/CEQA_Handbook_2012_wo_covers.pdf, accessed August 6, 2018.
- California Geological Survey (CGS). 2002. California Geomorphic Provinces, Note 36.
- City of Perris. 2005. Conservation Element, City of Perris General Plan, Adopted by the Perris City Council on July 12, 2005, www.cityofperris.org/city-hall/general-plan/Conservation_Element_01-08-09.pdf.
- McLeod, S. A., 2018, Unpublished museum collections records. Natural History Museum of Los Angeles County, CA.
- Morton, D.M. and Miller, F.K. 2006. Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California. U.S. Geological Survey, Open-File Report OF-2006-1217, scale 1:100,000.
- Morton, D.M., Bovard, K.R., and Alvarez, R.M. 2003. Preliminary Geologic map of the Perris 7.5' quadrangle, Riverside County, California. U.S. Geological Survey, Open-File Report OF-2003-270, scale 1:24,000
- Morton, D.M., Bovard, K.R., and Morton, G. 2003. Geologic map and digital database of the Romoland 7.5' quadrangle, Riverside County, California. U.S. Geological Survey, Open-File Report OF-2003-102, scale 1:24,000
- Norris, Robert M., and Robert W. Webb. 1990. *Geology of California*. John Wiley & Sons, New York.
- Reynolds, R. E., and R. L. Reynolds (1991). The Pleistocene beneath our feet: Near-surface Pleistocene fossils in inland Southern California basins. *San Bernardino County Museum Association Quarterly* 39(3): 41-43.
- Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee.
- Soil Survey Staff. 2003. Natural Resources Conservation Service, United States Department of Agriculture. Official Soil Series Descriptions, <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>.
- Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray. 2009. The Diamond Valley Lake local fauna: Late Pleistocene vertebrates from inland southern California. In Albright, L.B. III (ed.) Papers on Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne. *Museum of Northern Arizona Bulletin* 65: 217-3
- Woodford, A.O., J.S. Shelton, D.O. Doering, and R.K. Morton. 1971. Pliocene-Pleistocene history of the Perris Block, Southern California. *Geological Society of American Bulletin* 82: 3421-3448.