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July 2, 2021

Mr. Peter Kulmaticki
JD Pierce Company, Inc.
2222 Martin Street, Suite 100
Irvine, CA 92612
Transmitted via email to pkulmaticki@jdpierceco.com

RE: Paleontological Technical Memorandum for the Tentative Tract Map Number 38107 Project, City of San Jacinto, Riverside County, California

Dear Mr. Kulmaticki,

At the request of JD Pierce Company, Inc., Applied EarthWorks, Inc. (Æ) completed a paleontological resource assessment for the Tentative Tract Map Number 38107 Project in the City of San Jacinto, Riverside County, California (Project). The Project is a proposed residential development in the western portion of the city.

Æ's scope of work included desktop review of geologic maps, paleontological literature, museum records searches, and preparation of this technical memorandum (memo). This memo, which serves as a summary of findings, was written by staff who meet mitigation paleontology industrywide standards (Murphey et al., 2019), as well as qualifications standards of the Society of Vertebrate Paleontology (2010) and satisfy the requirements of the California Environmental Quality Act (CEQA). The City of San Jacinto (City) is the lead agency for CEQA compliance.

PROJECT DESCRIPTION AND BACKGROUND

The Project includes the development of 215 residential units, 3 open-space areas, and associated infrastructure on approximately 38.15 acres of vacant land on the west side of North Sanderson Avenue, approximately 0.45 miles southwest of the intersection with Ramona Expressway (Project area). Specifically, the Project area is mapped in the northwest quadrant of Section 20 of Township 4 South, Range 1 West, as shown on the Lakeview, California 7.5-minute U.S. Geological Survey (USGS) topographic quadrangle map. The maximum depth of proposed ground disturbance is 5.5 feet below ground surface (bgs).

REGULATORY CONTEXT

This Project is subject to both state laws and local goals and policies. The following section provides an overview of the relevant laws and regulations.

State

At the state level, paleontological resources are protected under CEQA, which requires detailed studies that analyze the environmental effects of a proposed project. If a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered. Specifically, Section VII(f) of Appendix G of the CEQA Guidelines, the Environmental Checklist Form, poses the question, “Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” If paleontological resources are identified as being within the proposed project area, the sponsoring agency must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

County of Riverside

There are several policies covering paleontological resources within the County of Riverside’s *General Plan*, *Multipurpose Open Space (OS) Element* (County of Riverside, 2015b:OS-51):

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

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

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

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

City of San Jacinto

The City’s *General Plan, Resource Management (RM) Element* also includes goals, policies, and implementation program that pertain to paleontological resources (City of San Jacinto, 2006:RM-9 and Appendix RM-5 and RM-6). Those within the cultural resources section of the document that are relevant to paleontological resources include:

- **Resource Management Goal 4:** Promote cultural awareness through the preservation of the City’s historical, archaeological, and paleontological resources.

- **RM-16 California Environmental Quality Act, Cultural Resources**

Continue to assess development proposals for potential impacts to sensitive historic, archaeological, and paleontological resources pursuant to the California Environmental Quality Act (CEQA).

c. The City shall require an assessment of the potential for development proposals to significantly impact paleontological resources pursuant to the California Environmental Quality Act Guidelines. If the project involves earthworks, the City may require a study conducted by a professional paleontologist to determine if paleontological assets are present, and if the project will significantly impact the resources. If significant impacts are identified, the City may require the project to be modified to avoid impacting the paleontological materials, require monitoring of rock units with high potential to contain significant nonrenewable paleontologic [sic] resources, or require mitigation measures to mitigate the impacts, such as recovering the paleontological resources for preservation.

PALEONTOLOGICAL RESOURCE POTENTIAL

Most professional paleontologists in California adhere to the guidelines set forth by the Society of Vertebrate Paleontology (2010) and industry-wide standards (Murphey et al., 2019) to determine the course of paleontological mitigation for a given project unless specific city, county, state, or federal guidelines are available. The County has developed its own guidelines that establish detailed protocols for the assessment of the paleontological sensitivity of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development (County of Riverside, 2015a).

Following the County's established process, baseline information is used to assign the paleontological sensitivity of a geologic unit(s) (or members thereof) to one of four categories—Low, Undetermined, High A (Ha), and High B (Hb) potential (County of Riverside, 2015a). Geologic units are considered to have a Low paleontological resource potential if they are unlikely to preserve fossils (e.g., very young sedimentary deposits, plutonic rocks, medium-grade or higher metamorphic rocks) or have been demonstrated to have Low potential from previous surveys and assessments. Geologic units with Undetermined paleontological resource potential are those with little to no information in the literature or have not been previously assessed. Geologic units are considered to be "sensitive" for paleontological resources and have a High paleontological resource potential if they are known to include significant fossils anywhere in their extent, even if outside the Project area. Significant fossils are defined by the Society of Vertebrate Paleontology (2010) as those that contribute new and useful taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. The County's High A (Ha) sensitivity is based on the occurrence of fossils that may be present at the ground surface of the Project area, while High B (Hb) sensitivity is based on the occurrence of fossils at or below 4 feet of depth, which may be impacted during construction activities (County of Riverside, 2015a). A coarse-grained paleontological sensitivity map of Riverside County indicates the sensitivity rankings across the ground surface based on the County's established process (County of Riverside, 2015b:Figure OS-8, OS-55).

METHODOLOGY

To assess the paleontological sensitivity of geologic units exposed at the ground surface and those likely to occur in the subsurface of the Project area, Æ reviewed published geologic maps and paleontological literature, and conducted museum records searches. For the records searches, Æ retained the Natural

History Museum of Los Angeles County (NHMLAC) and the Western Science Center of Hemet (WSC) to conduct a search of fossil localities recorded in their collections (Bell, 2021; Radford, 2021).

To augment these results, Æ also conducted searches of the online Paleobiology Database (PBDB) and the University of California Museum of Paleontology (UCMP). The PBDB lists a large collection of museum records and publications of fossil material, while the UCMP is the largest repository of fossils on the West Coast of the United States with an older history of collection than several other regional natural history museums.

RESOURCE CONTEXT

The Project area is in the San Jacinto Valley within the northern part of the geologically complex Peninsular Ranges geomorphic province. A geomorphic province is a region of unique topography and geology that is distinguished from other regions based on its landforms and tectonic history (American Geological Institute, 1976). Derived from the same massive batholith (i.e., very deep igneous intrusion) as the core of the Sierra Nevada Mountains, the Peninsular Ranges are a series of mountain ranges separated by northwest-trending valleys formed from faults branching from the San Andreas Fault (Norris and Webb, 1976; California Geological Survey, 2002). The mountain ranges are bounded to the east by the Colorado Desert and range in width from 30 to 100 miles (Norris and Webb, 1976). The Project area is located within the San Jacinto Fault Zone, with the Casa Loma Fault approximately 1 mile to the west (Morton et al., 2006b; Morton et al., 2006a).

The basement rocks in this region are part of a large assemblage known as the Peninsular Ranges Assemblage. The assemblage includes plutonic rocks of the Mesozoic-age Peninsular Ranges batholith, as well as pre-batholithic metasedimentary and metavolcanic rocks (Jahns, 1954; Morton et al., 2006b; Morton et al., 2006a). Thick sequences of Cenozoic sediments, mostly Quaternary in age, have accumulated above these in the valleys of the region.

The surficial geology of the Project area is mapped entirely as late Pleistocene- and Holocene-age young alluvial-valley deposits (Qyv) (Morton et al., 2006b; Morton et al., 2006a). This unit is commonly present along valley floors in the region, and the deposits east and west of the Casa Loma Fault are mostly sandy in composition (arenaceous).

Although the youngest middle and late Holocene-age deposits of Unit Qyv are typically too young for fossilization (Scott and Springer, 2003; Society of Vertebrate Paleontology, 2010), they may form only thin layers above older alluvial deposits where present. Similar older deposits have proven to be highly fossiliferous elsewhere in inland valleys of Riverside and San Bernardino counties (Reynolds and Reynolds, 1991) and have yielded a wide variety of Pleistocene megafauna, such as mammoths, ground sloths, dire wolves, saber-toothed cats, horses, camels, and bison, as well as numerous invertebrate and plant taxa (Scott, 2007; Springer et al., 2009).

RECORDS SEARCH RESULTS

Bell (2021) reports no fossil localities from the NHMLAC collections within the Project area. However, she lists a few nearby localities from Pleistocene-age alluvial deposits similar to those mapped either at the surface or likely at depth in the Project area. The closest locality is LACM IP 437, southeast of the Project area on the west side of Castile Canyon, north of the Soboba Indian Reservation, which yielded a specimen of a protoorthopteran (cricket relative) insect (*Sobobapteron kirkbaye*) and a terebratulid (lamp shell) brachiopod (*Terebratalia hemphili*). The next closest is LACM VP 7261 at Skinner Reservoir in Auld Valley to the southwest of the Project area, which yielded a specimen of the elephant order (Proboscidea) and an ungulate (Ungulata). Locality VP 6059 is slightly farther southwest in the overflow area just east-southeast of Lake Elsinore and yielded a specimen of camel (Camelidae). Localities VP 6967 and 7456 are still farther to the south-southwest near Highway 79 and Cushman Court in Pauba Valley near Temecula, and yielded specimens of tree frog (*Hyla*), legless lizard (*Anniella*), garter snake (*Thamnophis*), pocket gopher (*Thomomys*), deer mouse (*Peromyscus*), and various snails (Gastropoda). Bell (2021) does not suggest an age of the alluvium, but the fossils also likely date to the Pleistocene Epoch. The farthest locality is LACM VP 1207, approximately 30 miles northwest of the Project area, on the east side of a sewage disposal plant near the City of Corona. This locality yielded a specimen of bovid (Bovidae). Records search results from NHMLAC and other institutions are detailed in Table 1.

Table 1
Fossil Localities Reported Near the Project Area

Locality No.	Geologic Unit (Date)	Taxa	Depth	Approximate Distance from Project Area
WSC[1] – Eastside Pipeline of Diamond Valley Lake Project, hundreds of localities	Alluvial deposits (Pleistocene)	*Camelops* (camel) *Equus* (horse) Numerous other megafauna and microfauna	Unknown	2 miles
LACM[2] IP 437	Unknown formation (Pleistocene)	*Sobobapteron kirkbaye* (protoorthopteran insect) *Terebratalia hemphili* (terebratulid brachiopod)	Unknown	4–5 miles
PBDB[3] – Lakeview localities	Alluvial deposits (Pleistocene)	*Mammuthus* (mammoth) *Smilodon* (saber-toothed cat) *Equus* (horse) *Bison* sp. cf. *B. antiquus* (bison) Numerous other vertebrates, invertebrates, and plants	Unknown	6–7 miles
LACM[2] VP 7261	Unknown formation, arenaceous silt (Pleistocene)	Proboscidea (elephant order); Ungulate, unspecified	Unknown	15 miles
LACM[2] VP 6059	Unknown formation (Pleistocene)	Camelidae (camel)	Unknown	> 15 miles
LACM[2] VP 6967, 7456	Alluvium pebble – gravel, sand, silt, and clay (likely Pleistocene)	*Hyla* (tree frog) *Anniella* (legless lizard) *Thamnophis* (garter snake) *Thomomys* (pocket gopher) *Peromyscus* (deer mouse) Gastropoda (snails)	Unknown, but collected from subsurface during augering	> 15 miles

Table 1
Fossil Localities Reported Near the Project Area

Locality No.	Geologic Unit (Date)	Taxa	Depth	Approximate Distance from Project Area
LACM[2] VP 1207	Unknown formation (Pleistocene)	Bovidae (bovid)	Unknown	> 25 miles
UCMP[4] – Lake Elsinore localities	Alluvial deposits (Pleistocene)	*Pinus* (pine) *Salix* (willow) *Acer* (maple) *Eriogonum* (buckwheat) *Ambrosia* (ragweed) Numerous other plants	Unknown	> 25 miles

Sources: [1]Radford (2021) [2]Bell (2021) [3]PBDB, [4]UCMP

Radford (2021) also reports no fossil localities from the WSC collections within the Project area. However, she notes there are hundreds of localities from Pleistocene alluvial deposits similar to those mapped in the Project area reported from the Eastside Pipeline portion of the Diamond Valley Lake Project as close as 2 miles to the south of the Project area. These localities yielded numerous specimens of megafauna, including camel (*Camelops*) and horse (*Equus*), as well as many microfauna specimens.

The PBDB online database does not list any fossil localities from Pleistocene and Holocene alluvial deposits within the Project area, but lists numerous localities within a 10-mile-long radius. Several are reported near the community of Lakeview, approximately 6 to 7 miles west-northwest of the Project area, which are documented in Reynolds and Reynolds (1991). These localities yielded mammoth (*Mammuthus*), saber-toothed cat (*Smilodon*), horse (*Equus*), bison (*Bison* sp. cf. *B. antiquus*), and numerous small mammals, reptiles, invertebrates, and plants. The PBDB also lists the NHMLAC's LACM IP 437 locality and the extensive Diamond Valley Lake localities reported by the WSC, the latter of which are documented in Springer et al. (2009).

The UCMP's (2020) online database does not list any fossil localities from Pleistocene and Holocene alluvial deposits within the Project area or within a 10-mile-long radius. The nearest localities are from Holocene alluvial deposits over 25 miles southwest of the Project area near Lake Elsinore. These localities yielded over 450 pollen and seed specimens representing dozens of gymnosperm and angiosperm taxa including pine (*Pinus*), willow (*Salix*), maple (*Acer*), buckwheat (*Eriogonum*), ragweed (*Ambrosia*), and many others.

FINDINGS AND RECOMMENDATIONS

According to the County's paleontological sensitivity map, the Project area is mapped in an area with High B (Hb) sensitivity (County of Riverside, 2015b:Figure OS-8, OS-55). Æ's review of geologic maps, paleontological literature, and the records search results support this ranking. Unit Qyv ranges from late Pleistocene to Holocene age. The youngest surficial deposits are likely too young to form fossils, while older deposits at depths of 4 feet or greater bgs may potentially preserve them. Therefore, Æ recommends construction monitoring of ground-disturbing activities in the Project area, particularly because the maximum proposed depth of ground disturbance will exceed 4 feet bgs (i.e., 5.5 feet bgs).

For construction monitoring, Æ recommends a paleontological resource impact mitigation program (PRIMP) be prepared by a qualified professional paleontologist (Project Paleontologist) who meets industrywide standards (Murphey et al., 2019) and the Society of Vertebrate Paleontology (2010). The latter qualification standards are recommended because of the preponderance of local and regional evidence for vertebrate fossils to be encountered within the Project area. The PRIMP must be completed prior to issuance of grading permits. The purpose of the document is to establish mitigation monitoring procedures and discovery protocols, based on industrywide best practices (Murphey et al., 2019), for any paleontological resources that may be encountered as a result of earth-disturbing activities during construction of the Project. For instance, Worker's Environmental Awareness Program (WEAP) training should be prepared prior to the start of Project-related ground disturbance and presented in person to all field personnel to describe the types of fossils that may occur and the procedures to follow if any are encountered in the Project area. A PRIMP also will indicate where construction monitoring will be required for the Project and the frequency of required monitoring (i.e., full-time, spot checks, etc.). The collection and processing (e.g., wet- or dry-screening) of sediment samples to analyze for presence/absence of microvertebrates and other small fossils also would be addressed in a PRIMP. In addition to monitoring and sampling procedures, a PRIMP also will provide details about fossil collection, analysis, and preparation for permanent curation at an approved repository, such as the WSC. Lastly, the PRIMP describes the different reporting standards to be used for monitoring with negative findings versus monitoring resulting in fossil discoveries.

It has been a pleasure assisting you with this Project. If you have any questions, please do not hesitate to contact me at (626) 578-0119 x403.

Sincerely,

Chris Shi
Senior Paleontologist
Applied EarthWorks, Inc.

Edited and Approved By:

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REFERENCES CITED

American Geological Institute. 1976. Dictionary of Geological Terms. Anchor Press, Garden City, New York, 472 pp.

Bell, A. 2021. Paleontological resources for the TTM 30973 San Jacinto Project (#4292). Research and Collections, Natural History Museum of Los Angeles County, Los Angeles, California.

California Geological Survey. 2002. California Geomorphic Provinces. California Department of Conservation, California Geological Survey Note 36.

City of San Jacinto. 2006. San Jacinto General Plan.

County of Riverside. 2015a. Cultural and Paleontological Resources, Environmental Impact Report No. 521 for the General Plan, Public Review Draft. Riverside, California.

County of Riverside. 2015b. Multipurpose Open Space Element General Plan Revised, December 8, 2015. County of Riverside, Riverside, California.

Jahns, R. H. 1954. Geology of the Peninsular Range Province, Southern California and Baja California. California Division of Mines Bulletin 170:9–52.

Morton, D. M., F. K. Miller, P. M. Cossette, and K. R. Bovard. 2006a. Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, Geology and description of map units, version 1.0. 1:100,000. U.S. Geological Survey Open File Report OF-2006-1217.

Morton, D. M., F. K. Miller, P. M. Cossette, and K. R. Bovard. 2006b. Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California. 1:100,000. U.S. Geological Survey Open-File Report 2006-1217.

Murphey, P. C., G. E. Knauss, L. H. Fisk, T. A. Deméré, and R. E. Reynolds. 2019. Best practices in mitigation paleontology. Proceedings of the San Diego Society of Natural History No. 47, 43 pp.

Norris, R. M., and R. W. Webb. 1976. Geology of California. Wiley and Sons, Santa Barbara, California.

Radford, D. 2021. Paleontological Resources for the Proposed TTM 30943, AE Project #4292. Western Science Center, Hemet, California. Letter report submitted to Applied EarthWorks, Inc., Pasadena, California.

Reynolds, R. E., and R. L. Reynolds. 1991. The Pleistocene Benearth Our Feet: Near-surface Pleistocene Fossils in Inland Southern California Basins; pp. 41–43 in M. O. Woodburne and R. E. Reynolds (eds.), Inland Southern California: the Last 70 Million Years. San Bernardino County Museum Association, Redlands, California.

Scott, E. 2007. Paleontology review, Yucaipa Freeway Corridor Specific Plan, Calimesa and Yucaipa, San Bernardino County, California. San Bernardino County Museum, Redlands, California. Submitted April 30, 2007 to P&D Consultants.

Scott, E., and K. Springer. 2003. CEQA and Fossil Preservation in California. The Environmental Monitor Fall 2003.

Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee. Available at https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf. Accessed April 1, 2021. 11 pp.

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; pp. 217–235 in L. B. Albright, III (ed.) Papers on Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin 65, Flagstaff.