PALEONTOLOGICAL RESOURCE ASSESSMENT
SHADOW RUN RANCH
PAUMA VALLEY
SAN DIEGO COUNTY, CALIFORNIA

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TECHNICAL REPORT
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INTRODUCTION

Shadow Run Ranch LLC proposes to develop an irregularly-shaped 248-acre parcel within unincorporated San Diego County, California. The parcel is located within the Pala/Pauma Subregional Plan on the north side of Pala Road west of Adams Drive (Figure 1). It is situated approximately two miles northwest of the intersection of SR 76 and Cole Grade Road, between the Pala Reservation on the west and the Pauma Reservation on the east. SR 76 forms the southern boundary of the property, and Cleveland National Forest forms the northern boundary (County of San Diego, 2002).

This updated technical report provides an assessment of paleontological resources within the project footprint. The purpose of this report is to assist TRS Consultants with the preparation of the paleontological resources section of the environmental impact report for the Shadow Run Ranch Property. Specifically, the report is intended to summarize existing paleontological resource data in the project area and vicinity; assess potential impacts to paleontological resources from implementation of the project; and identify mitigation measures to avoid or reduce project-related impacts wherever feasible. Additional discussion of report methodology is provided below. The original report was prepared by Paul C. Murphey and Ian D. Browne and updates to the report were provided by Thomas A. Deméré, all former and current staff members of the Department of PaleoServices at the San Diego Natural History Museum, San Diego, California.

As defined here, paleontological resources (i.e., fossils) are the remains and/or traces of prehistoric plant and animal life exclusive of humans. Fossil remains such as bones, teeth, shells, leaves, and wood are found in the geologic deposits (rock formations) within which they were originally buried. For the purposes of this report, paleontological resources can be thought of as including not only the actual fossil remains but also the collecting localities and the geologic formations containing those localities.

METHODOLOGY

A review was conducted of relevant published geologic reports (Kennedy, 2000), unpublished paleontological reports (Deméré and Walsh, 1993), and museum paleontological site records (San Diego Natural History Museum-SDNHM; Natural History Museum of Los Angeles County-LACM). This approach was followed in recognition of the direct relationship between paleontological resources and the geologic

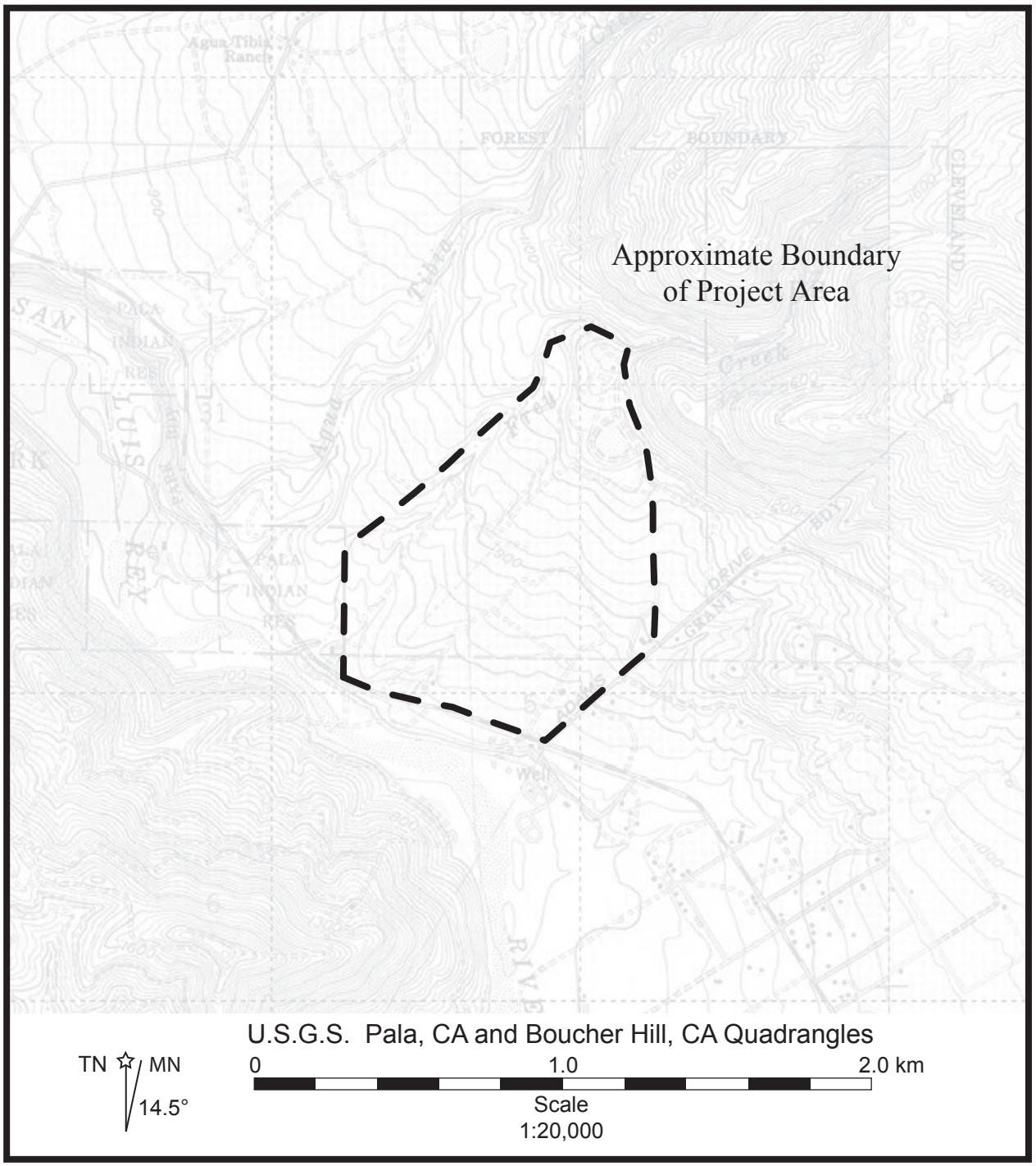

Figure 1. Index map showing location of the Shadow Ranch Property in San Diego County, CA.

formations within which they are entombed. Knowing the geology of a particular area and the fossil productivity of particular formations that occur in that area, it is possible to predict where fossils will, or will not, be encountered.

A field survey of potentially fossiliferous portions of the project site was conducted to field check the results of the literature and record surveys and to determine the paleontological sensitivity of the geologic units that will be affected by the planned improvements. This field work involved inspection of the site for bedrock outcrops and exposures of potentially fossiliferous surficial deposits, geologic contacts, and the presence or absence of paleontological resources (i.e., fossils). The field survey was conducted on April 5 2005, by Department of PaleoServices paleontologists Paul C. Murphey and Ian D. Browne.

EXISTING CONDITIONS

PHYSICAL GEOLOGICAL SETTING

As mapped by Kennedy (2000), the project area contains three geologic units: younger alluvial fan deposits, older alluvial fan deposits, and active alluvial flood plain deposits. The geology of these units is summarized below.

Older Quaternary Alluvial Fan Deposits

Older Quaternary alluvial fan deposits within the project area are reported to be younger than 500,000 years in age (Pleistocene), are moderately consolidated, and slightly to moderately well dissected (Kennedy, 2000). They have upper surfaces that are capped by moderately to well-developed soils. They include fan, debris flow, and talus deposits, with clasts which are highly weathered in a typically reddish-brown matrix. Lithologically, older alluvial fans are composed of unconsolidated boulders, cobbles, gravel, sand, silt and clay.

Younger Quaternary Alluvial Fan Deposits

Younger Quaternary alluvial fan sediments within the project area are Holocene and/or late Pleistocene in age, are slightly consolidated to cemented, and are slightly to moderately dissected (Kennedy, 2000). They typically have high coarse:fine clast ratios, and have upper surfaces that are capped by slight to moderately developed soil profiles. Lithologically, they are composed of unconsolidated boulders, cobbles, gravel, sand, silt and clay.

Active Channel and Wash Deposits

Active channel and wash deposits within the project area are late Holocene in age, and consist of unconsolidated to locally poorly consolidated sand and gravel deposited in active stream channels (Kennedy, 2000).

PALEONTOLOGICAL RESOURCE ASSESSMENT

SENSITIVITY

Impacts to paleontological resources are typically rated from high to zero depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

High Sensitivity

High sensitivity is assigned to geologic formations known to contain paleontological localities with rare, well-preserved, critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleobiology and evolutionary history (phylogeny) of animal and plant groups. Generally speaking, highly sensitive formations produce vertebrate fossil remains or are considered to have the potential to produce such remains. The Shadow Run Ranch property contains no high sensitivity geologic units.

Moderate Sensitivity

Moderate sensitivity is assigned to geologic formations known to contain paleontological localities with poorly preserved, common elsewhere, or stratigraphically unimportant fossil material. The moderate sensitivity category is also applied to geologic formations that are judged to have a strong, but unproven potential for producing important fossil remains. Moderately sensitive geologic units within the Shadow Run Ranch property include older and younger alluvial fan deposits. Note that younger alluvial fans that are less than 10,000 years old are not considered paleontologically sensitive because the animal and plant remains they contain are not old enough to be considered fossils. Because Kennedy (2000) reported that the younger fan deposits in the study area are late Pleistocene and Holocene, they may produce significant fossils, and are thus assigned moderate sensitivity.

Low Sensitivity

Low sensitivity is assigned to geologic formations that, based on their relatively youthful age and/or high-energy depositional history, are judged unlikely to produce important fossil remains. Typically, low sensitivity formations produce poorly-preserved invertebrate fossil remains in low abundance. The active channel and wash deposits within the Shadow Run Ranch property have low paleontological sensitivity because they are late Holocene in age and are thus too young to contain fossils.

Zero Sensitivity

Zero sensitivity is assigned to geologic formations that are entirely igneous in origin, and therefore have no potential for producing fossil remains. Artificial fill materials are also placed in this category. As mapped by Kennedy (2000), the Shadow Run Ranch property contains no zero sensitivity geologic units.

SITE SPECIFIC RESOURCE ASSESSMENT

Only one previously recorded fossil locality was found during the museum record search conducted for the Shadow Run Ranch property. This locality, LACM (CIT) 599, produced a single tooth of a fossil horse (*Equus* sp.). Unfortunately, the locality is described only as being "from Pala," so its exact whereabouts are unknown (McLeod, 2005). In general, Pleistocene-aged alluvial deposits are known to contain scientifically significant fossils of varying abundance, taxonomic diversity, and scientific significance. These fossils include extinct "Ice-Age" mammals including mammoth, mastodon, ground sloth, dire wolf, short-faced bear, saber-toothed cat, large and small horses, antelope, large and small camels, and bison (Scott, 2004; Pajak et al., 1996; Eisentraut and Cooper, 2002). Fossil invertebrates and plant remains have also been recovered from alluvial units.

Older and Younger Alluvial Fan Deposits

Introduction. Ellis and Lee (1919) mapped uplifted alluvial fan deposits (fanglomerates) in the Pala area, referring to them as the "Pala Conglomerate." They noted the extremely coarse-grained, bouldery nature of these deposits and related them to an older period of alluvial fan deposition. The old fan surface (Agua Tibia Fan) is as much as 150 feet (elevation 1000 feet) higher than the level of the present day San Luis Rey River. To the east, near Sycamore Canyon, exposures of fanglomerates occur up to elevations of 2,500 feet. Here the fanglomerates consist of a sequence of alternating reddish clayey sandstones (paleosols), coarse-grained conglomeratic sandstones, and poorly sorted cobble and boulder conglomerates (Figure 2). Elevations of fanglomerates in the Pala and Pauma valley areas suggest that deposition occurred at a time when stream-base-level was considerably higher than at present. Tectonic activity on the adjacent Elsinore Fault zone has probably been responsible for this impressive uplift. The age of these deposits is presently unknown. Jahns (1954) suggested a late Pleistocene (10-700 Ka) age for the "Pala Conglomerate" and the related Agua Tibia Fan. Kennedy (2000) did not use the term "Pala Conglomerate" in his geologic map of the Pala 7.5' quadrangle, but presumably it is equivalent to deposits he mapped as older alluvial fans, and which he considers to be younger than 500,000 years (middle to late Pleistocene). The younger alluvial fan deposits mapped by Kennedy (2000) are considered to be late Pleistocene and Holocene in age.

Figure 2. Top and Bottom. Exposures of the "Pala" Conglomerate (Older Alluvial Fan of Kennedy, 2000) adjacent to Frey Creek, San Diego County, California.

Paleontology. Jahns (1954) reported the occurrence of scattered vertebrate remains of late Pleistocene age in the "Pala Conglomerate" deposits. Unfortunately, he did not indicate the nature of these remains or in what university or museum collections the fossils were deposited. Subsequent field work has failed to turn up any new fossil discoveries in these deposits, although the fossil horse tooth in the collections of the LACM may have originated in an older alluvial fan deposit. The reasons for poor fossil recovery are primarily related to poor bedrock exposures and insufficient prospecting. It is felt that increased attention to these older alluvial deposits and/or new exposures created by excavation projects will turn up additional fossil material (Deméré and Walsh, 1993). As discussed above, younger alluvial fan sediments that are at least 10,000 years old have the potential to contain fossils.

Site Specific Assessment. From Frey Creek southeast to Adams Drive, the entire Shadow Run Ranch property is underlain by older and younger alluvial fan deposits, which are locally incised by active channel and wash deposits. With the exception of localized exposures within creek drainages and outcrops in steeper areas near the bases of the foothills towards the northeast border of the property, the alluvial fan deposits are not exposed. This is due to the nature of the topography and coverage by orange and avocado orchards. Older alluvial fan sediments are well exposed at several locations in the northeast portion of the property. Typical lithologies include coarse cobble to boulder conglomerate with sub-angular to sub-rounded granitic clasts in a reddish-brown matrix. Some clasts weather to rusty brown. In general, clast sizes within these deposits decrease in size away from the foothills, towards the escarpment above the San Luis Rey River, but even the most distal fan deposits contain cobbles and boulders in a matrix-supported conglomerate. No fossils were observed within the Shadow Run Ranch property during the field survey.

Active Channel and Wash Deposits

Introduction. Channel and wash deposits consisting primarily of gravel and sand are actively accumulating within the Frey Creek drainage (Kennedy, 2000) and other smaller unnamed drainages within and nearby the Shadow Run Ranch property. These sediments were derived from the erosion of bedrock on adjacent mountains and the re-working of older alluvial and colluvial deposits. Geologically, these are the youngest sediments on the Shadow Run Ranch property.

Paleontology. Although they may contain the unfossilized remains of animals and plants, active channel and wash deposits are unlikely to contain fossils unless they were re-worked from older fossiliferous surficial deposits or bedrock. This is because of their very young (late Holocene) age.

Site Specific Assessment. Channel and wash deposits are present within Frey Creek. The northeast to southwest trending unnamed drainage running through the center of the property has been partially channelized, and this drainage is no longer actively accumulating sediments.

IMPACT ANALYSIS

INTRODUCTION

Direct impacts to paleontological resources occur when earthwork activities, such as mass grading operations, cut into the geological deposits (formations) within which fossils are buried. These direct impacts are in the form of physical destruction of fossil remains. Since fossils are the remains of prehistoric animal and plant life they are considered to be nonrenewable. Such impacts can be significant and, under CEQA guidelines, require mitigation.

Impacts to paleontological resources are rated in this report from high to zero depending upon the resource sensitivity of impacted formations. The specific criteria applied for each sensitivity category are summarized below.

High significance

Impacts to high sensitivity formations (none on Shadow Run Ranch property).

Moderate significance

Impacts to moderate sensitivity formations (older and younger alluvial fan deposits that are at least 10,000 years old).

Low significance

Impacts to low sensitivity formations (active channel and wash deposits).

Zero significance

Impacts to zero sensitivity formations (none mapped on Shadow Run Ranch property).

SITE SPECIFIC IMPACTS

The project proponent proposes to develop 47 residential lots and 1 open space lot. Potential impacts to scientifically significant paleontological resources will be in the form of destruction of buried fossil remains during mass grading for residential construction including associated infrastructure and access roads. The sloping topography of the Shadow Run Ranch property will necessitate the removal of significant amounts of alluvial fan material, which occurs just below the ground surface throughout most of the project site. Grading activities are unlikely to adversely impact paleontological resources within low sensitivity active channel and wash deposits.

MITIGATION MEASURES

Due to the nature of the proposed construction, topography of the Shadow Run Ranch property, and presence of moderately sensitive alluvial fan deposits just beneath the ground surface, construction excavations have the potential to produce significant direct impacts on paleontological resources throughout the project site. It is recommended that the following mitigation measures be implemented in order to reduce project impacts to an insignificant level**.**

1. A qualified paleontologist should be at the pre-construction meeting to consult with the grading and excavation contractors concerning excavation schedules, paleontological field techniques, and safety issues. (A qualified paleontologist is defined as an individual with a MS or Ph.D. in paleontology or geology who is familiar with paleontological procedures and techniques, who is knowledgeable in the geology and paleontology of San Diego County, and who has worked as a paleontological mitigation project supervisor in the county for at least one year.)

2. A paleontological monitor should be on-site on a full-time basis during the original cutting of previously undisturbed deposits of moderate paleontological resource potential (alluvial fan deposits) to inspect exposures for contained fossils. (A paleontological monitor is defined as an individual who has experience in the collection and salvage of fossil materials. The paleontological monitor should work under the direction of a qualified paleontologist). As grading progresses, the qualified paleontologist and paleontological monitor should have the authority to reduce the monitoring program to an appropriate level if it is determined that the potential for impacts to paleontological resources is lower than anticipated.

3. When fossils are discovered, the paleontologist (or paleontological monitor) should recover them. In most cases this fossil salvage can be completed in a short period of time. However, some fossil specimens (such as a complete large mammal skeleton) may require an extended salvage period. In these instances the paleontologist (or paleontological monitor) should be allowed to temporarily direct, divert, or halt grading to allow recovery of fossil remains in a timely manner. Because of the potential for the recovering of small fossil remains, such as isolated mammal teeth, it may be necessary to set up a screen-washing operation on the site.

4. Fossil remains collected during monitoring and salvage should be cleaned, repaired, sorted, and cataloged as part of the mitigation program.

5. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, should be deposited (as a donation) in a scientific institution with permanent paleontological collections such as the San Diego Natural History Museum. Donation of the fossils should be accompanied by financial support for preparation, curation and initial specimen storage.

6. A final summary report should be completed that outlines the results of the mitigation program. This report should include discussions of the methods used, stratigraphic section(s) exposed, fossils collected, and significance of recovered fossils.

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