Appendix H – Evaluation of Paleontological Impacts

Evaluation of Paleontological Impacts for the Spieker Senior Continuing Care Community, Seven Hills Ranch Road Walnut Creek, California.

Prepared for Spieker
Senior Development Partners

By

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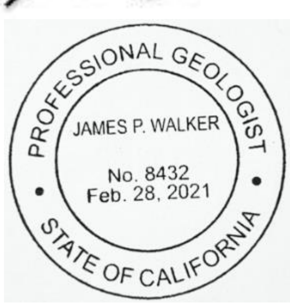
April 29, 2020



Overview

This report is an evaluation of the potential impact to paleontological resources (fossils) and the probable mitigation measures necessary to meet California Environmental Quality Act (CEQA) requirements. This report is designed to conform to the standards of the Society of Vertebrate Paleontology (SVP) *Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources* (2010).

Project Description

The site is located within unincorporated county land adjacent to the City of Walnut Creek, between Treat Boulevard and Ygnacio Valley Boulevard. Preliminary development plans show a 30.8-acre site to be developed into a senior living facility (Plate 1). It is understood that the project may require excavation and cuts up to 25-feet in depth.

Location Description

The site is located at the northern termination of Shell Ridge and is adjacent to the concrete lined channel of Walnut Creek. Shell Ridge is the most prominent in a set of ridges composed of Eocene to Pliocene age sandstone units. Shell Ridge itself is held up by a highly resistant beds composed of Coquina (a bed composed primarily of fossilized shells). On the flanks of Shell Ridge are alluvial deposits.

Methods and Assessment Criteria

This report is based on the review of geologic maps and reports for the area, a review of online paleontological databases and the authors field work in the area. The criteria used to determine the potential impacts to paleontological resources is based on criteria proposed by the SVP (2010).

Under SVP (2010) criteria, a stratigraphic unit (such as a formation, member, or bed) known to contain significant fossils is considered to have a high potential to yield additional significant fossils. These paleontological resources could be adversely impacted by earth-moving or ground- disturbing activities. The resource could be disturbed or destroyed. Stratigraphic units are described as having (a) high, (b) undetermined, (c) low, or (d) no potential for containing significant paleontological resources and 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. Rocks 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), and some low-grade metamorphic rocks *which 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, etc.). Paleontological potential consists of both (a) 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 (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which 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.*

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 if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist (see "definitions" section in this document) to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

Low Potential
Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have 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 only preserve fossils in rare circumstances and 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, for instance 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 nor impact mitigation measures relative to paleontological resources.

Geologic Setting

Mapping

The site is, as noted above, at the northern termination of Shell Ridge and because it is along strike has the same facies as found to the south along the more prominent topography of Shell Ridge proper. A review of geologic maps of the area show the following units in the project footprint (Plate 1). Graymer et al. (1994) show the formations of the Miocene age San Pablo Group composed of the Cierbo "sand and gravel member" and Cierbo Sandstone. Graymer et al (1994) are somewhat unclear in their definition of the Cierbo "sand and gravel member" as to whether it is a considered a member of the Cierbo Sandstone or a separate formation. The Cierbo "sand and gravel" was originally mapped as the Hambre Sandstone and the Rodeo Shale by Lawson (1914). Wentworth (1997) mapped the Cierbo Sandstone as Undifferentiated San Pablo Group and the Cierbo "sand and gravel" as the Sobrante Sandstone. This report will use the naming conventions of Graymer et al. (1994).

The age of the Cierbo Sandstone is constrained by a tuffaceous layer with a correlated K/Ar date of 14.5 Ma (Graymer et. al, 1994) near its base. At Shell Ridge the Cierbo Sandstone contains an 11.4 Ma tuff near its top (Sarna and Walker 1999).

The Cierbo "sand and gravel" is composed of medium to fine grained feldspathic sand containing lithics fragments and micas, giving a salt and pepper appearance. A basal conglomerate bed can be traced for several kilometers. Coquina (beds composed primarily of shells have been mapped in the unit, some appear to extend for over a kilometer along strike. Based on fossil evidence water depth was just below fair-weather wave base (Walker et al, 1996)

The Cierbo Sandstone is composed of medium grained feldspatholithic sands with several lenses of Coquina at different stratigraphic levels, the Coquinas tend to contain Striostea burgoise, pelyciopods, pectins, and astrodapsis. The faunal assemblages suggest near shore environments just below fair-weather wave base (Walker, 2004).

On the flanks of Shell Ridge are a series of Quaternary units (Plate 1). The Holocene age units associated with the now channelized Walnut Creek are too young to be of concern in this study. However, the Quaternary units adjacent to the ridge are of Pleistocene age (Graymer, 1994, Wentworth, 1997). These Pleistocene age alluvial units in California often contain Ice Age mammal remains.

Database Review

A number of different unit names have been applied to geologic units in the area but the contacts and location of the units is very consistent. This has required that a larger number of different geologic unit names be searched in the paleontological databases than those used in this report.

A review of the UCMP (University of California Museum of Paleontology) and the California Academy of Sciences online data bases (reviewed on April 16, 2020) of vertebrate fossils shows the following. Within the relevant Miocene units 18 vertebrate localities and 6 plant locations were noted in Contra Costa County alone. The most relevant of these finds are two Shell Ridge locations containing elements of a whale skull and pig like animal.

A very large number of Pleistocene vertebrate specimens (9,951) have been taken from 73 localities in Contra Costa County.

Results

Because of the presence of vertebrate fossils in the Miocene Cierbo Sandstone and the Cierbo "sand and gravel" (and its synonyms) they have a high potential for containing significant paleontological resources. The Pleistocene units are assigned a high potential for containing significant paleontological resources, because of the high number of significant finds and locations.

The above results will require mitigation measures under CEQA and SVP guidelines. This project will have a less than significant impact on any potential paleontological resources if the appropriate mitigation measures are employed.

Recommended Mitigation Measures

The presence of units that have a high potential for significant paleontological resources will require mitigation measures. This section describes proposed mitigation measures that could be implemented to reduce potential adverse impacts to significant paleontological resources. For this Project, activities that could adversely impact paleontological resources could include:

- Excavation and earth moving
- Construction of retaining walls.

The proposed mitigation plan will reduce to an insignificant level the impacts on paleontological resources that could result from project construction. The proposed mitigation measures are designed to meet SVP *standard procedures for mitigating adverse construction-related impacts on paleontological resources* (SVP 2010) as stated below.

Prior to construction, a qualified professional paleontologist (as defined by SVP [2010] and Caltrans SER) should be retained to both design a monitoring and mitigation program and implement the program during Project-related excavation and earth disturbance activities. The paleontological resource monitoring and mitigation program should include preconstruction coordination; construction monitoring; emergency discovery procedures; sampling and data recovery, if needed; preparation, identification, and analysis of the significance of fossil specimens salvaged, if any; museum storage of any specimens and data recovered; and reporting. Prior to the start of construction, the paleontologist should conduct a field survey of exposures of sensitive stratigraphic units within the construction footprint that will be disturbed. Earth-moving construction activities should be monitored and inspected for the presence of potentially fossiliferous sediments. Monitoring will not need to be conducted in sediments have been previously disturbed or in areas where exposed sediments will be buried, but not otherwise disturbed. Prior to the start of construction, construction personnel involved with earth-moving activities should be informed that fossils could be discovered during excavating, that these fossils are protected by laws, on the appearance of common fossils, and on proper notification procedures should fossils be discovered. This worker training should be prepared and presented *by a qualified professional paleontologist. Implementation of these mitigation measures will reduce the potentially significant adverse environmental impact of Project-related ground disturbance and earth-moving on paleontological resources to an insignificant level as required by CEQA by allowing for the salvage of fossil remains and associated specimen data and corresponding geologic and geographic site data that otherwise might be lost to earth-moving and to unauthorized fossil collecting.*

The SVP guidelines above are summarized in the table of the suggested mitigation plan below.

Mitigation Measure PALEO-1 Mitigation Plan:

Paleo-1a
Paleontological Monitoring. Construction activities involving excavation or other soil disturbance within the Project area shall be required to retain a qualified Paleontological Monitor as defined by the Society for Vertebrate Paleontology (SVP) (2010) equipped with necessary tools and supplies to monitor all excavation, trenching, or other ground disturbance. Monitoring will entail the visual inspection of excavated or graded areas and trench sidewalls. In the event that a paleontological resource is discovered, the monitor will have the authority to temporarily divert the construction equipment around the find until it is assessed for scientific significance and collected. The Principal Paleontologist will periodically assess monitoring results if no significant fossils have been exposed after fifty percent of excavation, the Principal Paleontologist may determine that full-time monitoring is no longer necessary and part-time monitoring may be recommended.
Paleo-1b
Inadvertent Discovery of Fossils. If fossils are discovered during excavation, Principal Paleontologist or his/her designated representative will make a preliminary taxonomic identification. The Principal Paleontologist will then inspect the discovery, determine whether further action is required, and recommend measures for further evaluation, fossil collection, or protection of the resource in place, as appropriate. Any subsequent work will be completed as quickly as possible to avoid damage to the fossils and delays in construction schedules. At a minimum, the paleontological staff will assign a unique field number to each specimen identified; photograph the specimen and its geographic and stratigraphic context along with a scale near the specimen and its field number clearly visible in close-ups; record the location using a global positioning system (GPS), record the field number and associated specimen data (identification by taxon and element, etc.) and corresponding geologic and geographic site data (location, elevation, etc.) in the field notes and in a daily monitoring report; stabilize and prepare all fossils for identification, and identify to lowest taxonomic level. Upon completion of fieldwork, all significant fossils collected will be prepared to a point ready for curation. Preparation will include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossil specimens will be identified to the lowest taxonomic level, cataloged, analyzed, and delivered to an accredited museum repository for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of the Project proponent. A report to be submitted to the repository museum documenting the results of the paleontological mitigation monitoring efforts associated with the Project will be prepared by the Principal Paleontologist. The report will include a summary of the field and laboratory methods, an overview of the Project area geology and paleontology, a list of taxa recovered, an analysis of fossils recovered and their scientific significance, and recommendations.

A well designed and implemented paleontological monitoring and mitigation plan, can result in the discovery of fossil remains that would not have been exposed without the Project and would not be available for scientific study. The recovery of fossil can help answer important questions regarding the paleontology, geology, tectonics and paleoenvironmental history of the area. With important economic and safety impacts to society.

References:

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California Academy of Sciences: Accessed 4/16/20 http://researcharchive.calacademy.org/research/izg/fossil/index.asp

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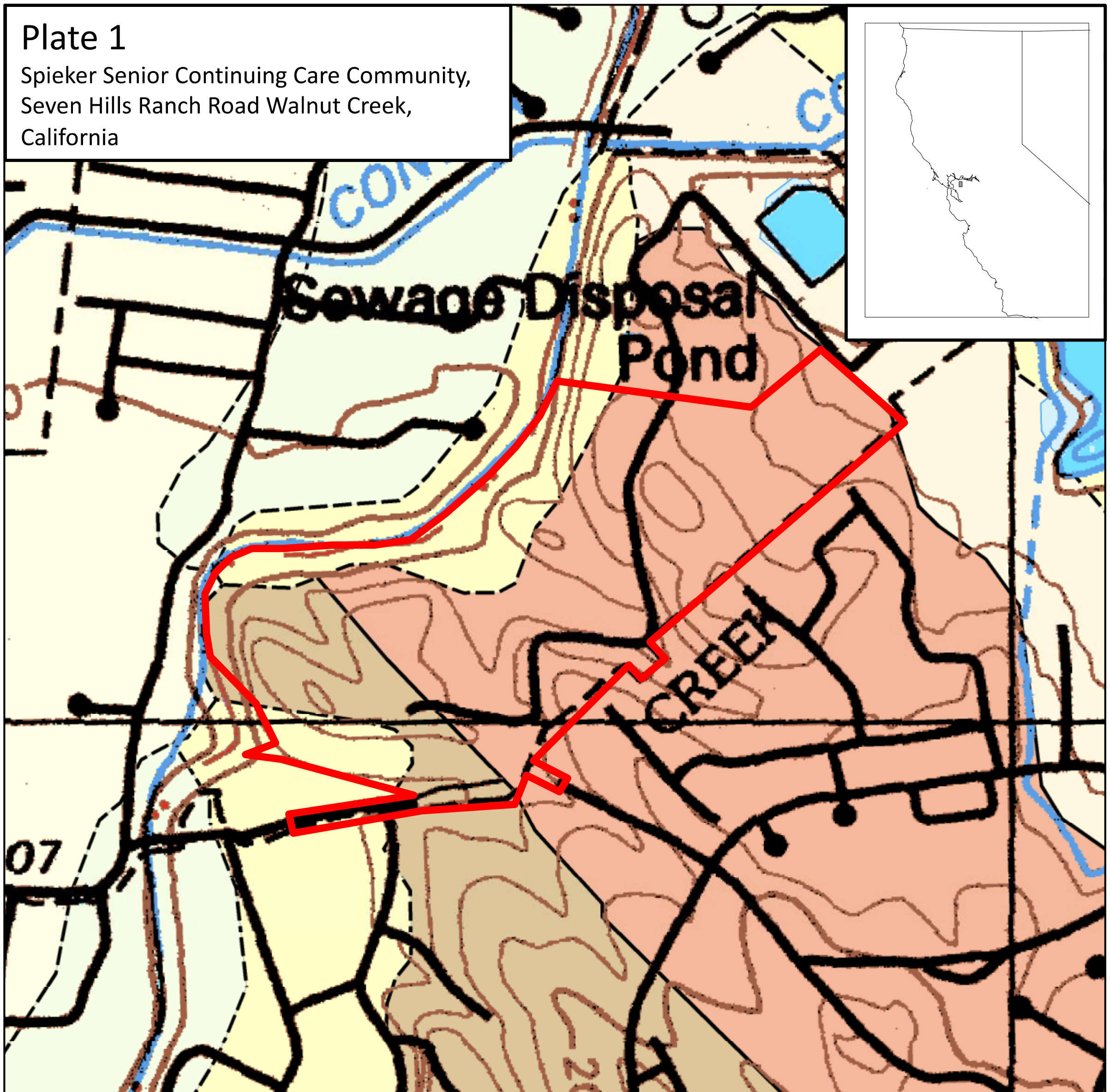
Wentworth, C.M., 1997, General Distribution of Geologic Materials in the San Francisco Bay Region, California: A Digital Map Database: U.S. Geological Survey Open-File Report 98-795, 52 p., scale 1:100,000.

Plate 1

Spieker Senior Continuing Care Community, Seven Hills Ranch Road Walnut Creek, California



Geology from USGS open-file report 94-622, Graymer et al.

Legend

- Qu, undiv. Quaternary deposits incl. colluvium
- Qham, Holocene Alluvium, medium-grained
- Qhac, Holocene Alluvium, coarse-grained
- Qpa, late Pleistocene alluvium
- Cierbo Sandstone
- Cierbo Sandstone and conglomerate member

- contact, approx. located
- contact, certain
- Site, Study Area

N

0 50 100 200

Meters