APPENDIX 7c

PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

ASSESSOR'S PARCEL NUMBER 900-030-036

City of Murrieta
Riverside County, California

For Submittal to:

City of Murrieta
Department of Development Services, Planning Division
1 Town Square
Murrieta, CA 92562

Prepared for:

Tom Dodson & Associates
2150 North Arrowhead Avenue
San Bernardino, CA 92405

Prepared by:

Ron C. Schmidtling, Paleontologist
Deirdre Encarnación, Report Writer
CRM TECH
1016 East Cooley Drive, Suite A/B
Colton, CA 92324

Bai "Tom" Tang, Principal Investigator
Michael Hogan, Principal Investigator

September 28, 2021

Approximately 29 acres
USGS Murrieta, Calif., 7.5' (1:24,000) quadrangle
Section 2, T7S R3W, San Bernardino Baseline and Meridian
City of Murrieta Case No. PRE-2021-2278
CRM TECH Project No. 3720P

EXECUTIVE SUMMARY

Between March and September 2021, at the request of Tom Dodson & Associates, CRM TECH performed a paleontological resource assessment on approximately 29 acres of undeveloped land in the City of Murrieta, Riverside County, California. The subject property of the study, Assessor's Parcel Number 900-030-036, is located on the southeastern corner of Clinton Keith Road and Whitewood Road, in the northeast quarter of Section 2, T7S R3W, San Bernardino Baseline and Meridian, as shown in the United States Geological Survey Murrieta, California, 7.5' quadrangle.

The study is part of the environmental review process for the proposed development of a multi-family residential complex with approximately 483 units of apartments and condominiums. The City of Murrieta, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the City with the necessary information and analysis to determine whether the proposed project would adversely affect any significant, nonrenewable paleontological resources, as required by CEQA, and to design a paleontological mitigation program, if necessary.

In order to identify any paleontological resource localities that may exist in or near the project area and to assess the probability for such resources to be encountered during the project, CRM TECH initiated a paleontological records search, conducted a literature review, and carried out a field inspection of the project area. The results of these research procedures suggest that the project area is situated entirely upon Cretaceous-age gabbro and monzogranite, which has a low potential to contain significant, nonrenewable paleontological resources. Therefore, CRM TECH recommends to the City of Murrieta a finding of *No Impact* regarding paleontological resources.

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INTRODUCTION

Between March and September 2021, at the request of Tom Dodson & Associates, CRM TECH performed a paleontological resource assessment on approximately 29 acres of undeveloped land in the City of Murrieta, Riverside County, California (Fig. 1). The subject property of the study, Assessor's Parcel Number 900-030-036, is located on the southeastern corner of Clinton Keith Road and Whitewood Road, in the northeast quarter of Section 2, T7S R3W, San Bernardino Baseline and Meridian, as shown in the United States Geological Survey (USGS) Murrieta, California, 7.5' quadrangle (Figs. 2, 3).

The study is part of the environmental review process for the proposed development of a multi-family residential complex with approximately 483 units of apartments and condominiums. The City of Murrieta, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the City with the necessary information and analysis to determine whether the proposed project would adversely affect any significant, nonrenewable paleontological resources, as required by CEQA, and to design a paleontological mitigation program, if necessary.

In order to identify any paleontological resource localities that may exist in or near the project area and to assess the probability for such resources to be encountered during the project, CRM TECH initiated a paleontological records search, conducted a literature review, and carried out a field inspection of the project area. The following report is a complete account of the methods, results, and final conclusion of this study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

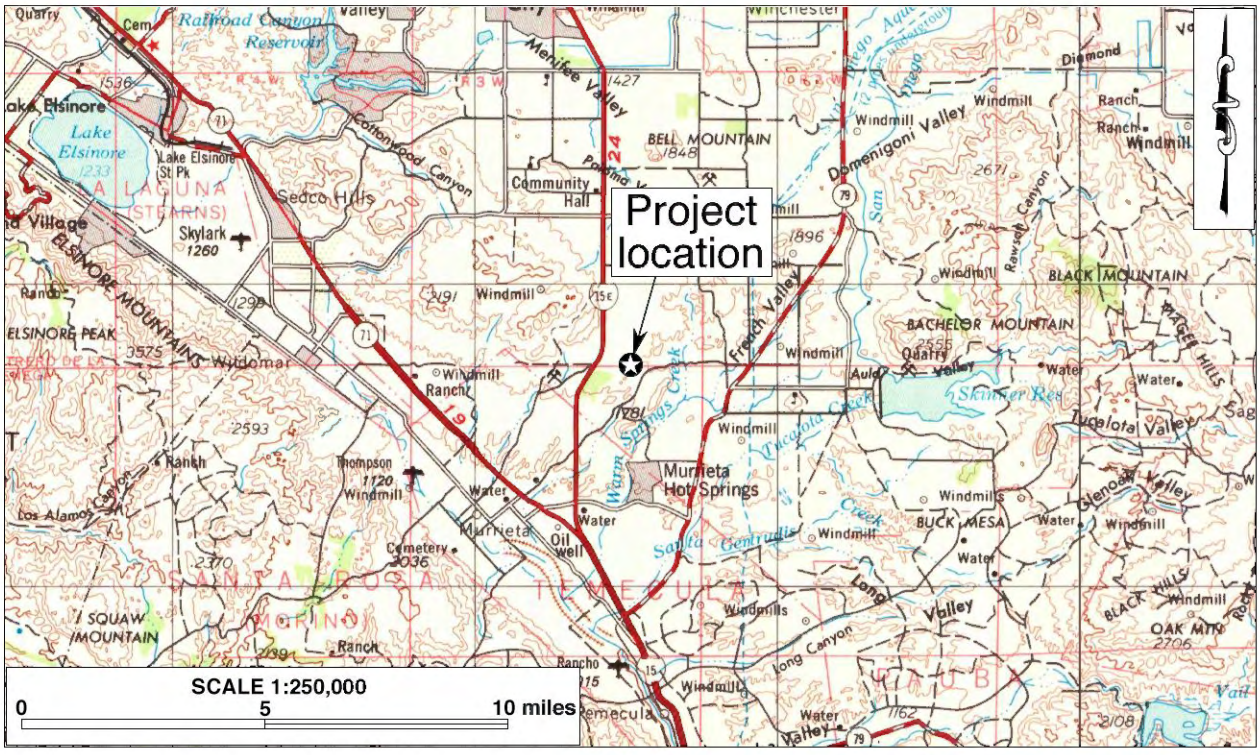


Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 120'x60' quadrangle, 1979 edition)

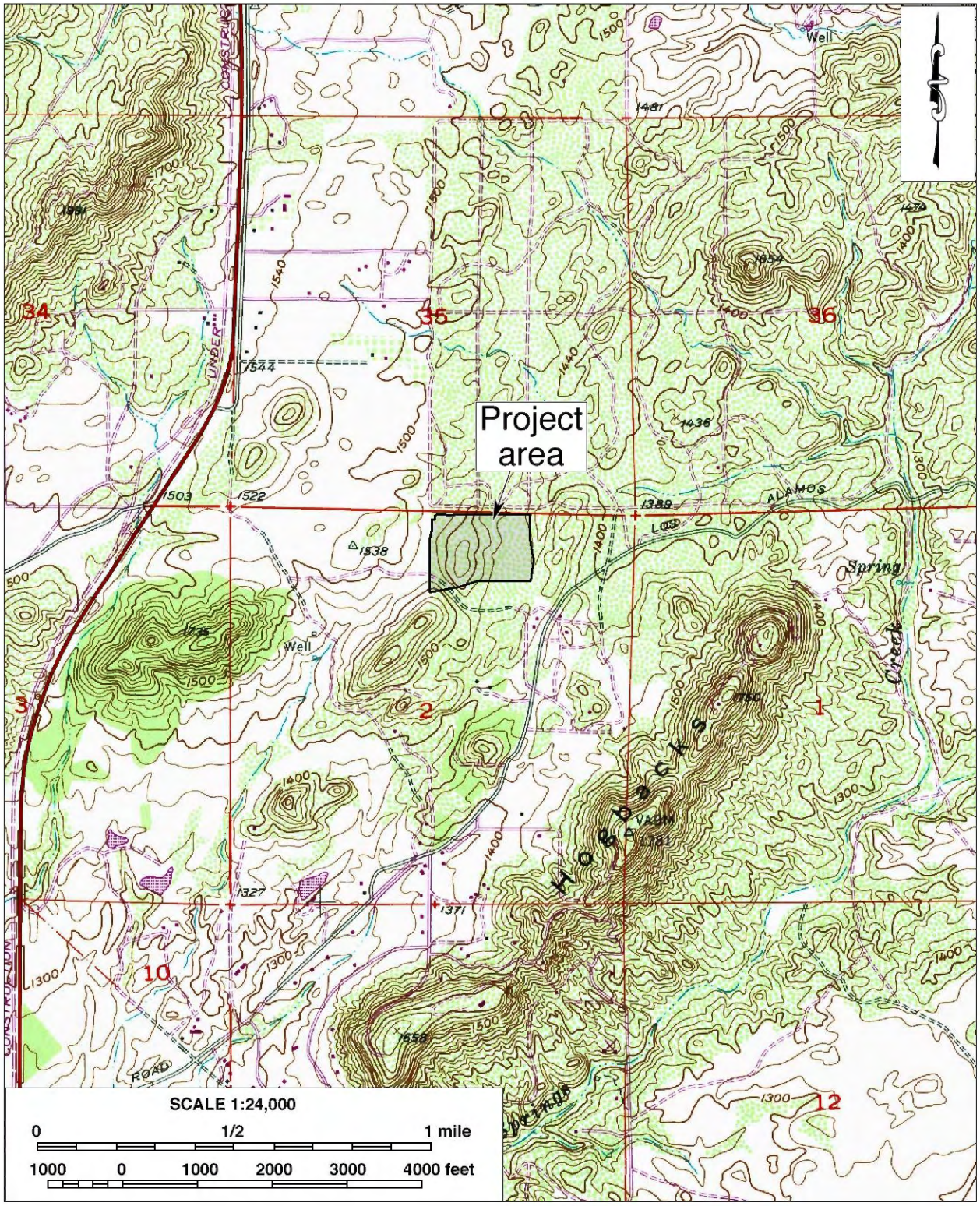


Figure 2. Project location. (Based on USGS Murrieta, Calif., 7.5' quadrangle, 1979 edition)

Figure 3. Aerial view of the project area.

PALEONTOLOGICAL RESOURCES

DEFINITION

Paleontological resources represent the remains of prehistoric life, exclusive of any human remains, and include the localities where fossils were collected as well as the sedimentary rock formations in which they were found. The defining character of fossils or fossil deposits is their geologic age, typically older than recorded human history and/or older than the middle Holocene Epoch, which dates to circa 5,000 radiocarbon years (Society of Vertebrate Paleontology 2010:11).

Common fossil remains include marine and freshwater mollusk shells; the bones and teeth of fish, amphibians, reptiles, and mammals; leaf imprint assemblages; and petrified wood. Fossil traces, another type of paleontological resource, include internal and external molds (impressions) and casts created by these organisms. These items can serve as important guides to the age of the rocks and sediments in which they are contained and may prove useful in determining the temporal relationships between rock deposits from one area and those from another as well as the timing of geologic events. They can also provide information regarding evolutionary relationships, development trends, and environmental conditions.

Fossil resources generally occur only in areas of sedimentary rock (e.g., sandstone, siltstone, mudstone, claystone, or shale). Because of the infrequency of fossil preservation, fossils, particularly vertebrate fossils, are considered nonrenewable paleontological resources. Occasionally fossils may be exposed at the surface through the process of natural erosion or because of human disturbances; however, they generally lay buried beneath the surficial soils. Thus, the absence of fossils on the surface does not preclude the possibility of their being present within subsurface deposits, while the presence of fossils at the surface is often a good indication that more remains may be found in the subsurface.

SIGNIFICANCE CRITERIA

According to guidelines proposed by Scott and Springer (2003:6), paleontological resources can be considered to be of significant scientific interest if they meet one or more of the following criteria:

1. The fossils provide information on the evolutionary relationships and developmental trends exhibited among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or the interactions between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

PALEONTOLOGICAL SENSITIVITY

The fossil record is unpredictable, and the preservation of organic remains is rare, requiring a particular sequence of events involving physical and biological factors. Skeletal tissue with a high percentage of mineral matter is the most readily preserved within the fossil record; soft tissues not intimately connected with the skeletal parts, however, are the least likely to be preserved (Raup and Stanley 1978). For this reason, the fossil record contains a biased selection not only of the types of organisms preserved but also of certain parts of the organisms themselves. As a consequence, paleontologists are unable to know with certainty, the quantity of fossils or the quality of their preservation that might be present within any given geologic unit.

Sedimentary units that are paleontologically sensitive are those geologic units (mappable rock formations) with a high potential to contain significant nonrenewable paleontological resources. More specifically, these are geologic units within which vertebrate fossils or significant invertebrate fossils have been determined by previous studies to be present or are likely to be present. These units include, but are not limited to, sedimentary formations that contain significant paleontological resources anywhere within their geographical extent as well as sedimentary rock units temporally or lithologically amenable to the preservation of fossils.

A geologic formation is defined as a stratigraphic unit identified by its lithic characteristics (e.g., grain size, texture, color, and mineral content) and stratigraphic position. There is a direct relationship between fossils and the geologic formations within which they are enclosed and, with sufficient knowledge of the geology and stratigraphy of a particular area, it is possible for paleontologists to reasonably determine the formation's potential to contain significant nonrenewable vertebrate, invertebrate, marine, or plant fossil remains.

The paleontological sensitivity for a geologic formation is determined by the potential for that formation to produce significant nonrenewable fossils. This determination is based on what fossil resources the particular geologic formation has produced in the past at other nearby locations. Determinations of paleontologic sensitivity must consider not only the potential to yield a large collection of fossil remains but also the potential to yield a few fossils that can provide new and significant taxonomic, phylogenetic, and/or stratigraphic data.

The Society of Vertebrate Paleontology issued a set of standard guidelines intended to assist paleontologists to assess and mitigate any adverse effects/impacts to nonrenewable paleontological resources. The guidelines defined four categories of paleontological sensitivity for geologic units that might be impacted by a proposed project, as listed below (Society of Vertebrate Paleontology 2010:1-2):

- **High Potential**: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered.
- **Undetermined Potential**: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment.
- **Low Potential**: Rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances.
- **No Potential**: Rock units that have no potential to contain significant paleontological resources, such as high-grade metamorphic rocks and plutonic igneous rocks.

SETTING

The City of Murrieta is located in the northern portion of the Peninsular Ranges geomorphic province, which is bounded by the Transverse Ranges province on the north, the Colorado Desert province on the northeast, and the Pacific Ocean on the west (Jenkins 1980:40-41; Harms 1996:131). The natural landscape in the Peninsular Ranges province is characterized by steep and elongated valleys and mountain ranges that generally extend northwestward from the southern tip of Baja California (Jahns 1954:Plate 3; Harden 2004:465).

The Peninsular Ranges province is made up of a series of northwest-southeast trending structural blocks consisting of uplifted mountains that are separated by valley basins developed along the intervening fault zones. The mountains are made up mainly of igneous intrusive rocks, metasedimentary rocks, and some metavolcanic rocks (Harden 2004:466-468). The non-crystalline rocks in the eastern portion of the mountains contain mainly metasedimentary rocks of Paleozoic and older age, while the crystalline basement rocks consist mainly of Mesozoic-age granitic rocks with some scattered gabbroic intrusions (*ibid*.:466-468, 471-472).

The Murrieta area is a part of the Perris Block, one of the structural blocks in the Peninsular Ranges province. Situated between the San Jacinto and Elsinore-Chino fault zones, the Perris Block includes many tectonically controlled valley-and-ridge systems (English 1926). It is bounded on the north by the Cucamonga (San Gabriel) Fault and on the south by a vaguely delineated boundary near the southern end of the Temecula Valley (*ibid.*). This structural block is considered to have been active since Pliocene time (Woodford et al. 1971:3421). Colluvial/alluvial sediments of varying thickness derived from the erosion of the elevated portions of the region fill the low-lying areas of the Perris Block.

The project area lies in the northern portion of the City of Murrieta, bounded on the north by Clinton-Keith Road and a rock-lined drainage, on the west by Whitewood Road and a small open-space preserve, and by undeveloped land on the south and the east (Fig. 3). Elevations range approximately around 1,439 to 1,527 feet above mean sea level, and soils consists of dry silty-clay loam of brown to orangish-brown color with small granitic outcrops. Vegetation observed includes buckwheat, elderberry, and other native as well as naturalized grasses and brush (Fig. 4).

METHODS AND PROCEDURES

RECORDS SEARCH

The paleontological records search service for this study was provided by the Western Science Center (WSC) in Hemet. The WSC maintains files of regional paleontological localities as well as supporting maps and documents. The records search results were used to identify previously performed paleontological resource assessments and known paleontological localities within a one-mile radius of the project location. A copy of the records search results is attached to this report in Appendix 2.

Figure 4. Typical landscape in the project area. (Photograph taken on June 18, 2021)

LITERATURE REVIEW

In conjunction with the records search, CRM TECH paleontologist Ron C. Schmidtling and report writer Deirdre Encarnación reviewed geological literature pertaining to the project vicinity. Sources consulted during the review include primarily published literature on regional geology, topographic, geologic, and soil maps of the Murrieta area, the City of Murrieta and County of Riverside GIS databases, satellite and aerial images available at the Nationwide Environmental Title Research (NETR) Online website and through the Google Earth software, and other materials in the CRM TECH library, including unpublished reports produced during similar studies in the vicinity.

FIELD INSPECTION

On June 18, 2021, CRM TECH paleontological surveyors Salvador Z. Boites and Nina Gallardo carried out the field inspection of the project area. As most of the project area was covered by dense vegetation growth, a cursory walk-over was conducted wherever the ground surface was exposed, primarily along various dirt roads and in their immediate vicinity. The focus of the field inspection was to determine soil types, verify the geological formations, and search for indications of paleontological remains. In all, the field team was able to inspect closely approximately 10% of the total acreage.

RESULTS AND FINDINGS

RECORDS SEARCH

The records search by the WSC identified no known paleontological localities within the project area, nor within a one-mile radius (Radford 2021; see App. 2). According to the WSC, the geologic formation in the project area features primarily gabbro and monzogranite, both dating to the

Cretaceous period (*ibid*.). The WSC does not consider either of these geologic units to be paleontologically sensitive as a high rate of heat is produced during the formation of both gabbro and monzogranite (*ibid*.:1). The WSC did not offer recommendations regarding proposed project but noted that, based upon the geologic makeup of the soils underlying the project area, "it is unlikely that fossil material will be present" (*ibid*.:1). Geologic mapping provided by the WSC shows the gabbro to be present in the western portion of the property with the monzogranite in the eastern portion (*ibid*:2).

LITERATURE REVIEW

The surface geology in most of the project area was mapped by Dibblee and Minch (2008) as *hdg*, described as "hornblende diorite to gabbro," with a possible minor inclusion of *qd*, undifferentiated quartz diorite, in the southeastern corner (Fig. 5). Both *hdg* and *qd* are igneous rocks of Cretaceous age (*ibid*.). Morton (2004) mapped the surface sediments within the project area as *Kgb* and *Kpvg*. *Kgb* represents gabbro of Cretaceous age, further described as "hornblende gabbro; medium- to very coarse-grained," while *Kpvg* represents monzogranite to grandiorite, further described as "biotite monzogranite, and less abundant hornblende- biotite granodiorite; gray, medium grained, hypidiomorphic-granular, massive" (*ibid*.).

According to the City of Murrietta's (2011) regional geologic map, the project area consists entirely of undifferentiated gabbro (*Kgb*). Riverside County paleontological sensitivity map classifies the project location as having a low potential to contain significant paleontological resources (RCIT n.d.; County of Riverside 2015:4.9-11). Aerial and satellite images indicate that, despite accelerated suburban development in the surrounding area since the 1990s, the entire project area has remained in a relatively natural state to the present time, with evidence of off-road vehicle path and foot trails the only signs of active use (NETR Online 1938-2018; Google Earth 1996-2020).

FIELD SURVEY

No surface manifestation of any paleontological remains was observed within the project area during the field inspection. Although only about 10% of the ground surface was visible due to the dense vegetation growth, in light of the low paleontological sensitivity assigned to the project area the poor ground visibility was deemed acceptable.

CONCLUSION AND RECOMMENDATIONS

CEQA guidelines (Title 14 CCR App. G, Sec. V(c)) require that public agencies in the State of California determine whether a proposed project would "directly or indirectly destroy a unique paleontological resource" during the environmental review process. The present study, conducted in compliance with this provision, is designed to identify any significant, non-renewable paleontological resources that may exist within or adjacent to the project area, and to assess the possibility for such resources to be encountered in future excavation and construction activities.

According to the records search and the literature review, the project area is situated upon surface exposure as well as subsurface deposits of Cretaceous-age gabbro and monzogranite, which has a

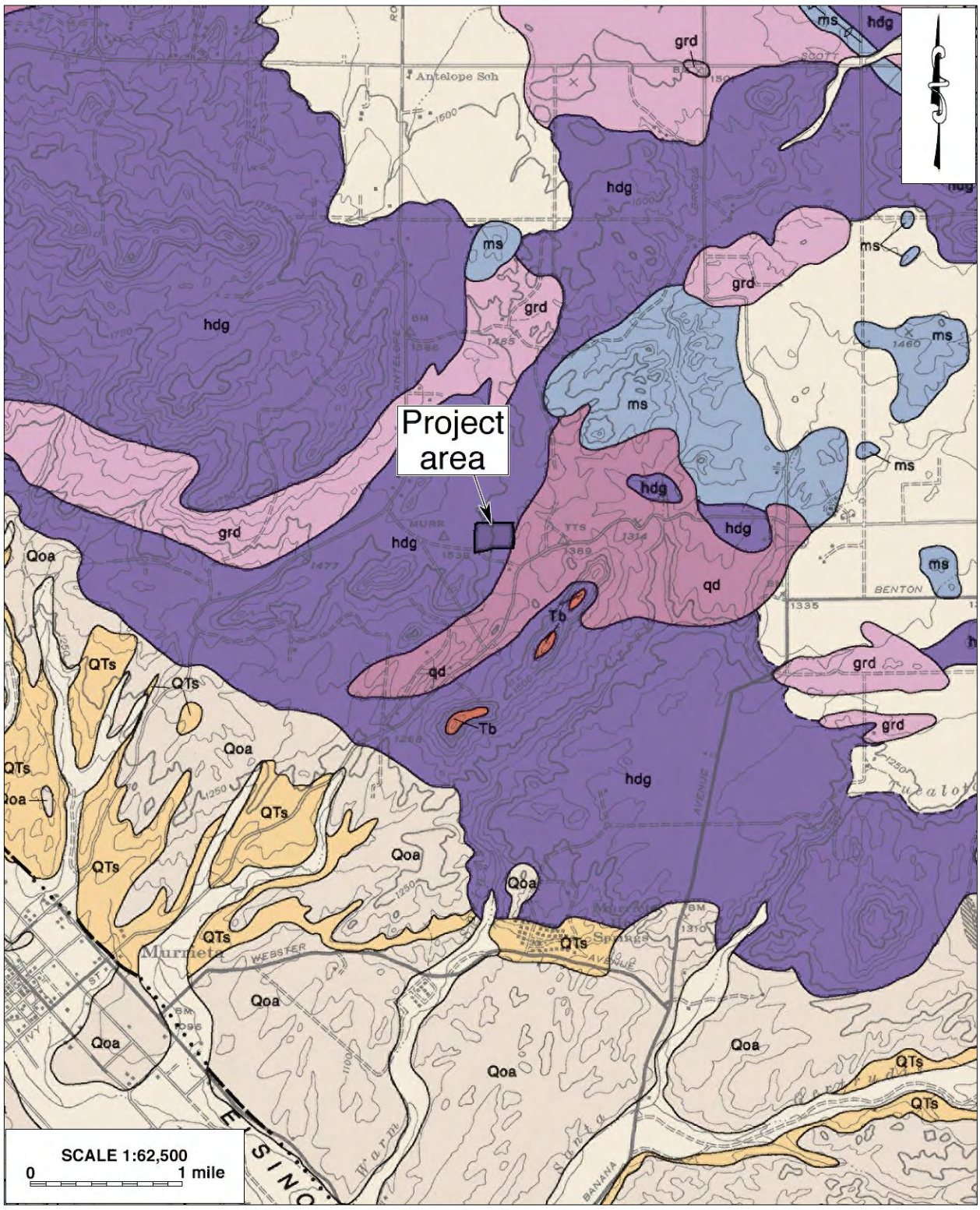


Figure 5. Geological map of the project vicinity. (Source: Dibblee and Minch 2008)

low potential to contain significant, nonrenewable paleontological resources. No fossil localities were previously identified in the project area, and the WSC further noted that no vertebrate fossil discoveries have been made within a one-mile radius, nor from similar settings throughout southern California (Radford 2021). Based on these findings, the proposed project's potential to impact significant, nonrenewable paleontological resources appears to be low. Therefore, CRM TECH recommends to the City of Murrieta a finding of *No Impact* regarding paleontological resources.

REFERENCES

City of Murrieta
2011 Final EIR, Murrieta General Plan Update, Section 5.8: Geology and Seismic Hazards. https://www.murrietaca.gov/DocumentCenter/View/790/05-08---Geology-and-Seismic-Hazards-PDF.

County of Riverside
2015 County of Riverside General Plan. https://planning.rctlma.org/ZoningInformation/GeneralPlan.aspx.

Dibblee, Thomas W., Jr. and John A. Minch
2008 Geologic Map of the Murrieta Quadrangle, Riverside County, California. Dibblee Geology Center Map #DF-417. Santa Barbara, California.

English, W.A.
1926 *Geology and Oil Resources of the Puente Hills Region, Southern California*. U.S. Geological Survey Bulletin 146. Washington, D.C.

Google Earth
1996-2020 Aerial photographs of the project vicinity; taken in 1996, 2002, 2003, 2005-2007, 2009, and 2011-2014, 2016, 2018, and 2020. Available through the Google Earth software.

Harden, Deborah R.
2004 *California Geology*. Prentice Hall, Upper Saddle River, New Jersey.

Harms, Nancy S.
1996 *A Precollegiate Teachers Guide to California Geomorphic/Physiographic Provinces*. National Association of Geoscience Teachers, Far West Section, Concord, California.

Jahns, R.H.
1954 Geology of the Peninsular Range Province, Southern California and Baja California. In R.H. Jahns (ed.): *Geology of Southern California*; Chapter II. California Division of Mines Bulletin 170, Part 3. San Francisco.

Jenkins, Olaf P.
1980 Geomorphic Provinces Map of California. *California Geology* 32(2):40-41.

Morton, Douglas M.
2004 Preliminary Digital Geologic Map of the Santa Ana 30'x60' Quadrangle, Southern California. United States Geological Survey Open-File Report 99-172, Ver. 2.1.

NETR (Nationwide Environmental Title Research) Online
1938-2018 Aerial photographs of the project vicinity; taken in 1938, 1967, 1978, 1996, 2002, 2005, 2009, 2010, 2012, 2014, 2016, and 2018. http://www.historicaerials.com.

Radford, Darla
2021 Letter of findings, paleontological resources records search for the proposed project. Prepared by Western Science Center, Hemet, California. (See Appendix 2)

Raup, David M., and Steven M. Stanley
1978 *Principle of Paleontology*. W.H. Freeman and Company, San Francisco.
RCIT (Riverside County Information Technology)
n.d. Map My County. https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public.
Scott, Eric, and Kathleen Springer
2003 CEQA and Fossil Preservation in California. *Environmental Monitor* Fall:4-10. Association of Environmental Professionals, Sacramento, California.
Society of Vertebrate Paleontology
2010 Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. http://vertpaleo.org/Membership/Member-Resources/SVP_Impact_Mitigation_Guidelines.aspx.
Woodford, Alfred O., John S. Shelton, Donald O. Doehring, and Richard K. Morton
1971 Pliocene-Pleistocene History of the Perris Block, Southern California. *Geological Society of America Bulletin* 82(12):3421-3448.

APPENDIX 1:
PERSONNEL QUALIFICATIONS

PROJECT PALEONTOLOGIST
Ron Schmidtling, M.S.

Education

1995	M.S., Geology, University of California, Los Angeles.
1991	Pasadena City College, Pasadena, California.
1985	B.A., Archaeology, Paleontology, Ancient Folklore, and Art History, University of Southern Mississippi, Hattiesburg.

Professional Experience:

2020-	Principal Paleontologist, CRM TECH, Colton, California.
2014-	Instructor of Earth Science, History of Life, Ecology, and Evolutionary Biology, Columbia College Hollywood, Reseda, California.
2013, 2015	Volunteer, excavation of a camarasaur and a diplodocid in southern Utah, Natural History Museum of Los Angeles County, California.
1993-2014	Consultant, Getty Conservation Institute, Brentwood, California. • Geological Consultant on the Renaissance Bronze Project, characterizing constituents of bronze core material; • Paleontological Consultant for Antiquities/Conservation, identifying the foraminifera and mineral constituents of a limestone torso of Aphrodite; • Scientific Consultant on the Brentwood Site Building Project, testing building materials for their suitability in the museum galleries.
1999-2001	Archaeological and Paleontological Monitor, Michael Brandman Associates, Irvine, California.
1997	Department of Archaeology, University of California, Los Angeles.
1994	Scientific Illustrator and Teaching Assistant, Department of Earth and Space Sciences and Department of Biological Sciences, University of California, Los Angeles.

Memberships

AAPS (Association of Applied Paleontological Sciences), USA; CSEOL (Center for the Study of Evolution and the Origin of Life), Department of Earth Sciences, University of California, Los Angeles.

Publications and Reports

Author, co-author, and contributor on numerous paleontological publications and paleontological resource management reports.

REPORT WRITER
Deirdre Encarnación, M.A.

Education

2003	M.A., Anthropology, San Diego State University, California.
2000	B.A., Anthropology, minor in Biology, with honors; San Diego State University, California.

Professional Experience

2004-	Project Archaeologist/Report Writer, CRM TECH, Riverside/Colton, California.
2001-2003	Part-time Lecturer, San Diego State University, California.
2001	Research Assistant for Dr. Lynn Gamble, San Diego State University.
2001	Archaeological Collection Catalog, SDSU Foundation.

PALEONTOLOGICAL SURVEYOR
Salvadore Z. Boites, M.A.

Education

2013	M.A., Applied Anthropology, California State University, Long Beach.
2003	B.A., Anthropology/Sociology, University of California, Riverside.
1996-1998	Archaeological Field School, Fullerton Community College, Fullerton, California.

Professional Experience

2014-	Project Archaeologist, CRM TECH, Colton, California.
2010-2011	Adjunct Instructor, Anthropology, Everest College, Anaheim, California.
2003-2008	Project Archaeologist, CRM TECH, Riverside/Colton, California.
2001-2002	Teaching Assistant, Moreno Elementary School, Moreno Valley, California.
1999-2003	Research Assistant, Anthropology Department, University of California, Riverside.

Research Interests

Cultural Resource Management, Applied Archaeology/Anthropology, Indigenous Cultural Identity, Poly-culturalism.

PALEONTOLOGICAL SURVEYOR
Nina Gallardo, B.A.

Education

2004 B.A., Anthropology/Law and Society, University of California, Riverside.

- Cross-trained in paleontological field procedures and identifications by CRM TECH Geologist/Paleontologist Harry M. Quinn.

Professional Experience

2004- Paleontologist Surveyor/Monitor, CRM TECH, Riverside/Colton, California.
2004- Project Archaeologist, CRM TECH, Riverside/Colton, California.

APPENDIX 2

RECORDS SEARCH RESULTS

(Confidential)

WESTERN SCIENCE CENTER

CRM Tech
Nina Gallardo
1016 E. Cooley Drive, Suite A/B
Colton, CA 92324

April 1, 2021

Dear Ms. Gallardo,

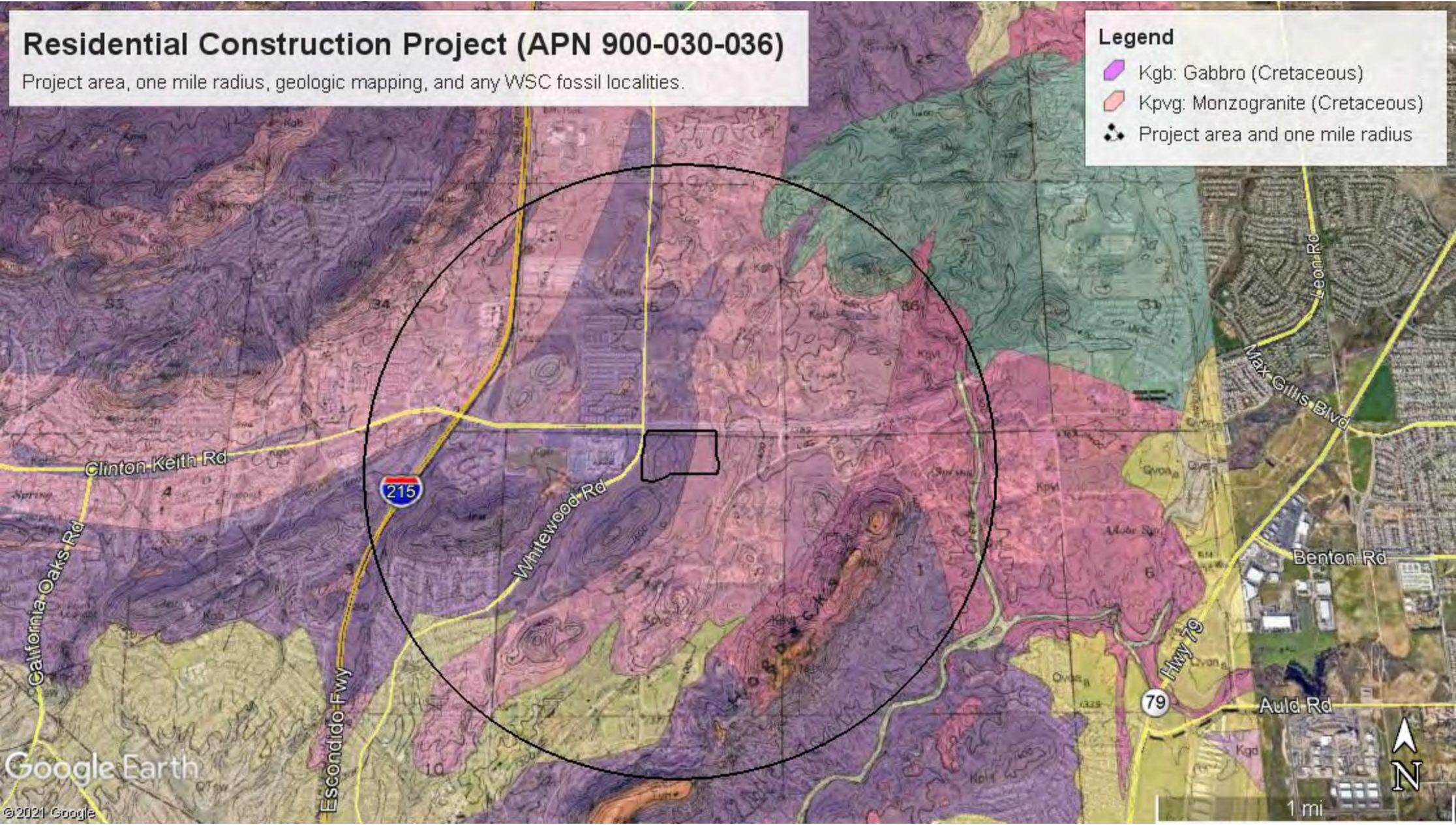
This letter presents the results of a record search conducted for the Proposed Residential Construction Project on Assessor Parcel Number 900-030-036 (CRM Tech Number 3720P) in the city of Murrieta, Riverside County, California. The project site is located south east of the intersection of Whitewood Road and Clinton Keith Road in Township 7 South, Range 3 West in Section 2 on the *Murrieta, CA* USGS 7.5 minute quadrangle.

The geologic units underlying this project are mapped as gabbro and monzogranite associated with the Peninsular Ranges batholith dating to the Cretaceous period (Kennedy et al, 2003). Gabbro and Monzogranite are not considered to be paleontologically sensitive due to the high rate of heat produced during their formation. A map showing geologic mapping for the area has been included for your reference. The Western Science Center does not have localities within the project area or within a one mile radius.

Given the geologic makeup of deposits underlying the project area, it is unlikely that fossil material will be present. If you have any questions or would like further information, please feel free to contact me at dradford@westerncentermuseum.org

Sincerely,

Darla Radford
Collections Manager


Residential Construction Project (APN 900-030-036)
Project area, one mile radius, geologic mapping, and any WSC fossil localities.
Legend
Kgb: Gabbro (Cretaceous)
Kpvg: Monzogranite (Cretaceous)
Project area and one mile radius
Clinton Keith Rd
California Oaks Rd
Escondido Fwy
215
Whitewood Rd
Leon Rd
Max Gillis Blvd
Benton Rd
Hwy 79
79
Auld Rd
N
1 mi
Google Earth
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