



April 30, 2019

Mr. Daniel P. Walsh, CEG 2413  
Riverside County Planning Department  
Transportation and Land Management Agency  
4080 Lemon Street, 12<sup>th</sup> Floor  
Riverside, California 92501

Subject: Revised Paleontological Resource Impact Mitigation Program (PRIMP), Surface Mining Permit No. 159, Amendment No. 2, San Timoteo Badlands, unincorporated Riverside County, California (Case No. SMP00159R2)

Dear Mr. Walsh:

**Introduction and Location:** This Revised Paleontological Resource Impact Mitigation Program (PRIMP) has been completed by Brian F. Smith and Associates, Inc. (BFSA) for a proposed expansion of the established Chandler Aggregates' Gilman Springs quarry (Case No. SMP00159R2). The expansion is located in the southeastern San Timoteo Badlands north of Gilman Springs Road in unincorporated Riverside County, California (Attachments 1 and 2). The expansion affects a total area of approximately 54.6 acres within Assessor's Parcel Number (APN) 422-240-007. Currently, only metamorphic rock and marble are being mined, as the sedimentary rocks within the bounds of the current mine property are too rich in clay to utilize as sand. The proposed mine expansion would allow continuation of the hard rock mining to the west, and allow for minor expansion into in an area partly composed of Tertiary sedimentary rocks for graded pads to use as areas for topsoil and clay storage. On the U. S. Geological Survey 7.5-minute, 1:24,000-scale El Casco and Lakeview, California topographic quadrangle maps, the area of the proposed expansion is located in the central part of Section 25, Township 3 South, Range 2 West, San Bernardino Base and Meridian (Attachment 2). Based on the County of Riverside Land Information System (CRLIS, 2019), APN 422-240-007 encompasses all of Section 25, with the exception of the southwest quarter portion.

This revised PRIMP supersedes the prior version of this PRIMP, dated 18 January 2018 (Kennedy and Wirths, 2018), drafted by BFSA for this project. Revisions include changes to the limits of mining and identification of responsible personnel. The new mining limits outlined herein (Attachments 2 and 3) do not change or modify the conclusions and recommendations stated in the original PRIMP dated 18 January 2018.

**Geology:** Geologically, the project site lies within a geologically complex area at the southeastern end of the San Timoteo Badlands adjacent to (bounded on the southwest by) the Claremont strand of the San Jacinto fault complex in unincorporated Riverside County, California (Attachment 3,

after Matti and Morton [2010] and Morton and Matti [2001]). The central core rocks of the project area, which are aligned in a northwest-southeast direction parallel to the San Jacinto fault, are composed of Cretaceous (90 to 95 million year old) granitic rocks (Granite of Mt. Eden, **Kmeg**, shown in pink on Attachment 3) and undifferentiated gneissic metasedimentary rocks of probable Paleozoic age (labeled **ms** and **Pzu** and shown in white and blue on Attachment 3). Bands of white marble (**m**), shown in darker blue, parallel the trend of the fault-controlled structures. Miocene to Pliocene (~ 5.6 million year old) sedimentary rocks that crop out adjacent to the proposed mine expansion area belong to the Mount Eden formation (**Tmea**, shown in amber on Attachment 3), which is assigned to the Blancan North American Land Mammal Stage (NALMS) on the basis of its fossil record of terrestrial land mammals and land plants. The formation has been subdivided into several subunits, based on differences in lithology (labeled **Tmea**, **Tmeb**, and **Tmeh** on Attachment 3).

**Paleontology:** Both the Mount Eden formation and the San Timoteo formation, which is exposed farther to the north and east, are often fossiliferous, yielding a variety of small to large terrestrial vertebrate fossils, as well as paleobotanical remains. The earliest important study of the vertebrate faunal assemblage was that of Frick (1921), who excavated quarries that yielded terrestrial vertebrate fossils about a mile north of the proposed mine expansion. Numerous published papers have since documented the terrestrial vertebrate record of the San Timoteo and Mount Eden formations. The most recent important works (Albright, 1999, 1999b) record six new fossil localities in Section 23, adjacent to the northwest corner of the project property. Remains of fossil plants (leaves and fruits) were also collected by Axelrod (1934, 1950) from the adjacent exposures of the Mount Eden formation. Based on unpublished museum collections and records searches for a number of projects that include exposures of the Mount Eden and San Timoteo formations, the areas of outcrop are regarded as “extremely fossiliferous and have a high potential to contain significant nonrenewable paleontological resources subject to adverse impacts by excavation during development.” Similar conclusions were reached in the paleontological analysis of the extensive Mesa Verde Estates project, northeast of the current project area. Results of an online search of the collections and records at the University of California Museum of Paleontology (UCMP) in Berkeley, California identified 51 UCMP fossil localities in the Mount Eden and San Timoteo formations, although none of the localities were plotted on a topographic map.

**Paleontological Sensitivity:** A paleontological sensitivity map generated by CRLIS (2019) in April of 2019 (Attachment 4) ranks part of the proposed mine expansion area as having a High Paleontological Sensitivity and part as having a Low Paleontological Sensitivity (shown in red and green, respectively, on Attachment 4). The basis for assigning a High paleontological sensitivity and resource potential to an area is “the presence of geologic formations or mappable rock units that contain fossilized body elements, and trace fossils such as tracks, nests and eggs. These fossils occur on or below the surface” (CRLIS, 2019). Certainly the documented fossil record of terrestrial mammals and land plants from the Mount Eden formation would justify its categorization as having a High Paleontological Sensitivity. The granitic and metamorphic (metasedimentary) core rocks within the southern San Timoteo Badlands have little or no possibility of yielding any fossils and have been assigned a Low Paleontological Sensitivity. Note, however, that the areas of High or Low sensitivity as shown on Attachment 4 differ somewhat from the boundaries of these rock types as shown on Attachment 3, most likely due to problems of scaling the original paleontological sensitivity map down to the 1:24,000 scale of the geologic map. We regard the geologic contacts shown on the geologic map of the area

(Attachment 3) as being a more reliable representation of areas with a High or Low Paleontological Sensitivity than the contacts shown on Attachment 4.

The greatest part of the proposed mine expansion area (Area A on Attachments 2 and 3) is underlain by metamorphic (metasedimentary) rocks, including marble, and has little to no likelihood of containing recognizable fossils. Area A has an area of approximately 48.5 acres. This area is assigned a Low Paleontological Sensitivity. However, Area B, as shown on Attachments 2 and 3, is underlain by sedimentary rocks of the Mount Eden formation, which has a well documented record of yielding terrestrial mammal and plant fossils in the San Timoteo Badlands, and is assigned a High Paleontological Sensitivity. Area B is composed of two portions totaling approximately 6 acres.

***Specific Elements of the Proposed PRIMP:***

**Identification and qualifications of the qualified paleontological monitor to be employed for monitoring of grading operations:** Experienced paleontological monitors, under the supervision of Mr. Todd A. Wirths, P.G. 7588, will conduct monitoring activities at the project site. The primary paleontological monitors will include Mr. Wirths himself, who has more than 15 years of professional geological and paleontological experience in southern California doing paleontological monitoring and salvage recovery, particularly of mammalian remains. Professional qualifications of Mr. Wirths have been previously forwarded to the Riverside County Chief Engineering Geologist. Monitoring personnel may also include Mr. Clarence “Bud” Hoff, Ms. Allison Reynolds, Ms. Cheryle Hunt, Mr. Jeffrey Henry, M.A., and Ms. Mary Chitjian, all of whom have several years of paleontological monitoring experience.

**Identification of personnel with authority and responsibility to temporarily halt or divert grading equipment to allow for the recovery of large specimens:** In the field, the primary monitor (Mr. Wirths, PG) will be the responsible person on-site with the assigned authority and responsibility to control all grading operations that might adversely affect any salvage efforts. Additionally, other BFSa monitoring personnel present at the site at the time of discovery will have the authority and responsibility to control grading operations, if necessary. In the BFSa office, the primary responsible person will be Mr. Todd A. Wirths, the principal investigator for paleontology for this project. Note that all paleontological monitors automatically inform the BFSa office (Mr. Wirths) upon the discovery of any fossils while monitoring. It is the practice of the BFSa office to immediately notify all concerned parties (client, resident engineer, and lead agency [in unincorporated Riverside County, the Chief Engineering Geologist]) at the time of any discovery.

**Means and methods to be employed by the paleontological monitor to quickly salvage fossils as they are unearthed to avoid construction delays:** Paleontological salvage during trenching and boring activities is typically from the generated spoils and does not delay the trenching or drilling activities. Fossils are collected and placed in cardboard flats or plastic buckets and identified by field number, collector, and date collected. Notes are taken on the map location and stratigraphy of the site, and the site is photographed before it is vacated and the fossils are removed to a safe place. On grading projects, any discovered fossil site is protected by red flagging to prevent it from being overrun by earthmovers (scrapers) before salvage begins. Fossils are collected in a similar manner. Notes and photographs are taken before removing the fossils from

the collecting site. Precise location of the site is determined with the use of handheld Global Positioning System (GPS) units. If the site involves a large terrestrial vertebrate, such as large bone(s) or a mammoth tusk that is/are too large to be easily removed by a single monitor, BFSa will send a fossil recovery crew to excavate around the find, encase the find within a plaster jacket, and remove it after the plaster is set. For large fossils, use of the contractor's construction equipment is solicited to help remove the jacket to a safe location before it is returned to the BFSa laboratory facility for preparation.

**Sampling of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates:** Sediments containing small invertebrate and/or vertebrate fossils are considered just as important as larger fossils and will always be collected.

**Procedures and protocol for the collecting and processing of samples and specimens:** Isolated fossils are collected by hand, wrapped in paper, and placed in temporary collecting flats or five-gallon buckets. Notes are taken on the map location and stratigraphy of the site, and the site is photographed before it is vacated and the fossils are removed to a safe place. Particularly small invertebrate fossils typically represent multiple specimens of a limited number of organisms and a scientifically suitable sample can be obtained from one to several five-gallon buckets of fossiliferous sediment. If it is possible to dry-screen the sediment in the field, a concentrated sample may consist of one or two buckets of material. For vertebrate fossils, the test is usually the observed presence of small pieces of bones within the sediments. If present, as many as 20 to 40 five-gallon buckets of sediment can be collected and returned to a separate facility to wet-screen. In the laboratory, individual fossils are cleaned of extraneous matrix, any breaks are repaired, and the specimen, if needed, is stabilized by soaking in an archivally approved acrylic hardener (*e.g.*, a solution of acetone and Paraloid B-72).

**Fossil identification and curation procedures to be employed:** Fossils will be identified by an adjunct invertebrate and/or vertebrate paleontology specialist, depending on the group of fossils needing identification (*e.g.*, mollusks, reptiles, birds, and/or mammals). Standard museum curation steps will be utilized by, or under the direct supervision of, the principal investigator.

**Identification of the permanent repository to receive any recovered fossil material:** Pursuant to the County of Riverside's "SABER Policy" for recovered fossils, they should, by preference, be directed to (deposited at) the Western Science Center Museum on Searl Parkway in the city of Hemet, Riverside County, California. A written agreement between the developer and the Western Science Center should be in hand before grading begins.

**Procedures for reporting of findings:** At the close of the monitoring program and ensuing laboratory and curation work, if necessary, a final written report will be produced by BFSa and authored by Mr. Todd A. Wirths, P.G., Principal Investigator, and submitted to the Riverside County Planning Department at the conclusion of grading activities for the project. The report will include sections on general background information, previous studies (both geologic and paleontologic), results of findings and analysis, discussion of all recovered fossils, a list of fossils identified to the lowest level possible, cited references, and index and locality maps and graphics to show all fossil localities, etc. If no fossils are recovered during the project, the final negative report will be in a shortened letter format.

**Identification and acknowledgement of the developer for the content of the PRIMP, as well as acceptance of financial responsibility for monitoring, reporting, and curation fees:** Brian F. Smith, President of BFSA, acknowledges that the Chandler Aggregates' Gilman Springs quarry will assume financial responsibility for the PRIMP and any associated monitoring and museum curation fees for the project if it is necessary to undertake any fossil-related mitigation measures.

***Final Recommendations:*** The existence of Miocene to Pliocene (~ 5.6 million year old) sediments of the Mount Eden formation (Tmea on Attachment 3) across Area B within the bounds of the proposed mine expansion, the documented fossil record of terrestrial mammals and land plants from this formation, and the High Paleontological Resource Sensitivity assigned to the Mount Eden formation by the CRLIS (Attachment 4) all support the ***recommendation that full-time paleontological monitoring be required during mass grading and excavation activities in Area B*** (Attachments 2 and 3) in order to mitigate any adverse impacts (loss or destruction) to potential nonrenewable paleontological resources in this area. A Mitigation Monitoring and Reporting Program (MMRP) consistent with the provisions of the California Environmental Quality Act (CEQA), those of the County of Riverside, and those of the draft guidelines of the Society of Vertebrate Paleontology should be implemented for grading and excavation-related activities within Area B of the proposed mine expansion. The greatest part of the proposed mine expansion (Area A on Attachments 2 and 3), however, is underlain by metamorphic (metasedimentary) rocks, has little to no likelihood of yielding any recognizable fossils, and is assigned a Low Paleontological Sensitivity. ***Paleontological monitoring of any mining or earth-disturbing activities in Area A is not necessary and is not recommended.***

If you have any questions concerning this evaluation, please feel free to contact us at our Poway office. Thank you for your time and consideration.

Sincerely,



Todd A. Wirths, M.S., P.G. 7588  
Senior Paleontologist, California Professional Geologist



Attachments: Index maps, geologic map, paleontological sensitivity map

**Paleontological Mitigation Monitoring and Reporting Program (MMRP)**  
**Chandler Aggregates' Gilman Springs Quarry Project (SMP00159R2)**

A mitigation program (MMRP) consistent with CEQA provisions, regulations currently implemented by the County of Riverside, and proposed guidelines of the Society of Vertebrate Paleontology is to be implemented for a limited area (Area B on Attachments 2 and 3) within the proposed expansion of the Chandler Aggregates, Inc. mining operation. The mitigation measures are to be implemented for all areas of Tertiary (Miocene to Pliocene) sediments of the Mount Eden formation (**Tmea**) as shown on Attachment 3 (after Matti and Morton [2010] and Morton and Matti [2001]):

1. Prior to initiation of any grading and/or excavation activities, a preconstruction meeting will be held and attended by the paleontologist of record, representatives of Chandler Aggregates, Inc. (project owner or developer), and a representative of the lead agency (County of Riverside). The nature of potential paleontological resources shall be discussed, as well as the protocol that is to be implemented following the discovery of any fossiliferous materials. Complete grading plans must be made available to the paleontologist or paleontological monitor prior to the start of any earthmoving activities.

2. Monitoring of mass grading and excavation activities in areas identified as likely to contain paleontological resources by a qualified paleontologist or paleontological monitor. Full-time paleontological monitoring will be conducted in all areas of grading or excavation in undisturbed Mount Eden formation sediments (Tmea on Attachment 3), as well as where over-excavation of surficial alluvial sediments will encounter these formational sediments in the shallow subsurface. Paleontological monitors will be equipped to salvage fossils as they are unearthed to avoid operational delays and to remove samples of sediment that are likely to contain the remains of small fossil invertebrates and vertebrates. The monitor must be empowered to temporarily halt or divert equipment to allow for the removal of abundant or large specimens in a timely manner. Monitoring may be reduced if the potentially fossiliferous units are not present in the subsurface, or if present, are determined upon exposure and examination by qualified paleontological personnel to have a low potential to contain fossil resources.

3. Preparation of recovered specimens to a point of identification and permanent preservation (not display), including screen-washing sediments to recover small invertebrates and vertebrates if necessary. Fossils will be identified by an adjunct invertebrate and/or vertebrate paleontology specialist, depending on the group of fossils needing identification (*e.g.*, mollusks, reptiles, birds, and/or mammals).

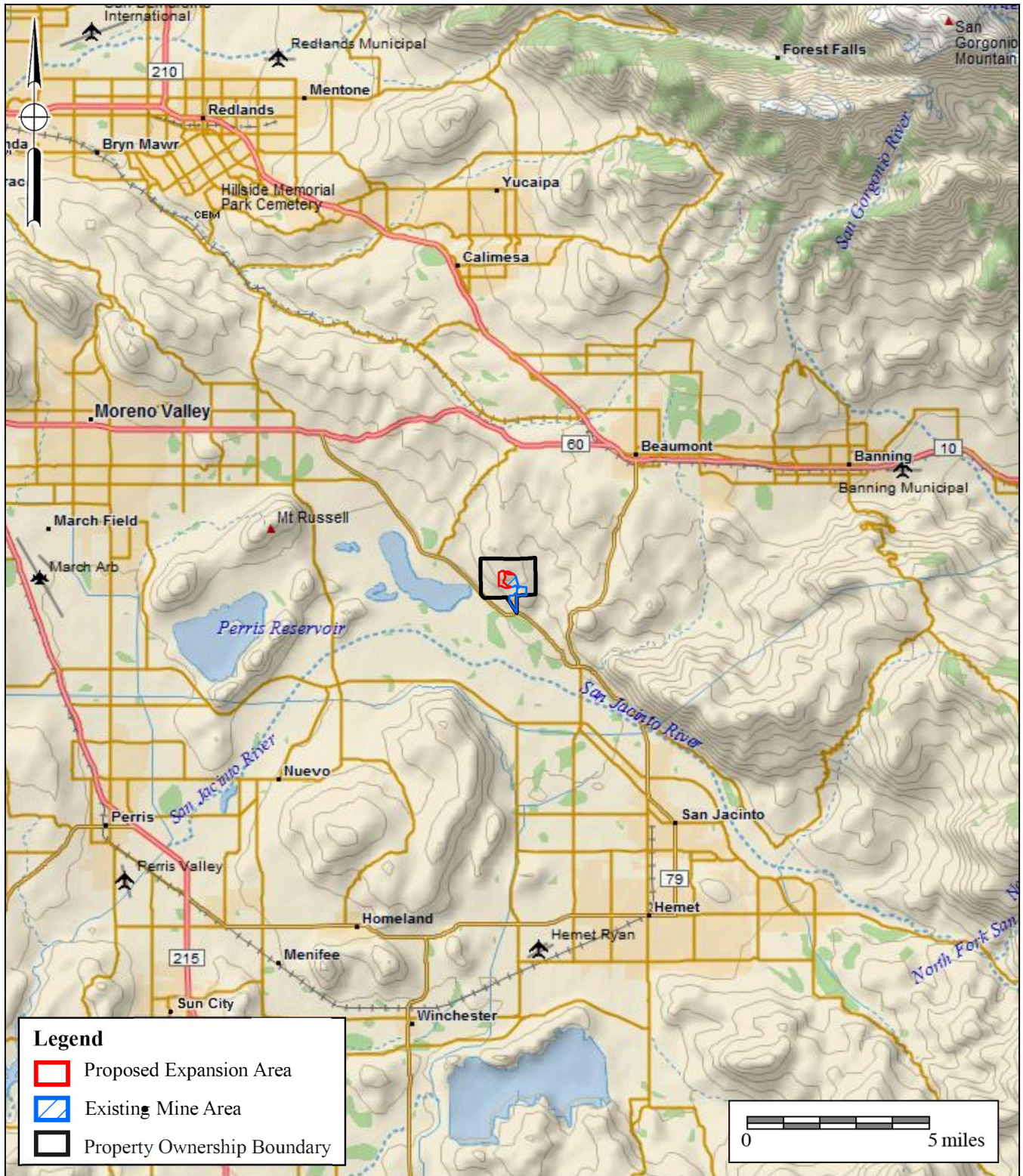
4. Identification, cataloging, and curation of specimens must be completed before final placement with a professional, accredited public museum repository with a commitment to archival conservation and permanent retrievable storage. Pursuant to the County of Riverside "SABER Policy," paleontological materials (fossils) found in Riverside County should, by preference, be directed to the Western Science Center Museum on Searl Road in Hemet, Riverside County, California. The paleontological program should include a written repository agreement prior to the initiation of mitigation activities.

5. Preparation of a final monitoring and mitigation report of findings and significance, including lists of all fossils recovered and necessary maps and graphics to accurately record their original collection localities. Costs of all aspects of the MMRP are to be the responsibility of the property owner. Laboratory and report work are to be completed within 90 days of completion of monitoring of excavation activities within Area B (Attachments 2 and 3). The final report, when submitted to and accepted by the appropriate lead agency (Attn.: Mr. Daniel P. Walsh, CEG 2413, Riverside County Planning Department, Transportation and Land Management Agency, 4080 Lemon Street, 12<sup>th</sup> floor, Riverside, California 92501), will signify satisfactory completion of the project program to mitigate impacts to any potential nonrenewable paleontological resources (*i.e.*, fossils) that might have been either lost or otherwise adversely affected without such a program in place.

## ***References:***

- Albright, L. B., III. 1999a. Magnetostratigraphy and biochronology of the San Timoteo Badlands, southern California, with implications for local Pliocene–Pleistocene tectonic and depositional patterns. *Geological Society of America Bulletin*, 111(9): 1265-1293, figs. (Sept. 1999)
- Albright, L. B., III. 1999b. Biostratigraphy and vertebrate paleontology of the San Timoteo Badlands, southern California. *University of California Publications in Geological Sciences*, 44: i-xiii + 1-121, figs. 1-21, pls. 1-8, tables 1-16. (Nov. 1999)
- Axelrod, D. I. 1934. A Pliocene flora from the Eden beds. *American Museum Novitates*, no. 729: 1-4.
- Axelrod, D. I. 1950. Further studies on the Mount Eden flora, southern California. *Carnegie Institution of Washington Publication* 590: 73-117.
- County of Riverside Land Information System (CRLIS). 2019. Map My County; Paleontological Sensitivity. [https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC\\_Public](https://gis.countyofriverside.us/Html5Viewer/?viewer=MMC_Public).
- Frick, Childs. 1921. Extinct vertebrate faunas of the badlands of Bautista Creek and San Timoteo Cañon, southern California. *University of California Publications, Bulletin of the Department of Geological Sciences*, 12(5): 277-424, figs. 1-165, pls. 43-50.
- Kennedy, G.L., and Wirths, T.A. 2018. Paleontological Resource Impact Mitigation Program (PRIMP), Surface Mining Permit No. 159, Amendment No. 2, San Timoteo Badlands, unincorporated Riverside County, California (Case No. SMP00159R2). Unpublished report for Daniel Walsh, Riverside County Planning Department, Riverside, Calif., by Brian F. Smith and Associates, Inc., Poway, Calif.
- Matti, J. C., and Morton, D. M., 2010. Geologic Map, Sheet 1 of 3. *In* J. C. Matti, D. M. Morton, and V. E. Langenheim, 2015, Geologic and geophysical maps of the El Casco 7.5' quadrangle, Riverside County, California, with accompanying geologic-map database. U. S. Geological Survey, Open-File Report 2010-1274: i-vi + 1-141, figs. 1-xx, sheets 1-3 (scale 1:24,000).
- Morton, D. M., and Matti, J. C. 2001. Geologic map of the Lakeview 7.5' quadrangle, Riverside County, California. U. S. Geological Survey, Open-File Report 01-174: 1 map sheet with text, scale 1:24,000.





## Attachment 1

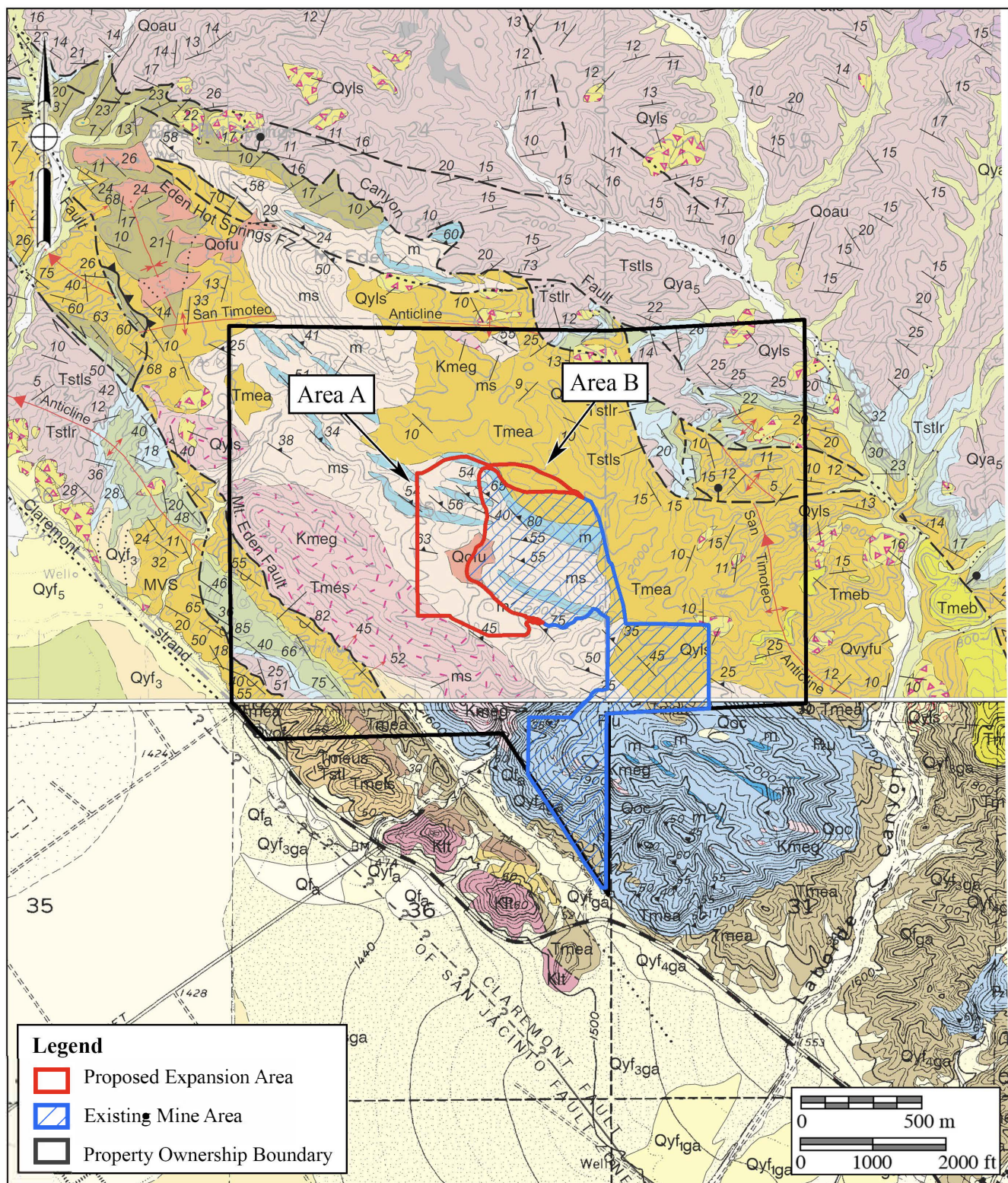
### General Location Map

The Surface Mining Permit No. 159, Amendment No. 2 Project  
DeLorme (1:250,000)









### Attachment 3

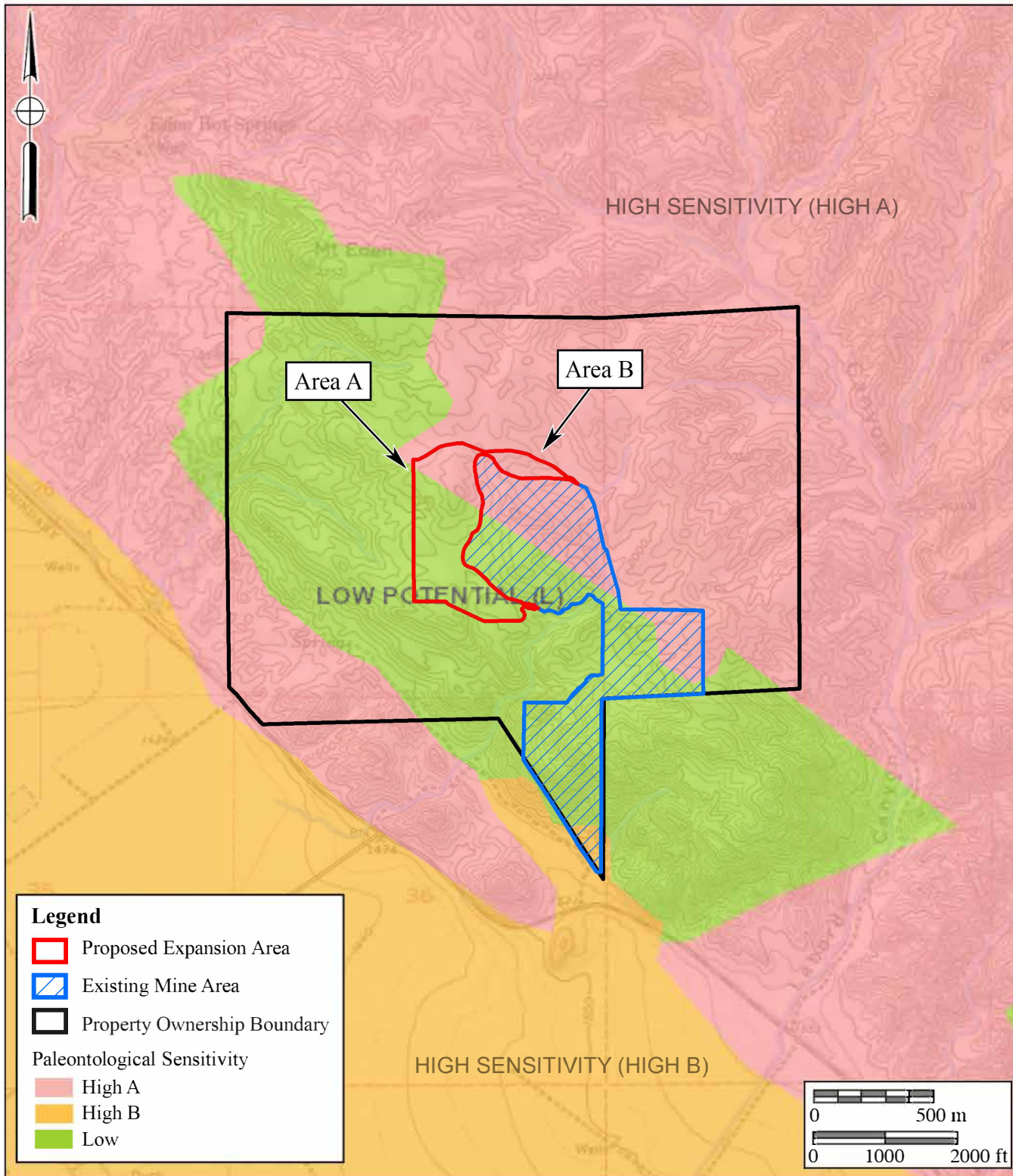
### Geologic Map

The Surface Mining Permit No. 159, Amendment No. 2 Project

Geology after U.S. Geological Survey (2001 and 2010)







## Attachment 4

### Paleontological Sensitivity Map

The Surface Mining Permit No. 159, Amendment No. 2 Project

