DOCKETED	
Docket Number:	24-OPT-03
Project Title:	Soda Mountain Solar
TN #:	257932
Document Title:	Appendix H Paleontological Resources Technical Report
Description:	This Appendix summarize the results of a renewed paleontological resources assessment, which includes a review of geologic maps, geotechnical investigation data, scientific literature, confidential fossil locality records from the Natural History Museum of Los Angeles County (NHMLA) and the San Bernardino County Museum (SBCM), the BLM's Potential Fossil Yield Classification (PFYC) mapping, and a reconnaissance survey. This technical report also includes a discussion of the potential of the project to impact scientifically significant paleontological resources and provides mitigation recommendations to reduce potential impacts to less-than-significant levels, pursuant to CEQA.
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Submission Date:	7/22/2024 5:19:38 PM
Docketed Date:	7/23/2024

Paleontological Resources Technical Report for the Soda Mountain Solar Project for an Environmental Impact Report, San Bernardino County, California

FEBRUARY 2024

PREPARED FOR

Soda Mountain Solar, LLC

PREPARED BY

SWCA Environmental Consultants

PALEONTOLOGICAL RESOURCES TECHNICAL REPORT FOR THE SODA MOUNTAIN SOLAR PROJECT FOR AN ENVIRONMENTAL IMPACT REPORT, SAN BERNARDINO COUNTY, CALIFORNIA

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SWCA Project No. 068347-002-PAS
BLM Report No. CR-680-2023-0009P

February 2024

EXECUTIVE SUMMARY

Purpose and Scope: Soda Mountain Solar, LLC (project applicant), retained SWCA Environmental Consultants (SWCA) to update technical studies and draft an Environmental Impact Report (EIR) in support of the proposed Soda Mountain Solar Project (project), situated on lands administered by the Bureau of Land Management (BLM) in San Bernardino County, California. The project applicant proposes to construct, operate, maintain, and decommission a proposed 300-megawatt photovoltaic solar facility. The proposed project was previously analyzed for potential impacts under the National Environmental Policy Act (NEPA) and environmental review under the California Environmental Quality Act (CEQA) during an initial right-of-way (ROW) grant application with the Bureau of Land Management (BLM). The BLM and the County of San Bernardino (County) published the *Proposed Plan Amendment/ Final Environmental Impact Statement/ Environmental Impact Report for the Soda Mountain Solar Project* (PA/EIS/EIR) on June 12, 2015 (BLM 2015). A Record of Decision (ROD) was issued by the BLM; however, the County rejected the EIR. Due to changes in the overall project, the California Department of Fish and Wildlife (CDFW) has been listed as the new CEQA lead agency and requires reanalysis for the new EIR. Therefore, SWCA has prepared this paleontological resources technical report to summarize the results of a renewed paleontological resources assessment, which includes a review of geologic maps, geotechnical investigation data, scientific literature, confidential fossil locality records from the Natural History Museum of Los Angeles County (NHMLA) and the San Bernardino County Museum (SBCM), the BLM's Potential Fossil Yield Classification (PFYC) mapping, and a reconnaissance survey. This technical report also includes a discussion of the potential of the project to impact scientifically significant paleontological resources and provides mitigation recommendations to reduce potential impacts to less-than-significant levels, pursuant to the CEQA.

Date of Investigation: SWCA conducted a reconnaissance survey and reviewed the relevant maps, scientific literature, results of museum records searches, a preliminary geotechnical investigation, and other relevant information in April, June, July, and August 2023. The results of museum records searches were received from the NHMLA on May 7, 2023, and from the SBCM on May 19, 2023. The reconnaissance survey was conducted over 2 days from July 5 to July 6, 2023, under SWCA's California Bureau of Land Management (BLM) Permit for Paleontological Investigations (CA- 22-08P), with a Fieldwork Authorization received from the Barstow Field Office (FA-680-23-0020-P, obtained June 23, 2023).

Summary of Findings: SWCA reviewed geologic maps, geotechnical investigation data, scientific literature, museum records, and the BLM's PFYC mapping, which were supplemented by a reconnaissance survey, to determine the potential for significant impacts to scientifically significant paleontological resources. According to published geologic mapping, the surface of the project site is mapped as late Holocene alluvial fan deposits (Qf), Holocene to late Pleistocene young alluvial fan deposits (Qyf), Holocene to late Pleistocene young eolian and dune deposits (Qye), and late to middle Pleistocene old alluvial fan deposits (Qof), with Tertiary (Neogene) age formations of volcanic origin (Tv) and Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr) present in the immediate vicinity. Geotechnical investigation data indicate that sediments in the alluvial deposits fine downward (grade with depth to finer-grained deposits) at depths of at least 7 to 10 feet below ground surface (bgs). Additionally, although the results of the museum records searches did not note the presence of paleontological resources within the bounds of the project site, several Pleistocene-age fossils have been documented at the surface to depths of at least 25 feet bgs within a 5-mile to 11-mile radius of the project site, and the PA/EIS/EIR noted four fossils immediately outside of the project site. The results of the reconnaissance survey indicate that fine-grained deposits capable of preserving intact fossils are present at depths as shallow as 4.5 feet bgs, which are capped by a veneer of coarse-grained sediments that likely would not contain intact fossils. No paleontological resources were observed or recorded during the reconnaissance survey.

The BLM's (2022b) PFYC mapping indicates that the surface of the project site contains low potential (PFYC Class 2) or unknown potential (PFYC Class U). However, the results of this assessment indicate that the project site varies in its paleontological sensitivity classification from very low potential (PFYC Class 1) to moderate potential (PFYC Class 3). SWCA recommends provisional reassignment of the paleontological potential for Qyf and Qof from low potential (PFYC Class 2) and unknown potential (PFYC Class U), respectively, to both be low to moderate potential, increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth, e.g., 4.5 feet bgs). Additionally, since Qye only form a veneer over Tv and/or gr (both of which have very low potential [PFYC Class 1]), Qye are provisionally reassigned from low potential (PFYC Class 2) to very low potential (PFYC Class 1). The BLM's PFYC rankings for Qf (low potential [PFYC Class 2]), Tv (very low potential [PFYC Class 1]), and gr (very low potential [PFYC Class 1]) would remain the same.

Ground-disturbing activities in geologic units of very low potential (PFYC Class 1) or low potential (PFYC Class 2) are unlikely to result in potentially significant impacts to scientifically significant or important paleontological resources. However, ground-disturbing activities in previously undisturbed sediments in geologic units identified as moderate or higher potential (e.g., PFYC Class 3, 4, 5, or U) may result in disturbances to potentially significant paleontological resources. Any fossils encountered during ground disturbances in these areas would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA.

Recommendations: To ensure that potentially significant impacts to scientifically significant or important paleontological resources are reduced to less-than-significant levels, SWCA recommends the following mitigation measures, which have been developed in accordance with and incorporate the mitigation measures in the *Proposed Plan Amendment/ Final Environmental Impact Statement/ Environmental Impact Report for the Soda Mountain Solar Project* (BLM 2015); the BLM's (2008a, 2008b, 2016, 2022a, 2022b) guidelines; federal, state, and local regulations; and best practices in mitigation paleontology (Murphey et al. 2019): 1) retain a Project Paleontologist listed as a Principal Investigator on a current California BLM Permit for Paleontological Investigations who meets or exceeds the standards of the BLM (2008a, 2022a) to oversee the execution of all paleontological mitigation measures; 2) conduct worker training to educate the construction crew on the legal requirements and procedures to follow in the event of a fossil discovery; 3) prepare a paleontological resources monitoring and mitigation plan (PRMMP) that incorporates the latest project description, engineering plans, and project site location, as well as specifies location and depth thresholds that require paleontological monitoring during ground-disturbing activities; 4) prepare protocols for unanticipated discovery of paleontological resources; and 5) prepare a final paleontological resources monitoring report at the conclusion of ground-disturbing activities to document the paleontological monitoring efforts for the project and describe any paleontological resources discoveries observed and/or recorded during the life of the project. If paleontological resources are curated, the final monitoring report and any associated data pertinent to the curated specimen(s) should be submitted to the designated repository. A copy of the final monitoring report should be filed with the BLM, CDFW, and/or another overseeing agency.

Disposition of Data: Pending BLM approval, this report will remain on file with the project applicant, CDFW, BLM, and SWCA's Pasadena office.

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INTRODUCTION

Soda Mountain Solar, LLC (project applicant) retained SWCA Environmental Consultants (SWCA) to update technical studies and draft an Environmental Impact Report (EIR) in support of the proposed Soda Mountain Solar Project (project) in San Bernardino County, California (Figure 1). The project applicant proposes to construct, operate, maintain, and decommission a proposed 300-megawatt (MW) photovoltaic (PV) solar facility. The proposed project is subject to environmental review under the California Environmental Quality Act (CEQA), and the California Department of Fish and Wildlife (CDFW) is the new lead CEQA agency. The proposed project was analyzed for potential impacts under the National Environmental Policy Act (NEPA) and environmental review under CEQA during an initial right-of-way (ROW) grant application with the Bureau of Land Management (BLM). The BLM and the County of San Bernardino (County) published the *Proposed Plan Amendment/ Final Environmental Impact Statement/ Environmental Impact Report for the Soda Mountain Solar Project* (PA/EIS/EIR) on June 12, 2015 (BLM 2015). A Record of Decision (ROD) was issued by the BLM, and County Planning staff recommended approval of the project. However, the County Board of Supervisors declined to certify the EIR, and no decision was made regarding the issuance of groundwater well permits. The current project is similar to the revised project in the BLM's ROD; however, groundwater wells would no longer be required for water supply. Therefore, a groundwater permit from the County is no longer necessary. In addition, the County will no longer act as the CEQA lead agency as it does not have discretionary responsibility for the project. CEQA requires the assessment of potentially significant impacts to the environment caused by construction or implementation of the project. Therefore, SWCA has prepared this paleontological resources technical report to summarize the results of a paleontological resources assessment, which includes a review of geologic maps, scientific literature, subsurface geotechnical data prepared by Diaz Yourman & Associates (DYA 2010), confidential fossil locality records from the Natural History Museum of Los Angeles (NHMLA) and the San Bernardino County Museum (SBCM), a paleontological field reconnaissance survey, and other relevant information. This technical report also includes a discussion of potential impacts to scientifically significant paleontological resources and mitigation recommendations to reduce potential impacts to less-than-significant levels.

This study follows the guidelines of the BLM (1998, 2008a, 2016, 2022a, 2022b) and published best practices in mitigation paleontology (Murphey et al. 2019). SWCA Paleontology Team Lead and BLM-permitted Principal Investigator Mathew Carson, M.S., provided technical oversight of the project and was the main author of this technical report. SWCA Staff Paleontologists and BLM-permitted Field Agents Jasmyn Nolasco, M.S., and Kristina Akesson, B.S., conducted the pedestrian reconnaissance survey and co-authored this technical report. SWCA Principal Paleontologist and BLM-permitted Principal Investigator Russell Shapiro, Ph.D., provided peer review of this report for technical quality assurance/quality control, SWCA Project Paleontologist and BLM-permitted Principal Investigator Sarah Rieboldt, Ph.D., provided additional technical review, and SWCA Lead Environmental Planner Kara Laurenson-Wright, B.S., managed the overall project. Figures were generated by SWCA Geographic Information System (GIS) Specialist Marty Kooistra, M.A. Copies of the report are on file with SWCA's Pasadena office.

PROJECT LOCATION

The project ROW and project area (collectively referred herein as "project site") is located entirely on federally owned land managed by the BLM, approximately 7 miles southwest of the community of Baker in unincorporated San Bernadino County, California (Figures 2 and 3). The project would occupy approximately 2,670 acres in the alluvial valley dividing the northern and southern portions of the Soda Mountains in the Mojave Desert. The project is bounded to the east by the Mojave National Preserve and BLM lands, including the Rasor Off-Highway Vehicle (OHV) recreation area at the southeast corner.

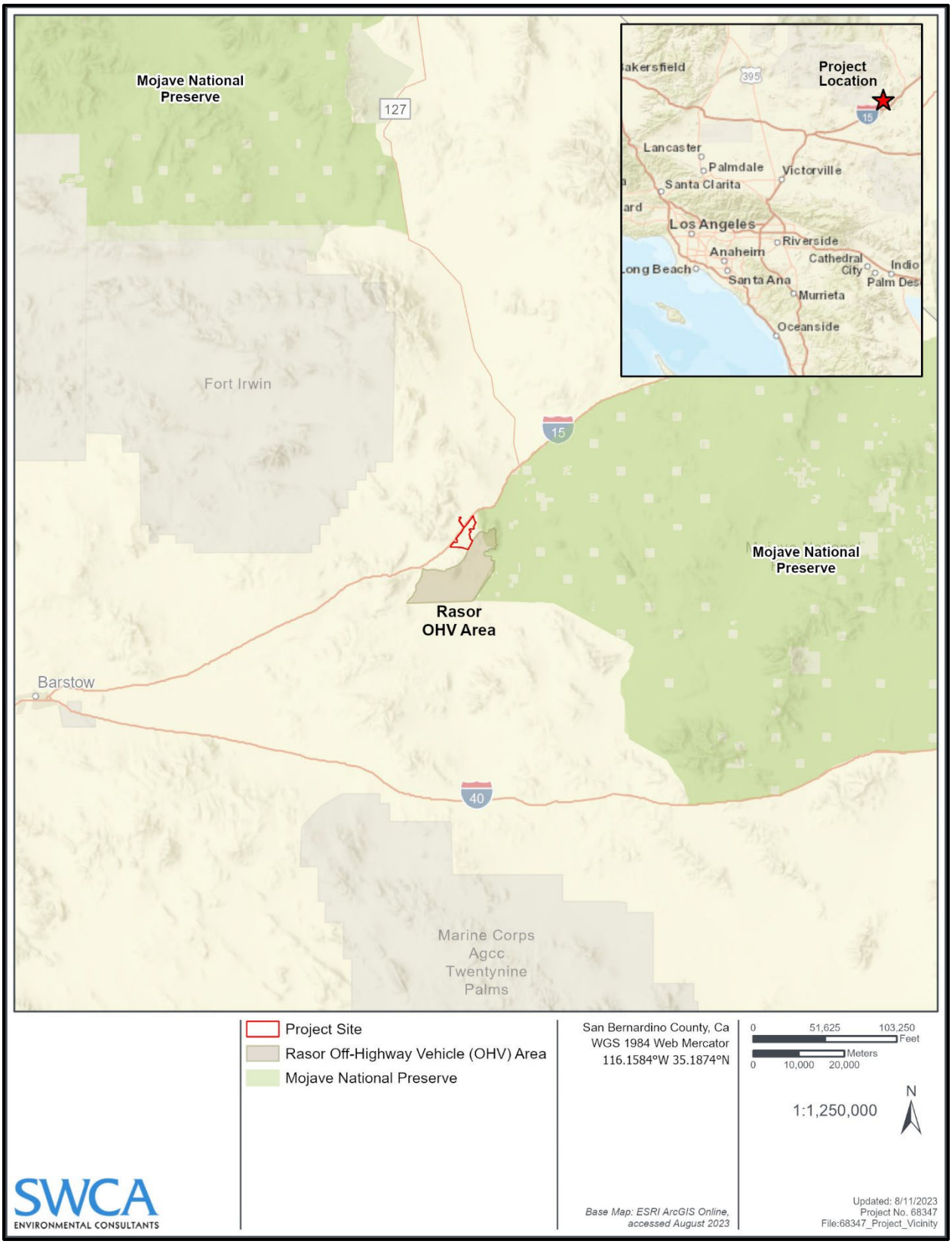

Figure 1. Project site vicinity.

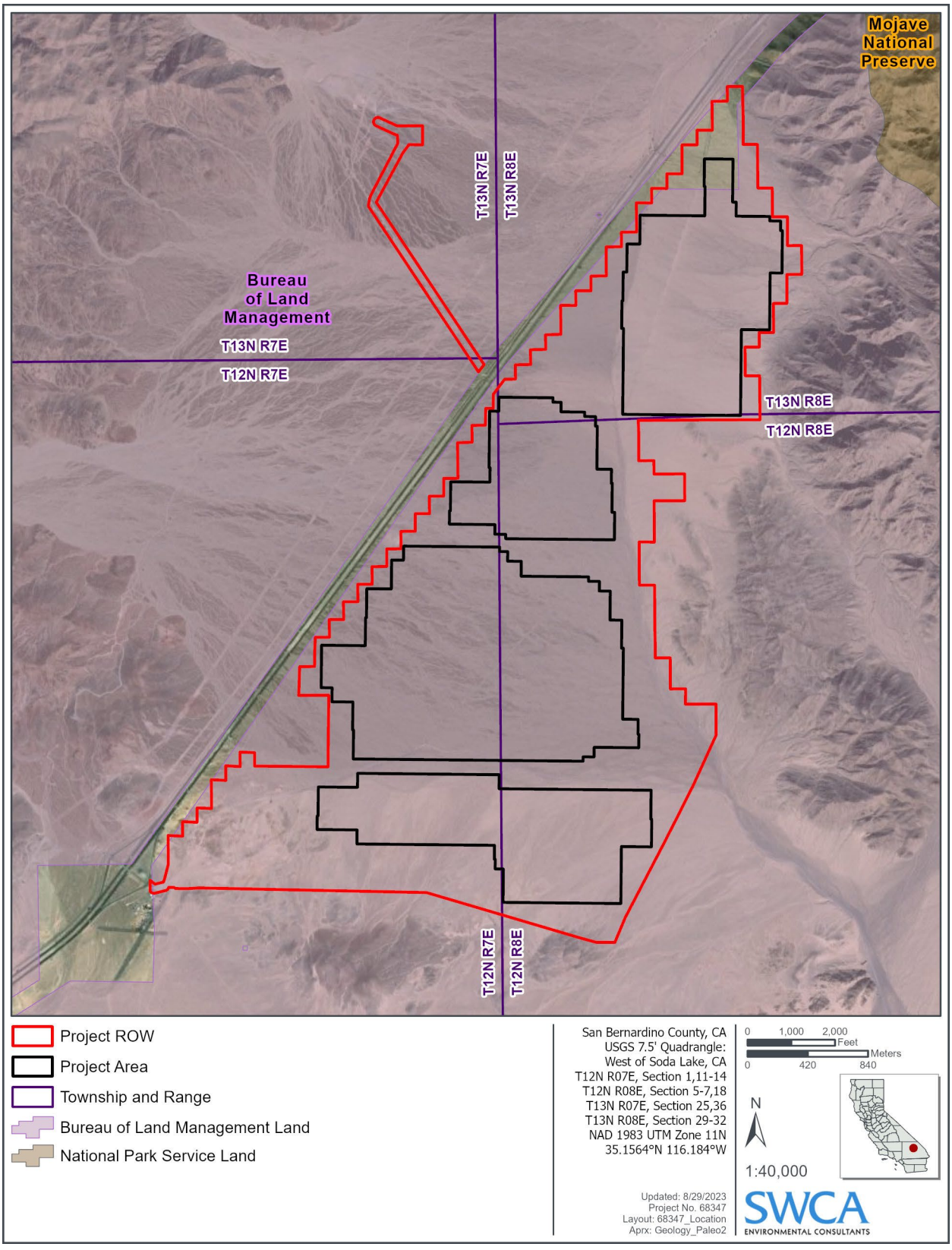

Figure 2. Project site location plotted on an aerial map.

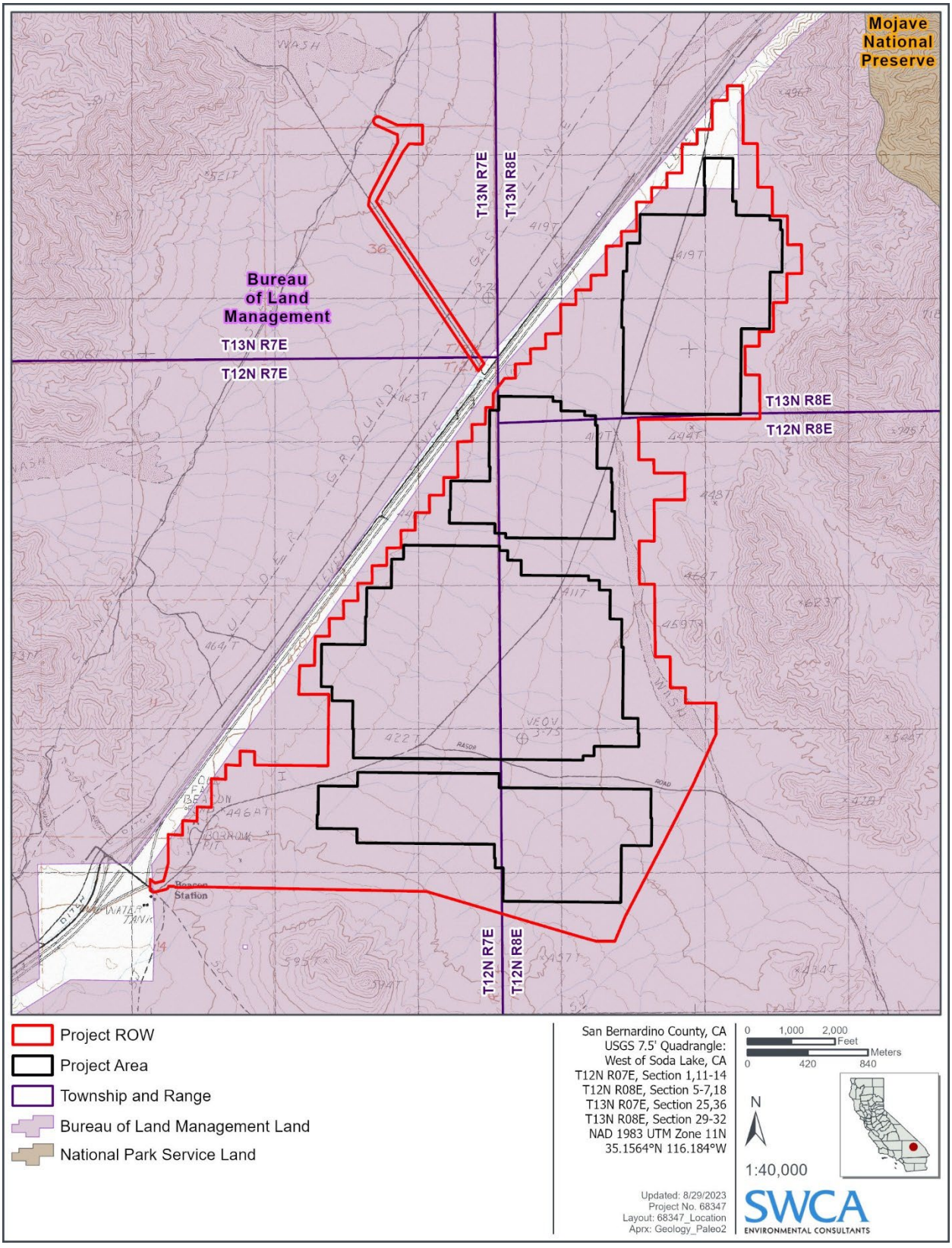

Figure 3. Project site location plotted on the USGS West of Soda Lake, California, 7.5-minute topographic quadrangle.

Interstate 15 (I-15) runs along the western boundary of the project site, with Rasor Road Services Shell Oil gas station located off I-15 southwest of the project site, along the access road to the project site.

Infrastructure surrounding the site includes the four-lane I-15, two high-voltage electric transmission lines, an electrical distribution line, wireless cellular telephone towers, two fiber-optic cables, and two fuel pipelines. The two high-voltage electrical transmission lines to the west of I-15 are a 115-kilovolt (kV) sub-transmission line owned by Southern California Edison (SCE) and the Marketplace-Adelanto 500-kV transmission line operated by the Los Angeles Department of Public Works (LADWP). Approximately six culverts run under I-15 adjacent to the project site.

The project site is plotted in Sections 1 and 12, Township 12 North, Range 7 East; Sections 6, 7, and 18, Township 12 North, Range 8 East; and Sections 30–32, Township 13 North, Range 8 East as depicted on the U.S. Geological Survey (USGS) West of Soda Lake, California, 7.5-minute topographic quadrangle (see Figure 3).

PROJECT DESCRIPTION

The project proposes to construct, operate, maintain, and decommission a proposed 300 MW PV solar facility located on approximately 2,670 acres. The project components are as follows:

1. The solar plant site, operation and maintenance buildings and structures, stormwater infrastructure, and related infrastructure and improvements
2. A substation and switchyard for interconnection to the existing transmission system
3. Approximately 300 MW of battery energy storage system (BESS) across 18 acres

The project would operate year-round and would generate electricity during daylight hours when the sun is shining. The project would generate and deliver solar-generated power to the regional electrical grid through an interconnection with the existing Marketplace-Adelanto 500-kV transmission line operated by the LADWP. The approximate permanent disturbance acreage for the project would be approximately 2,040 acres. The estimate for permanent disturbance includes the solar arrays, substation, switchyard, gen-tie interconnection, BESS, operation and maintenance facilities, access roads, berms, collector routes, laydown areas, and desert tortoise exclusion fencing. The following description of project components and infrastructure is based on the project's 30% civil design. During final design, the configuration and number of components may vary as a result of micrositing but would occur within the project footprint analyzed.

Ground-disturbing activities would be needed for construction of the following project components: 1) support and mounting structures that will be spaced approximately 20 feet apart and buried to a depth of approximately 8 to 12 feet; 2) electrical connection system that will include trenches from the combiner boxes to the inverters and transform pads that would be approximately 3 to 4 feet deep and 1 to 3 feet wide; 3) gen-tie connection from the solar array to substation extending approximately 0.25 mile; 4) security fencing with posts buried up to 3.5 feet deep; 5) grading and ground treatment outside of existing major drainage channels up to 2,040 acres; 6) three drainage channels, each of which is approximately 3 feet deep; and 7) ten temporary basins. Grubbing and grading would be required across a majority of the site to level rough or undulating areas of the site and to prepare soils for concrete foundations for substation equipment, inverters, energy storage systems, and the operations and maintenance buildings. Grubbing would involve the removal of vegetation from the construction site, while grading would include earthwork to achieve a certain base or slope. There would be approximately 630,000 cubic yards of cut and 180,100 cubic yards of fill, thus requiring approximately 449,900 cubic yards of cut on site.

DEFINITION OF SIGNIFICANCE

For the purposes of this project and as defined by the Paleontological Resources Preservation Act of 2009 (PRPA) (16 United States Code [USC] 470aaa), paleontological resources are fossilized remains, traces, or imprints of organisms, preserved in or on the Earth's crust that are of paleontological interest and that provide information about the history of life on Earth. They are considered nonrenewable resources because the organisms they represent no longer exist, and such resources, if destroyed, cannot be replaced. Paleontological resources may include bones, teeth, shells, traces, leaves, and wood. Fossils are important scientific and educational resources that paleontologists use to study taphonomic processes. Paleontologists also use the morphologic information that fossils provide to reconstruct phylogenetic relationships of extinct and extant organisms; to study evolution, extinction, and speciation patterns; to reconstruct ancient environments and paleobiogeographic relationships; and to provide relative geological dates through biochronology and biostratigraphy.

The BLM's (2008a) defines a "significant paleontological resource" as follows:

> Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be scientifically important because it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has identified educational or recreational value. Paleontological resources that may be considered to not have paleontological significance include those that lack provenience or context, lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities. (BLM 2008a:1–18 to 1–19)

Yet, with the passage of the PRPA and consideration of other agency definitions and paleontological resource best practices it is useful and appropriate, when determining fossil importance, to consider a other criteria. Fossils are considered scientifically important if one or more of the following criteria (modified from Scott and Springer [2003]) are met:

- The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and extinct.
- 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 geological events therein.
- The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas.
- The fossils demonstrate unusual or spectacular circumstances in the history of life.
- 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 resources that may not have paleontological significance or be considered not scientifically important are those that lack provenience or context, that lack physical integrity because of decay or natural erosion, or that are overly redundant or are otherwise not useful for research (Murphey et al. 2019).

RESOURCE ASSESSMENT GUIDELINES

The loss of any identifiable paleontological resources that could yield information important to prehistory, or that embodies the distinctive characteristics of a type of organism, environment, period of time, or geographic region, would be a significant environmental impact. Direct impacts on paleontological resources primarily concern the potential destruction of nonrenewable paleontological resources and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information (a significant impact). At the project-specific level, direct impacts can be reduced to a less-than-significant level through the implementation of paleontological mitigation.

The CEQA threshold of significance for an impact to paleontological resources is reached when a project is determined to "directly or indirectly destroy a significant paleontological resource or unique geologic feature" (State CEQA Guidelines: Appendix G). In general, ground-disturbing activities associated with a project's construction or implementation in areas considered to have geologic units of moderate, high, or very high paleontologically sensitivity, either at the surface or at depth, could result in potentially significant impacts to significant paleontological resources if mitigation practices are not implemented. Conversely, for ground-disturbing activities associated with a project situated directly within geologic units identified as having low or very low paleontological sensitivity, there is low to very low potential for significant impacts to significant paleontological resources unless such ground-disturbing activities have the potential to impact underlying geologic units of relatively higher paleontological sensitivity in the subsurface.

REGULATORY SETTING

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under federal regulations, state legislation, and local laws and regulations.

Federal Regulations

Although this report has been prepared specifically to support a CEQA EIR, the project is on federal land, and therefore, pertinent federal regulations are provided below.

National Environmental Policy Act

NEPA (42 United States Code [USC] 4321) requires the consideration of important natural aspects of our national heritage during the assessment of environmental consequences of proposed projects with federal land or, in some cases, federal oversight. With the passage of the PRPA, paleontological resources are considered significant resources, and therefore, it is standard practice to include paleontological resources in NEPA studies in all instances where there is a possible impact in order to make a determination of the significance of affected resources and to take into account whether irreversible adverse impacts to such resources can or should be avoided, minimized, or mitigated.

Paleontological Resources Preservation Act, Omnibus Public Lands Act, Public Law 111-011, Title VI, Subtitle D (16 USC 470aaa-1 through aaa-11)

The PRPA (16 USC 470aaa-aaa-11) defines paleontological resources, reaffirms that paleontological resources collected from federal lands are federal property, and states that the Secretaries of the Interior and Agriculture shall use scientific principles and expertise to manage and protect paleontological resources on federal land. It incorporates many of the recommendations from the report of the Secretary of the Interior entitled Assessment of Fossil Management on Federal and Indian Lands (U.S. Department of the Interior [DOI] 2000), which details actions to formulate a consistent paleontological resources management framework, including defining the value of fossil resources and providing management guidelines for federal and Indian lands (DOI 2000). The PRPA provides certain mandates for administering paleontological resource research and collecting permits and the curation of fossil specimens. As discussed in detail in the 2022 DOI Paleontological Resources Preservation rule (87 Federal Register 47296), 43 CFR 49 implements provisions of the PRPA on lands under the jurisdiction of the DOI, including the BLM. This regulation provides for the management, preservation, and protection of paleontological resources on lands administered by the BLM, the Bureau of Reclamation, the National Park Service, and the U.S. Fish and Wildlife Service, and ensures that these federally owned resources are available for present and future generations to enjoy as part of America's national heritage. The regulation addresses the management, collection, and curation of paleontological resources from federal lands using scientific principles and expertise, including collection in accordance with permits, curation in an approved repository, and maintenance of confidentiality of specific locality data. The regulation details the processes related to the civil and criminal penalties for illegal collecting, damaging, otherwise altering or defacing, or selling paleontological resources.

Federal Land Policy and Management Act

The Federal Land Policy and Management Act of 1976 (FLPMA) does not refer specifically to fossils. However, “significant fossils” are understood and recognized in policy as scientific resources. Under FLPMA, federal agencies are charged to:

- manage public land in a manner that protects the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, archaeological, and water resources, and, where appropriate, preserve and protect certain public lands in their natural condition (Section 102 [a][8][11]);

- periodically inventory public land so that the data can be used to make informed land-use decisions (Section 201[a][2]); and

- regulate the use and development of public land and resources through easements, licenses, and permits (Section 302[b]).

Code of Federal Regulations, Title 43

Under Title 43 of the Code of Federal Regulations, Section 8365.1-5, the collection of scientific and paleontological resources, including vertebrate fossils, on federal land is prohibited. The collection of a “reasonable amount” of common invertebrate or plant fossils for non-commercial purposes is permissible (43 CFR 8365.1-5).

State Regulations

California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the state and is codified at California Public Resources Code (PRC) 21000 et seq. CEQA requires lead agencies to determine whether a proposed project would have a significant effect on the environment, including significant effects on paleontological resources. Guidelines for the Implementation of CEQA, as amended December 28, 2018 (Title 14, Chapter 3, California Code of Regulations 15000 et seq.), define procedures, types of activities, persons, and public agencies required to comply with CEQA. Section VII(f) of the Environmental Checklist (State CEQA Guidelines: Appendix G) asks whether a project would directly or indirectly destroy a unique paleontological resource and result in impacts to the environment.

California Public Resources Code Section 5097.5

Requirements for paleontological resource management are included in PRC Division 5, Chapter 1.7, Section 5097.5, which states,

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

These statutes prohibit the removal, without permission, of any paleontological site or feature from land under the jurisdiction of the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, local agencies are required to comply with PRC Section 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others. PRC Section 5097.5 also establishes the removal of paleontological resources as a misdemeanor and requires reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, and district) land.

Local Regulations

County of San Bernardino

The Conservation Element of the County of San Bernardino 2007 General Plan (County of San Bernardino 2007: Chapter V) identifies paleontological resources as part of the heritage of San Bernardino County. Goal CO3 states, "the County will preserve and promote its historic and prehistoric cultural heritage," and identifies the following policies to preserve paleontological resources:

> **Policy CO 3.4, Program 4**: In areas of potential but unknown sensitivity, field surveys prior to grading will be required to establish the need for paleontologic monitoring.
>
> **Policy CO 3.4, Program 5**: Projects requiring grading plans that are located in areas of known fossil occurrences, or demonstrated in a field survey to have fossils present, will have all rough grading (cuts greater than 3 feet) monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and

preserved. Fossils include large and small vertebrate fossils, the latter recovered by screen washing of bulk samples.

Policy CO 3.4, Program 6: A report of findings with an itemized accession inventory will be prepared as evidence that monitoring has been successfully completed. A preliminary report will be submitted and approved prior to granting of building permits, and a final report will be submitted and approved prior to granting of occupancy permits. The adequacy of paleontologic reports will be determined in consultation with the Curator of Earth Science, San Bernardino County Museum.

Additionally, the Cultural Resources Element of the County of San Bernardino Countywide Plan (County of San Bernardino 2020) contains one goal and one policy related to the preservation of paleontological resources. Goal CR-2 states, "Historic resources (buildings, structures, or archaeological resources) and paleontological resources that are protected are preserved for their cultural importance to local communities as well as their research and educational potential," and identifies the following policy to preserve paleontological resources:

Policy CR-2.3 Paleontological and archaeological resources: We strive to protect paleontological and archaeological resources from loss or destruction by requiring that new development include appropriate mitigation to preserve the quality and integrity of these resources. We require new development to avoid paleontological and archeological resources whenever possible. If avoidance is not possible, we require the salvage and preservation of paleontological and archeological resources.

Mitigation Measures

The following four mitigation measures are incorporated into this assessment from the *Proposed Plan Amendment/ Final Environmental Impact Statement/ Environmental Impact Report for the Soda Mountain Solar Project* (BLM 2015).

Mitigation Measure 3.12-1: Prior to construction, design plans shall be compared with geotechnical data and foundation design requirements compiled under Mitigation Measure 3.7-2 to determine whether the subsurface geology has a higher paleontological sensitivity than the surface geology, and whether construction will disturb the underlying higher sensitivity geologic units. If disturbance will occur, then monitoring of construction excavations in the disturbance areas shall take place in order to reduce potential adverse effects on significant paleontological resources.

Mitigation Measure 3.12-2: Prior to construction, a training session on the recognition of the types of paleontological resources that could be encountered within the requested ROW boundary and the procedures to be followed if they are found shall be presented to project personnel by a qualified and BLM-permitted professional paleontologist.

Mitigation Measure 3.12-3: Based on the results of the field survey ([see BLM 2015 for reference]) and in accordance with the BLM's paleontological resource management policies, monitoring shall take place in all areas where excavations that disturb areas with PFYC designations of 3, 4, and 5 would occur during any project phase. The monitoring program shall be designed and implemented by a qualified and BLM-permitted professional paleontologist and shall be consistent with Section IV of the Guidelines for Assessment and Mitigation of Potential Impacts to Paleontological Resources (BLM, 2008a). All scientifically significant fossils salvaged during construction monitoring shall be prepared to the point of curation, identified to element

and the lowest possible taxonomic level, and transferred to the San Bernardino County Museum for permanent storage. The results of the paleontological monitoring program, including an itemized inventory of salvaged fossils, shall be detailed in a Final Paleontological Monitoring Report prepared according to BLM policy (BLM 1998, 2008a, 2008b).

Mitigation Measure 3.12-4: If any potential fossils are discovered during construction, operation and/or maintenance activities, or during decommissioning, all activities within 100 feet in all directions from the discovery shall cease immediately to protect the discovery and its geological context from damage, and the Applicant shall notify the BLM Authorized Officer immediately. As soon as possible, but not later than 10 working days after being notified, the BLM Authorized Officer shall notify and work with a qualified and BLM-permitted professional paleontologist to evaluate the significance of the discovery. The BLM Authorized Officer and BLM-permitted professional paleontologist shall determine appropriate measures to mitigate adverse effects to significant paleontological resources in consultation with the Applicant. Activities may not resume within 100 feet in any direction of the discovery until the BLM Authorized Officer and BLM-permitted professional paleontologist concur that activities may resume.

METHODS

The following sections present an overview of the methodology used to analyze the potential for significant impacts to paleontological resources within the project site. This report conforms to requirements of the BLM (1998, 2008a, 2008b, 2016, 2022a, 2022b) and published best practices in mitigation paleontology (Murphey et al. 2019). The purpose of this analysis is to 1) determine whether any previously recorded fossil localities are within the project site; 2) if so, assess the potential for disturbance of these localities during construction; and 3) evaluate the paleontological potential of the project site.

Existing Data Analysis

SWCA conducted an analysis of available existing data pertinent to paleontological resources. This analysis included a review of geologic maps, geotechnical information, scientific literature, results of museum records searches, and a pedestrian reconnaissance survey. The geologic mapping used in this analysis is from Bedrossian and others (2012) compiled from several quadrangles at scales of 1:100,000, and geotechnical investigation data are from DYA (2010). Museum records search requests were submitted to the NHMLA and the SBCM on April 26, 2023. The results of the museum records searches are incorporated into the Results section of this report. Appendix A (confidential) and Appendix B (confidential) provide a copy of the NHMLA and SBCM museum records search results, respectively. The "desktop" review was supplemented by a review of the BLM's Potential Fossil Yield Classification (PFYC) data (BLM 2016, 2022a, 2022b). The desktop information and PFYC were used to determine areas subject to a pedestrian reconnaissance survey and to assign provisional PFYC rankings to geologic units within the project site.

Bureau of Land Management Potential Fossil Yield Classification System

The PFYC system was developed to provide baseline guidance for assessing paleontological resources and allow BLM employees to make initial assessments of paleontological resources. The presence of paleontological resources is known to be correlated with mapped geologic units. The PFYC system

assigns a class value to geological units, representing the potential abundance and significance of paleontological resources that occur in that geological unit. The BLM has assigned a PFYC ranking (Class 1 to Class 5) to each geological unit (formation, member, or other distinguishable units) at the most detailed, mappable level based on the taxonomic diversity and abundance of previously recorded scientifically significant paleontological resources associated with the unit and the potential for future discoveries, with a higher-class number indicating higher potential (BLM 2022a). Additional rankings are provided for geological units of unknown potential (Class U), water (Class W), and ice (Class I). The PFYC system is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally exist in a geological unit, a few widely scattered important fossils or localities do not necessarily indicate a higher class; instead, the relative abundance of significant localities is intended to be the major determinant for the class assignment. The PFYC system provides baseline guidance for agencies and specialists for determining the potential for paleontological resources and allows management considerations to be proposed and implemented as recommended. A complete discussion of the background and context for the PFYC system is provided in BLM *Instructional Memorandum (IM) 2016-124* (BLM 2016), which was updated in BLM *Permanent IM No. 2022-009* (BLM 2022a). The following descriptions of paleontological sensitivity class rankings pertinent to this project, drawn directly from the BLM guidelines (BLM 2022a), are provided here:

Class 1 – Very Low. Geologic units that are not likely to contain recognizable paleontological resources. Units assigned to Class 1 typically have one or more of the following characteristics:

- Geologic units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
- Geologic units are Precambrian in age.

(1) Management concerns for paleontological resources in Class 1 units are usually negligible or not applicable.

(2) Paleontological mitigation is unlikely to be necessary except in very rare or isolated circumstances that result in the unanticipated presence of paleontological resources, such as unmapped geology contained within a mapped geologic unit. For example: young fissure-fill deposits often contain fossils but are too limited in extent to be represented on a geological map; a lava flow that preserves evidence of past life; or caves that contain important paleontological resources. Such exceptions are the reason that no geologic unit is assigned a Class 0.

Overall, the probability of impacting significant paleontological resources is very low, and further assessment of paleontological resources is usually unnecessary. An assignment of Class 1 normally does not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate an unanticipated discovery.

Class 2 – Low. Geologic units that are not likely to contain paleontological resources. Units assigned to Class 2 typically have one or more of the following characteristics:

- Field surveys have verified that significant paleontological resources are not present or are very rare.
- Units are generally younger than 10,000 years before present.

- Recent aeolian deposits.

- Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely.

  (1) Except where paleontological resources are known or found to exist, management concerns for paleontological resources are generally low and further assessment is usually unnecessary except in occasional or isolated circumstances.

  (2) Paleontological mitigation is only necessary where paleontological resources are known or found to exist.

  The probability of impacting significant paleontological resources is low. Localities containing important paleontological resources may exist, but are occasional and should be managed on a case-by-case basis. An assignment of Class 2 may not trigger further analysis unless paleontological resources are known or found to exist. However, standard stipulations should be put in place prior to authorizing any land use action in order to accommodate unanticipated discoveries.

Class 3 – Moderate. Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence. Units assigned to Class 3 have some of the following characteristics:

- Marine in origin with sporadic known occurrences of paleontological resources.

- Paleontological resources may occur intermittently, but abundance is known to be low.

- Units may contain significant paleontological resources, but these occurrences are widely scattered.

- The potential for an authorized land use to impact a significant paleontological resource is known to be low-to-moderate.

  (1) Management concerns for paleontological resources are moderate because the existence of significant paleontological resources is known to be low. Common invertebrate or plant fossils may be found in the area, and opportunities may exist for casual collecting.

  (2) Paleontological mitigation strategies will be proposed based on the nature of the proposed activity.

  This classification includes units of moderate or infrequent occurrence of paleontological resources. Management considerations cover a broad range of options that may include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Surface-disturbing activities may require assessment by a qualified paleontologist to determine whether significant paleontological resources occur in the area of a proposed action, and whether the action could affect the paleontological resources.

Class 4 – High. Geologic units that are known to contain a high occurrence of paleontological resources. Units assigned to Class 4 typically have the following characteristics:

- Significant paleontological resources have been documented but may vary in occurrence and predictability.
- Surface-disturbing activities may adversely affect paleontological resources.
- Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
- Illegal collecting activities may impact some areas.

(1) Management concerns for paleontological resources in Class 4 are moderate to high, depending on the proposed action.

(2) Paleontological mitigation strategies will depend on the nature of the proposed activity, but field assessment by a qualified paleontologist is normally needed to assess local conditions.

The probability for impacting significant paleontological resources is moderate to high and is dependent on the proposed action. Mitigation plans must consider the nature of the proposed disturbance, such as removal or penetration of protective surface alluvium or soils, potential for future accelerated erosion, or increased ease of access that could result in looting. Detailed field assessment is normally required, and on-site monitoring or spot-checking may be necessary during land-disturbing activities. In some cases, avoidance of known paleontological resources may be necessary.

Class 5 – Very High. Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources. Units assigned to Class 5 have some or all of the following characteristics:

- Significant paleontological resources have been documented and occur consistently.
- Paleontological resources are highly susceptible to adverse impacts from surface-disturbing activities.
- Unit is frequently the focus of illegal collecting activities.

(1) Management concerns for paleontological resources in Class 5 areas are high to very high.

(2) A field survey by a qualified paleontologist is almost always needed. Paleontological mitigation may be necessary before or during surface-disturbing activities.

The probability for impacting significant paleontological resources is high. The area should be assessed prior to land tenure adjustments. Pre-work surveys are usually needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.

Class U – Unknown Potential. Geologic units that cannot receive an informed PFYC assignment. Characteristics of Class U may include:

- Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is known.

- Geological units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail.

- Scientific literature does not exist or does not reveal the nature of paleontological resources.

- Reports of paleontological resources are anecdotal or have not been verified.

- Area or geologic unit is poorly or under-studied.

- BLM staff has not yet been able to assess the nature of the geologic unit.

  (1) Until a provisional assignment is made, geologic units that have an unknown potential have medium to high management concerns.

  (2) Lacking other information, field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

  An assignment of "Unknown" may indicate the unit or area is poorly studied, and field surveys are needed to verify the presence or absence of paleontological resources. Literature searches or consultation with professional colleagues may allow an unknown unit to be provisionally assigned to another class, but the geological unit should be formally assigned to a class after adequate survey and research is performed to make an informed determination.

Class W – Water. Includes any surface area that is mapped as water. Bodies of water do not normally contain paleontological resources. However, shorelines should be carefully considered for uncovered or transported paleontological resources. Reservoirs are a special concern because important paleontological resources are often exposed during low water intervals. In areas of karst sinkholes and cenotes may trap animals and contain paleontological resources. Dredging river systems may result in the disturbance of sediments that contain paleontological resources.

Class I – Ice. Includes any area that is mapped as ice or snow. Receding glaciers, including exposed lateral and terminal moraines should be considered for their potential to reveal recently exposed paleontological resources. Other considerations include melting snow fields that may contain paleontological resources with possible soft-tissue preservation.

Reconnaissance Survey Methods

During the survey for the PA/EIS/EIR, four fossil localities were documented immediately outside of the project site and included nonsignificant burrow and root casts, as well as unidentifiable fossil bone fragments, indicating that fossil material may be present in the general vicinity (BLM 2015). Additionally, although geologic units classified by the BLM (2022b) as low potential (PFYC Class 2) are mapped at the surface throughout most of the project site, geologic units of unknown potential (PFYC Class U) are mapped by the BLM (2022b) along the project site's periphery and may extend into the project site as unmapped deposits or may be present in the subsurface.

Therefore, to supplement the results of the existing data analysis and to conform to the BLM's (2008, 2022a) guidelines, SWCA conducted a pedestrian reconnaissance survey of the project site on July 5 and 6, 2023, under SWCA's California BLM Permit for Paleontological Investigations (CA-22-08P), with a Fieldwork Authorization received from the Barstow Field Office (FA-680-23-0020-P, obtained June 23, 2023). The pedestrian reconnaissance survey was conducted by SWCA Staff Paleontologists and BLM-permitted Field Agents Jasmyn Nolasco M.S., and Kristina Akesson, B.S., working under the direction of SWCA Paleontology Team Lead and BLM-permitted Principal Investigator Mathew Carson, M.S.

The purpose of the reconnaissance survey was to 1) confirm the geologic mapping by Bedrossian and others (2012); 2) assess the status of previously recorded paleontological localities noted in the results of the museum records searches, if any; 3) inspect exposures of previously undisturbed sediments or bedrock outcrops within the project site, if any, to assess their potential to preserve paleontological resources and to evaluate the appropriateness of the BLM's (2022b) PFYC mapping; and 4) record newly identified or previously unrecorded paleontological localities that may be present within the project site, if any. The reconnaissance survey included both pedestrian reconnaissance surveying of most areas identified as unknown potential (PFYC Class U) by the BLM (2022b), and a combined pedestrian and visual reconnaissance survey for areas noted as low potential (PFYC Class 2) by the BLM (2022b). Areas subject to pedestrian reconnaissance survey included walking in transects across the site, inspecting outcrops in dissected channels and survey washes. Areas not subject to pedestrian reconnaissance survey were instead subject to a visual reconnaissance that included windshield drive-by survey to confirm geologic mapping, overview site reconnaissance during pedestrian or windshield survey, and overview site reconnaissance from elevated vantage points looking across the project site.

The results of the pedestrian reconnaissance survey are incorporated into the Results section of this report.

RESULTS

Regional Geology

The project site is in the Mojave Desert, a geomorphic province that occupies about 65,000 square kilometers, bounded to the south and southwest by the Transverse Ranges and to the southeast by the Colorado Desert. The Sierra Nevada and the Basin and Range provinces establish the northern boundary, and the Nevada state line and the Colorado River establish the eastern boundary (Norris and Webb 1990). The Mojave Desert province is wedged in a sharp angle between the Garlock Fault and the San Andreas Fault, where the latter bends east from its northwest trend. The northern boundary of the Mojave Desert is separated from the prominent Basin and Range by the eastern extension of the Garlock Fault (Dokka and Travis 1990).

The Mojave Desert is characterized by scattered mountain blocks composed of a complex of Proterozoic (538.8–2500 million years ago [Ma]) metamorphic rocks, Paleozoic (358.9–538.8 Ma) sedimentary rocks, and Mesozoic (66.0–358.9 Ma) sedimentary and igneous rocks, bounded by normal and strike-slip faults and the broad alluvial basins between them (Cohen et al 2023; Dibblee 1967). Basin sediments vary from thick sequences of Miocene (5.333–23.03 Ma) sediments north of Barstow to younger Quaternary (Present–2.58 Ma) depressions north of Baker, and even rock-floored pediments in the northeastern Mojave Desert (Cohen et al. 2023; Norris and Webb 1990). Lava flows that date from the Cenozoic (Present–66.0 Ma) are also common features across the Mojave Desert, such as Amboy Crater, Cima Dome, and around Pisgah, with volcanic sediments intermixed with terrestrial sediments dating to as far back as the Miocene (Cohen et al. 2023; Dibblee 1967). A more recent feature are the many playas scattered across Mojave Desert, these being particularly numerous in the eastern Mojave Desert (Norris and Webb 1990). Dates for the geologic time intervals used throughout this report are based on the

International Chronostratigraphic Chart prepared and updated regularly by the International Commission on Stratigraphy (Cohen et al. 2023).

The sedimentary record in the western Mojave Desert is dominated by Cenozoic deposits, with earlier deposits of Mesozoic, Paleozoic, and Proterozoic age generally limited to the eastern Mojave Desert (Dibblee 1967). The Cenozoic record in the western Mojave Desert is predominantly nonmarine except for a few thin, restricted lower Miocene marine sediments. The western Mojave Desert region includes extensive thicknesses of non-marine alluvium, with widespread tuff, ash, and other volcaniclastics, interbedded with lakebed sediments and evaporites. Miocene-aged rocks are prominent among the Cenozoic basins of the western Mojave Desert and occur where tectonic activity has exposed these sequences, such as within the Barstow Basin north of Barstow (Norris and Webb 1990). Some of these sedimentary deposits are well known for preserving abundant fossil resources that date from the Quaternary, specifically from the early Holocene to the Pleistocene (8,200 years ago–2.58 Ma) (e.g., Loughney et al. 2019; Tweet et al. 2018).

Local Geology and Paleontology

The Soda Mountains lie within the north-central portion of the Mojave Desert of Southern California. The area encompasses several broad Quaternary-age alluvial basins that receive non-marine deposits from adjacent uplands and Neogene-age (2.58–23.03 Ma) and older strata of surrounding mountain ranges (Bedrossian et al. 2012). The easternmost portion is dominated by a chain of lower valleys that include East Cronese Lake, the Mojave River Wash, and Soda Lake to the south, and Silver Lake and the Silurian Valley to the north. These areas are characterized by late Holocene (Present–4,200 years ago) lakebed, eolian, and wash deposits surrounded by adjacent alluvial fan and eolian deposits of Holocene to late Pleistocene age (Present–129,000 years ago). To the west of these valleys, pre-Cenozoic (older than 66.0 Ma) granitic rocks of the Soda Mountains are interspersed with Neogene-age sedimentary and volcanic rocks and old to very old alluvial fan deposits ranging from late to early Pleistocene age (11,700 years ago–2.58 Ma) (Bedrossian et al. 2012).

According to geologic mapping by Bedrossian and others (2012), the surface of the project site is mapped as late Holocene alluvial fan deposits (Qf), Holocene to late Pleistocene young alluvial fan deposits (Qyf), Holocene to late Pleistocene young eolian and dune deposits (Qye), and late to middle Pleistocene (11,700–774,000 years ago) old alluvial fan deposits (Qof) (Figure 4). In general, geologic units mapped at the surface near the project site (e.g., within a 0.5-mile buffer) can be a good indicator of the geologic units that may be present in the subsurface, provided that structural deformation has not altered or displaced the vertical or lateral continuity of the units and that the geologic units are in their original geochronological order (relatively young deposits overlying relatively old deposits based on the principles of stratigraphy). Neogene (Tertiary) formations of volcanic origin (Tv), and Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr) are also mapped along the uplifted hills east and west of the project site (Bedrossian et al. 2012). These units are likely present at substantial depth within the project site but have very low potential for fossil preservation. Therefore, Qf, Qyf, Qye, Qof, Tv, and gr, are given consideration in this paleontological resource assessment (see Figure 4). These geologic units are described in geochronological order (youngest to oldest) below.

Late Holocene Alluvial Fan Deposits (Qf)

Late Holocene alluvial fan deposits (Qf) are mapped at the surface within the project site and its immediate vicinity (see Figure 4). In general, alluvial fan deposits are composed of gravel, sand, silt, and clay-sized sediments that originate from the weathering, erosion, transportation, and deposition from highlands to basin floors (Williams et al. 2006). According to Bedrossian and others (2012), Qf consist of

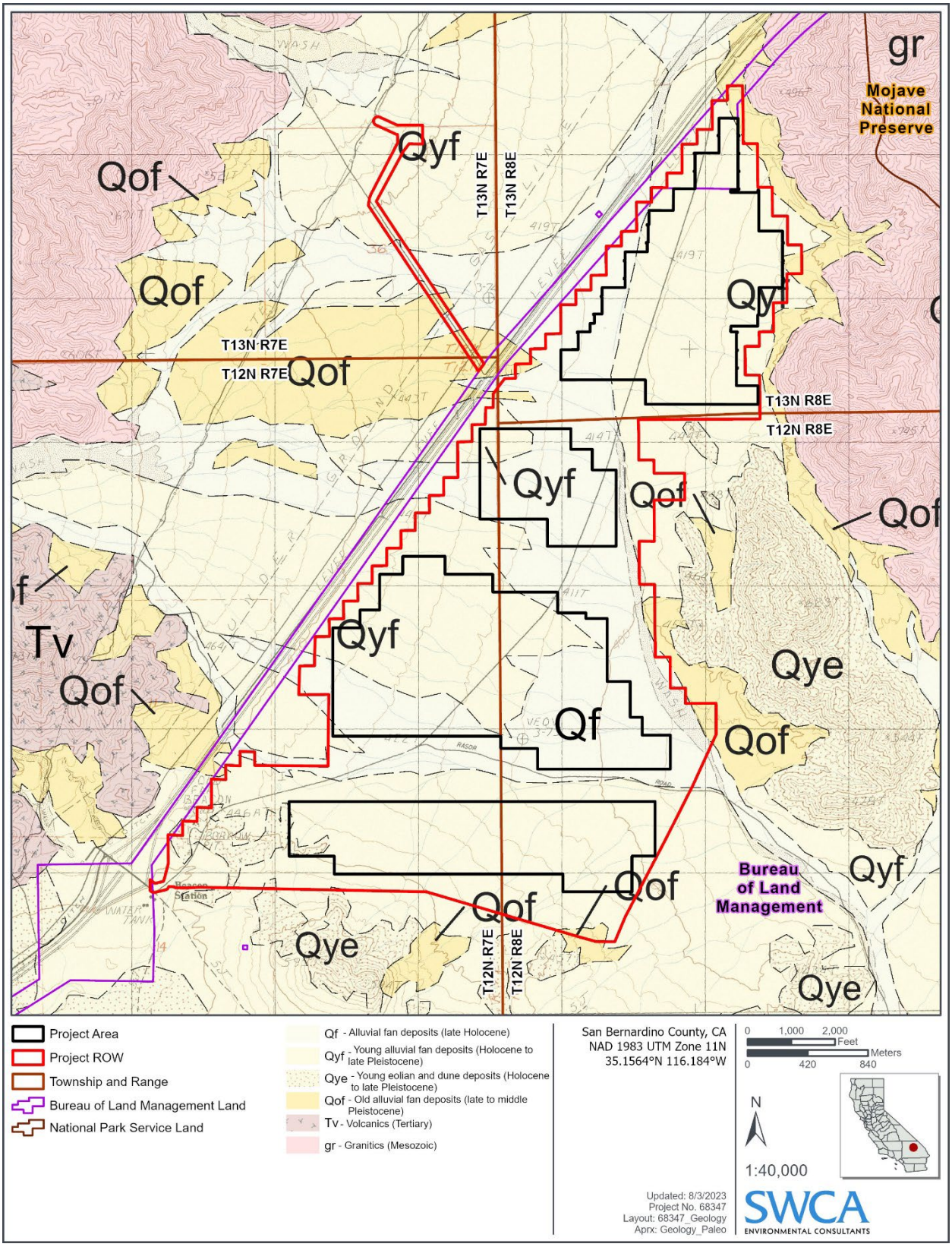

Figure 4. Geologic units within the project site and its vicinity.

unconsolidated boulders, cobbles, gravel, sand, and silt that were recently deposited from fluvial and alluvial processes in a confined valley or canyon. This sediment is typically deposited in a fan-shaped cone where gravelly sediment is generally more dominant near the apex, but generally becomes finer-grained at the distal end (or toe) of the fan and grade to finer-grained deposits at depth. The results of the preliminary geotechnical investigation (DYA 2010) further support this as most of the boreholes within the project site yielded sediment that tended to fine with depth starting at approximately 7 to 10 feet below ground surface (bgs). In some instances, alluvial fans can also trap the bulk of the coarse-grained, poorly sorted sediment that is eroded from the highlands, thus serving as buffers for lowland areas, limiting the sediment supply to fine-grained sediment (Harvey et al. 2005). The development of alluvial fans is controlled by an array of factors, including tectonic setting, climate, sediment availability, and hydrologic regimes, but in general, fans fall on a spectrum from fans formed primarily from gravity-controlled debris flows to fans formed under primarily fluvial deposition, with many fans exhibiting a combination of these processes over time (Williams et al. 2006).

The sorting of fine-grained sediment increases preservation potential of paleontological resources in these lowlands; however, Qf is too young (i.e., less than 4,200 years old) to yield paleontological resources. Qf may transition at unknown depths within the project site to middle to early Holocene-age (4,200 – 11,700 years ago) sediments, may directly overlie Pleistocene-aged (11,700 years ago–2.58 Ma) deposits (e.g., Qof), and/or may be underlain by other older geologic units (e.g., Tv and gr). The results of the museum records searches and the pedestrian reconnaissance survey allow for paleontologists to determine the likely depth to the underlying geologic units (see following sections). Because of their young age, Qf at the surface of the project site are too young to preserve paleontological resources and are considered to have a low potential (PFYC Class 2) (BLM 2022b), but they may be directly underlain by geologic units of varying PFYC rankings at unknown depth (Figure 5).

Holocene to Late Pleistocene Young Alluvial Fan Deposits (Qyf)

Holocene to late Pleistocene young alluvial fan deposits (Qyf) are mapped at the surface within the project site and the immediate vicinity (Bedrossian et al. 2012) (see Figure 4). Qyf contains unconsolidated to slightly consolidated, undissected to slightly dissected boulder, cobble, gravel, sand, and silt deposits that were recently deposited from fluvial and alluvial processes in a confined valley or canyon. This sediment is typically deposited in a fan-shaped cone where gravelly sediment is generally more dominant near the apex, but generally becomes finer-grained at the distal end (or toe) of the fan and grade to finer-grained deposits at depth. The results of the preliminary geotechnical investigation (DYA 2010) further support this as most of the boreholes within the project site yielded sediment that tended to fine with depth starting at approximately 7 to 10 feet bgs (though see the Reconnaissance Survey Results section below for observations that indicate fine-grained deposits may be present at shallower depths). Alluvial fans trap the bulk of the coarse-grained, poorly sorted sediment that is eroded from the highlands, thus serving as buffers for lowland areas, limiting the sediment supply to fine-grained sediment (Harvey et al. 2005). The development of alluvial fans is controlled by an array of factors, including tectonic setting, climate, sediment availability, and hydrologic regimes, but in general, fans fall on a spectrum from fans formed primarily from gravity-controlled debris flows to fans formed under primarily fluvial deposition, with many fans exhibiting a combination of these processes over time (Williams et al. 2006). This fine sediment increases preservation potential of paleontological resources in these lowlands.

While the Mojave Desert today has an arid climate, the area has seen dramatic climate changes oscillating between wet and dry periods during the interglacial and glacial periods of the Pleistocene that contributed to the formation of the fans present today (Sweeney et al. 2020). While late Holocene deposits are considered to be too young to contain paleontological resources, they likely transition into or overlie older sediments that may preserve paleontological resources (BLM 2016, 2022a; SVP 2010). While the exact depth at which the transition to older sediments is unknown (possibly 7 to 10 feet bgs based on the depth

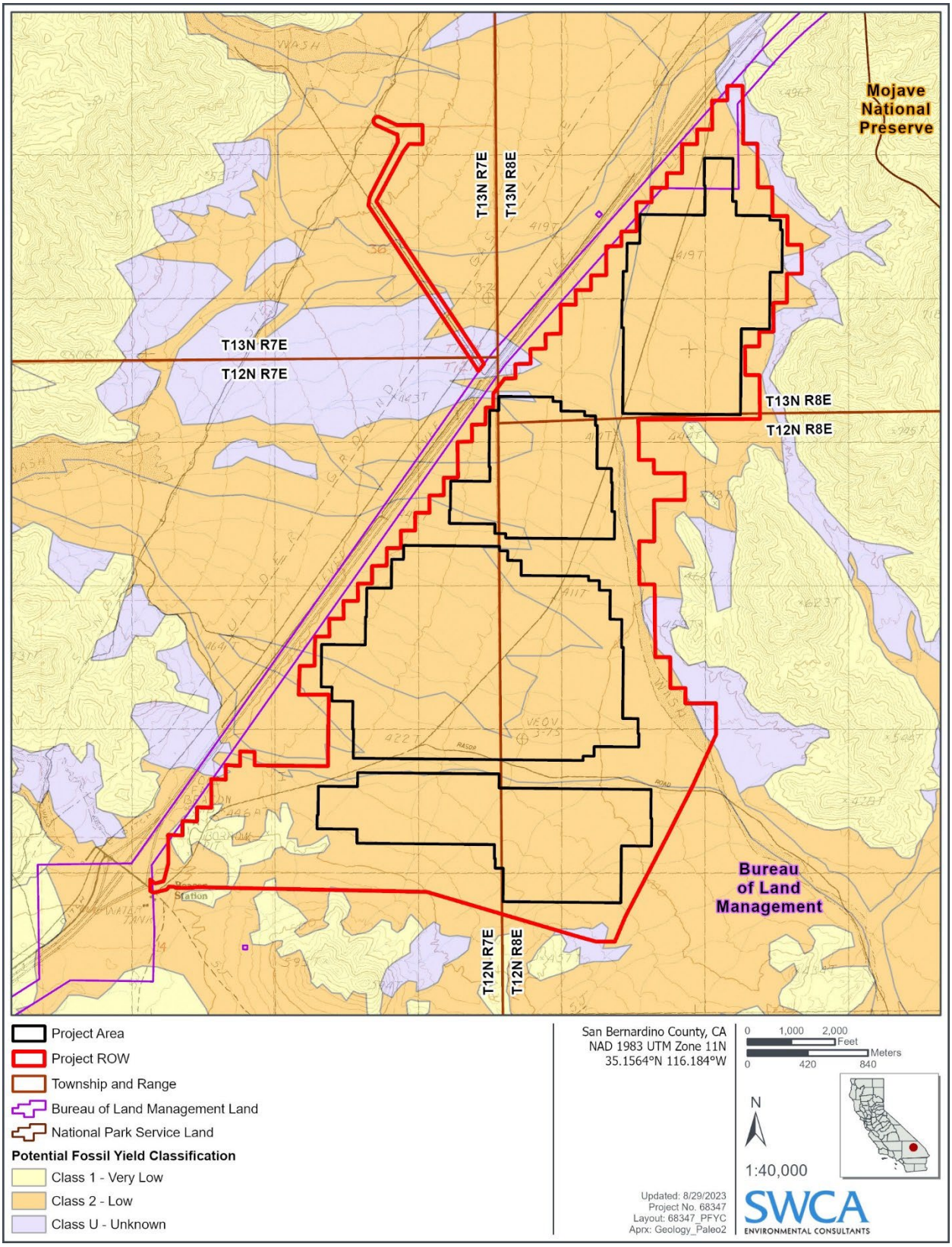

Figure 5. PFYC within the project site and its vicinity.

at which fine-grained deposits were encountered during the geotechnical investigation [DYA 2010] or approximately 4.5 feet bgs based on the survey results [see below]), fossils from comparable alluvial deposits of Pleistocene-age have been recorded within San Bernardino County at the surface or at shallow depths (Jefferson 1991a, 1991b; Paleobiology Database [PBDB] 2023; University of California Museum of Paleontology [UCMP] 2023).

Although the results of the museum records searches did not note the presence of paleontological resources within the bounds of the project site, several Pleistocene-age fossils have been documented at the surface to depths of at least 25 feet bgs within a 5-mile to 11-mile radius of the project site, and the PA/EIS/EIR noted four fossils immediately outside of the project site (BLM 2015). Elsewhere near Newberry Mountains, abundant fossil localities have yielded taxa, including ground sloth, horse, canine, cougar, rabbit, lizard, bird, tortoise, squirrel, gopher, rat, vole, and others (Jefferson 1991a, 1991b). In addition, several other paleontological resources have been recovered in San Bernardino County from unnamed late Pleistocene deposits. These localities have yielded fish; amphibians, such as frogs, toads, and newts; reptiles, such as tortoises, turtles, snakes, and lizards; birds, such as condor, hawk, owl, robin, oriole, passerines, and others; and mammals, such as bats, rodents, pika, rabbits, hares, weasel, skunks, ringtail, badger, racoon, fox, coyote, dire wolf, saber-toothed cat, scimitar-toothed cat, lynx, cougar, American lion, bear, short-faced bear, horses, pronghorn, deer, sheep, camels, ground sloths, elephant, and mammoth (Jefferson 1999a; 1999b; PBDB 2023; UCMP 2023). These fossils illuminate the striking differences between Southern California during the late Pleistocene compared to today, and this abundant fossil record has been vital in studies of extinction (e.g., Barnosky et al. 2004; Sandom et al. 2014; Scott 2010), ecology (e.g., Connin et al. 1998), and climate change (e.g., Roy et al. 1996). Therefore, while Qyf are considered to have a low paleontological potential at the surface (PYFC Class 2) (BLM 2022b) (see Figure 5), they may transition at depth to sediments of an appropriate age to preserve scientifically significant paleontological resources, which may warrant an increase in PFYC ranking with depth.

Holocene to Late Pleistocene Young Eolian and Dune Deposits (Qye)

According to Bedrossian and others (2012), Holocene to late Pleistocene young eolian and dune deposits (Qye) are present within the project site and are composed of unconsolidated to slightly consolidated, undissected to slightly dissected windblown sands (see Figure 4). In general, eolian deposits consist of fine-grained sands deposited by wind that can form either broad sheets or localized dunes. Eolian deposits are readily differentiated from alluvial deposits as they are well-sorted, consisting entirely of fine-grained sand and lacking the even finer-grained deposits, such as clay and silt, and significant amounts of coarser clasts (coarse-grained sand, gravel, cobbles, etc.). Eolian deposits in the Mojave Desert usually occur as isolated areas downwind from point sources of sediment (Bedrossian et al. 2012).

In general, eolian (i.e., windblown) deposits are not necessarily well known for their high preservation potential of organic remains. Areas of eolian activity shift over time in response to local conditions and are sensitive to changes in climate, sometimes on as little as decadal scales (Whitney et al. 2015), thereby causing fossilization within eolian units unlikely. Additionally, late Holocene portions of Qye are considered too young to contain paleontological resources (SVP 2010). The BLM (2022b) considers Qye to have a low potential (PFYC Class 2) (see Figure 5); however, the reconnaissance survey noted that these deposits overlie other geologic units that are unlikely topreserve paleontological resources (see below).

Late to Middle Pleistocene Old Alluvial Fan Deposits (Qof)

According to geologic mapping by Bedrossian and others (2012), late to middle Pleistocene old alluvial fan deposits (Qof) are mapped along the base of the Soda Mountains and lie around the perimeter of the project site (see Figure 4). Qof are slightly to moderately consolidated, moderately dissected boulder,

cobble, gravel, sand, and silt deposits (Bedrossian et al. 2012). Although mapped only along the periphery of the project site, these deposits may be present at shallow depth across the project site, underlying relatively younger alluvial deposits (e.g., Qf and Qyf).

In alluvial fans, grain size typically decreases downslope along the surface of the alluvial fan, such that the coarsest sediments (not likely to preserve fossils) are found at the apex of the fan near the channel in the highlands, with progressively finer sediments (more conducive to fossil preservation) deposited toward the toe of the fan where it meets the lowest point of the basin or valley floor. Additionally, grain-size within alluvial fans may grade from coarser-grained to finer-grained deposits with depth. The results of the preliminary geotechnical investigation (DYA 2010) further support this as most of the boreholes within the project site yielded sediment that tended to fine with depth starting at approximately 7 to 10 feet bgs (though, see the Reconnaissance Survey Results section below that indicates fining of sediments may occur at shallower depths). Over time, alluvial fans can also trap the bulk of the coarse-grained, poorly sorted sediment that is eroded from the highlands, thus serving as buffers for lowland areas, limiting the sediment supply to only finer-grained sediments (Harvey et al. 2005). Thus, although very coarse-grained alluvial fan deposits do not typically preserve intact organic remains as fossils, finer-grained sediments (fine gravel, sand, silt, and clay) farther downslope or in the shallow subsurface of the alluvial fan represent a relatively lower-energy depositional environment that may be conducive to the nondestructive burial and subsequent preservation of intact organic remains. This fine sediment increases preservation potential of paleontological resources in these lowlands. Within the project site, Qof is mapped along base of the surrounding Soda Mountains, where these deposits may be the coarsest, but based on the geomorphology of alluvial fan progradation, they could be increasingly finer-grained near the center of the project site (under relatively younger alluvial deposits) where older fan toes converged within the basin. If true, these deposits would represent a lower-energy depositional environment that would have a relatively higher preservation potential.

Although the results of the museum records searches did not note the presence of paleontological resources within the bounds of the project site, several Pleistocene-age fossils have been documented at the surface to depths of at least 25 feet bgs within a 5-mile to 11-mile radius of the project site, and the PA/EIS/EIR (BLM (2015) noted four fossils immediately outside of the project site. In fact, similar deposits throughout San Bernardino County have yielded numerous paleontological resources, including mammoth, bison, pronghorn, horse, sheep, camel, ground sloth, cougar, jaguar, saber-toothed cat, badger, rabbit, hare, rodents, reptiles, amphibians, and others (Jefferson 1999a, 1999b; PBDB 2023; UCMP 2023). Because the preservation potential of older alluvial fans depends on the depositional environment that leads to the formation of the alluvial fan, Qof is classified as having unknown potential (PFYC Class U) (BLM 2022b) (see Figure 5). Following BLM (2016) criteria, these deposits may actually have low potential (PFYC Class 2) at or near the surface and increase with depth to relatively higher potential (PFYC Class 3) at depth..

Tertiary (Neogene) Age Formations of Volcanic Origin (Tv)

Bedrossian and others (2012) map Neogene (Tertiary) age formations of volcanic origin (Tv) to the southwest of the project site (see Figure 4). Lava flows that date from the Cenozoic are also common features across the Mojave Desert, in places such as Amboy Crater, Cima Dome, and around Pisgah, with volcanic sediments intermixed with terrestrial sediments dating to as far back as the Miocene. Volcanic flows primarily consist of basalt and are formed from the rapid cooling and crystallization of lava (Dibblee 1967). Here, Tv does not include volcanoclastic/air-fall deposits (i.e., tuff). Because of the high heat, high pressure, and/or destructive processes in which these rocks formed at or near the surface via the cooling of molten rock (physical conditions not conducive to the preservation of organic remains as fossils), Tv are considered to have a very low paleontological potential (PFYC Class 1) (BLM 2022b) (see Figure 5).

Mesozoic and Older Granitic and Other Intrusive Crystalline Rocks of All Ages (gr)

Bedrossian and others (2012) map Mesozoic older granitic and other intrusive crystalline rocks of all ages (gr) in the vicinity of the project site, particularly in the Soda Mountains (see Figure 4). Formations of gr are made of plutonic igneous rocks that form from the slow cooling and crystallization of magma under high heat and high pressure, typically deep below the surface (Bedrossian et al. 2012). Because of the high heat and high pressure in which these rocks formed at deep depths via the cooling of molten rock (physical conditions not conducive to the preservation of organic remains as fossils), gr are considered to have a very low paleontological potential (PFYC Class 1) (BLM 2022b) (see Figure 5).

Museum Records Searches

SWCA requested museum records search results for fossil localities located within a 1-miles buffer of the project site or within the vicinity of the project site from both the NHMLA (Confidential Appendix A) and the SBCM (Confidential Appendix B). The results of the NHMLA museum records search were received on May 7, 2023, and the results of the SBCM museum records search were received on May 19, 2023. Based on the results of the museum records searches, neither the NHMLA (2023) nor the SBCM (2023) possess records of paleontological resources from within the project site; however, several fossil localities have been recorded in the vicinity of the project site from Pleistocene alluvial, fluvial, and lacustrine deposits. Table 1 summarizes the results of the NHMLA (2023) and SBCM (2023) museum records searches.

Table 1. NHMLA and SBCM Fossil Localities near the Project Site

Locality Number	Approximate Distance from the Project Site	Formation	Taxa	Approximate Depth (bgs)
LACM IP 31389	5 miles	Unspecified Pleistocene deposits	Invertebrates (uncatalogued)	Surface
SBCM 1.64.1	6.8 miles	Pleistocene fluvial or lacustrine deposits	Invertebrates, including the California floater bivalve (*Anodonta californiensis*) and freshwater snail (*Planorbella* sp.)	Unrecorded
LACM VP 1208	7.9 miles	Unspecified Pleistocene lake deposits	Horse (*Equus conversidens*) and camel (*Camelops sp.*)	Unrecorded
LACM IP 7219	11.1 miles	Unspecified Pleistocene deposits	Invertebrates (uncatalogued)	25 feet

Source: NHMLA (2023) and SBCM (2023)

LACM IP = Los Angeles County Museum Invertebrate Paleontology

LACM VP = Los Angeles County Museum Vertebrate Paleontology

Reconnaissance Survey Results

SWCA's Staff Paleontologists completed a pedestrian reconnaissance survey of most areas mapped as late to middle Pleistocene old alluvial fan deposits (Qof), which the BLM designated as having unknown potential (PFYC Class U). Areas mapped as Qof that were not subject to a pedestrian reconnaissance survey were either inaccessible due to access road conditions (i.e., earthen roads were washed out and unimproved) or were too steep to traverse on foot. Areas not subject to pedestrian reconnaissance survey were instead subject to a visual reconnaissance that included windshield drive-by survey to confirm geologic mapping, overview site reconnaissance during pedestrian or windshield survey, and overview

site reconnaissance from elevated vantage points looking across the project site. All other geologic units within the project site were subject to combined pedestrian and visual survey. Approximately 11% of the project site was subject to a pedestrian survey, with the remainder of the project site subject to a combination of pedestrian and visual (windshield) survey, or visual overview survey (Figure 6).

The topography of the project site consists of mostly flat to gently sloping alluvial fans originating from the east and west, with shallow washes (Figure 7). Channels and washes are deeper and clast sizes increase up to small boulders closer to the base of the surrounding mountains (Figure 8). Small shrubs and desert grasses cover approximately 35% of the site, and there is very little evidence of prior disturbance or any built environment; prior ground disturbance consists of slightly graded dirt roads and modern alluvial channels.

Previously undisturbed sediments are observed at the surface throughout the project site. Mapped along the base of the mountains along the edges of the project site, Qof consist of mainly angular, desert varnished, pale blue to dark gray cobbles and boulders that are composed of granites, volcanics, and sparse lithic sandstone clasts with a very fine- to coarse-grained sand matrix (Figure 9). Areas mapped as Qof have larger channels and washes that dissect the surface up to 4.5 feet deep (Figure 10). Observations of grain-size grading within Qof corroborate the results of the preliminary geotechnical investigation (DYA 2010) that noted a fining downward of sediments; however, the depth of transition to fine-grained sediments may be as shallow as 4.5 feet bgs instead of 7 to 10 feet bgs based on field observations in channels. Areas mapped as Holocene to late Pleistocene young eolian and dune deposits (Qye) contain exposures up to 10 feet thick of dark gray, weathered igneous rocks, that have been at least partially metamorphosed based on observations of crystal foliation (i.e., “layered” minerals). Areas mapped as Qye that contain exposures of igneous rocks contain discontinuous and very thin deposits of light tan, very fine-grained sand, likely deposited as windblown deposits infilling cracks within the igneous rocks (Figure 11). Holocene to late Pleistocene young alluvial fan deposits (Qyf) are confirmed to be present across most of the project site (Figure 12). Qyf consist of pale yellowish-brown silt, medium to coarse sand, gravels, cobbles, and sparse small boulders composed of granitic rocks and porous volcanic lithics with less desert varnish than the former two units (Figure 13). Qyf differ from late Holocene alluvial fan deposits (Qf) by consisting of mainly very pale orange gravels and sand, while Qf consist of pale brown gravels and sand (Figure 14). Additionally, areas of Qf at the surface are more vegetated with desert shrubs than other surrounding areas with different surficial geologic units (Figure 15). Although Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr) and Tertiary (Neogene) age formations of volcanic origin (Tv) are not mapped directly within the project site, outcrops of the partially metamorphosed igneous bedrock are present within areas mapped as Qye – these partially metamorphosed igneous rocks may be gr or Tv, which are mapped nearby (see Figure 4). Additionally, rock clasts that may have originated within gr or Tv areas are present within the alluvial fan deposits (e.g., Qyf and Qof) (Figures 16 and 17), indicating that sediments infilling the basin likely originated from the Soda Mountains and surrounding highlands, as opposed to transported from greater distances.

No newly identified or previously recorded paleontological resources were observed during the pedestrian reconnaissance survey; however, sediments capable of preserving paleontological resources are present within the project site.

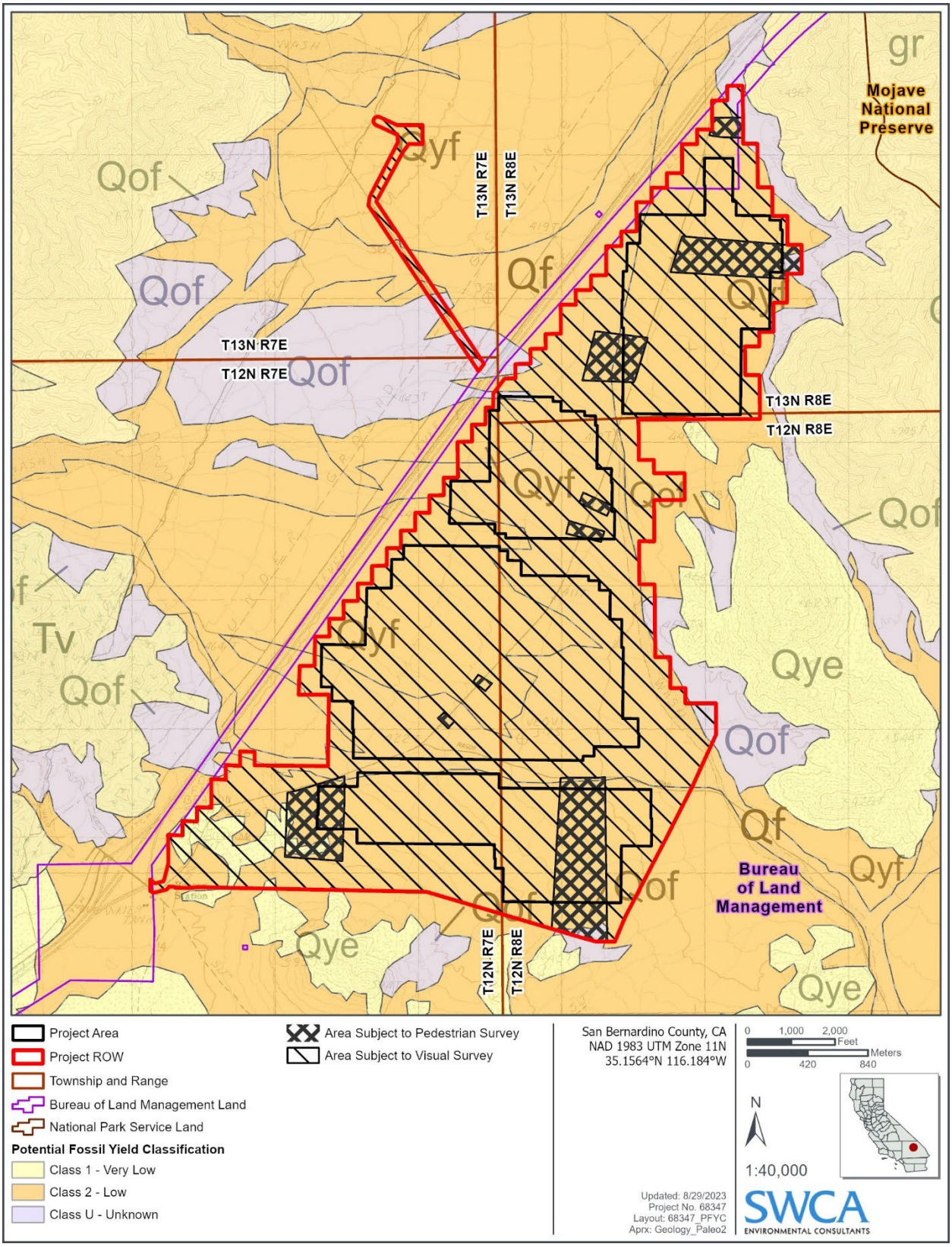

Figure 6. Pedestrian and visual reconnaissance survey coverage.

Figure 7. Overview of the project site, facing west, showing land topography and ground cover, on the west side of the northern parcel. Sediments consist of young alluvial fan deposits, shallow washes, and sparse desert scrub.

Figure 8. Overview of the project site, facing east, showing land topography and ground cover, on the east side of the northern parcel. Sediments consist of older alluvial fan deposits, shallow channels, and desert scrub.

Figure 9. Alluvial wash exposing geology mapped as late to middle Pleistocene old alluvial fan deposits (Qof); view facing east.

Figure 10. Outcrop of late to middle Pleistocene old alluvial fan deposits (Qof) exposed along the sidewall of an alluvial wash in the northeastern portion of the site; view facing south.

Figure 11. Outcrop of foliated igneous rock with very fine-grained sand in an area mapped as Holocene to late Pleistocene young eolian and dune deposits (Qye) in the southwestern portion of the project site; view facing south.

Figure 12. Holocene to late Pleistocene young alluvial fan deposits (Qyf) exposed at the surface; view facing south.

Figure 13. Holocene to late Pleistocene young alluvial fan deposits (Qyf) exposed at the surface toward the middle of the project site; view facing west.

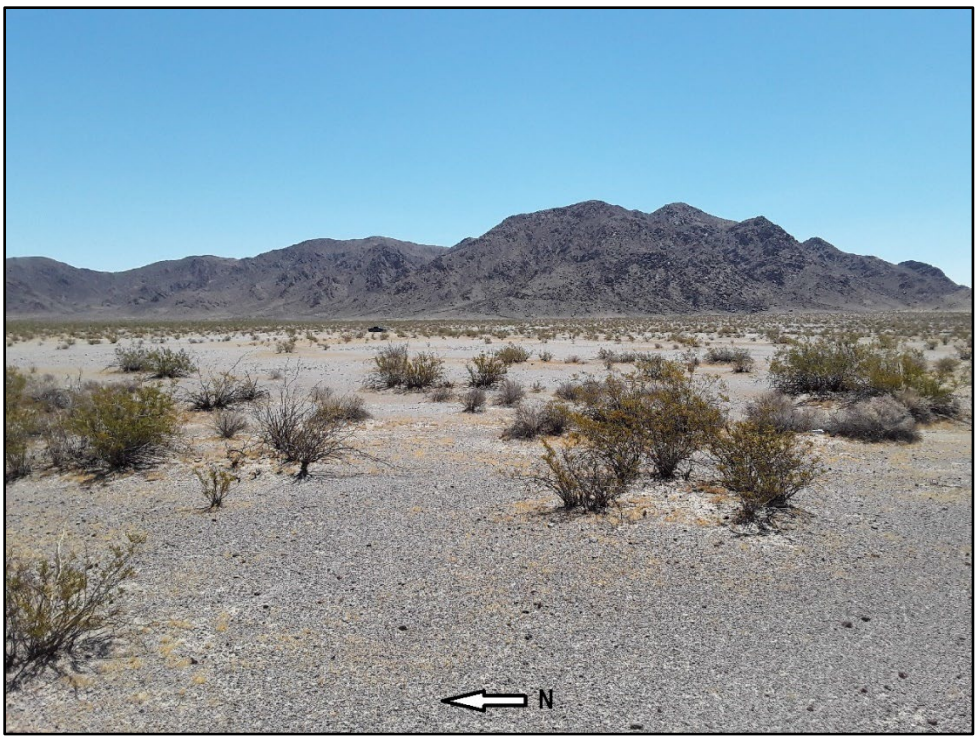

Figure 14. Contact between Holocene to late Pleistocene young alluvial fan deposits (Qyf) and late Holocene alluvial fan deposits (Qf); view facing east. Note the darker color of the volcanic-rich clasts of Qf compared with the granitic-rich clasts of Qyf.

Figure 15. Detailed view of late Holocene alluvial fan deposits (Qf) exposed at the surface, facing west. Note the lack of desert varnish on these younger deposits.

Figure 16. Granitic clasts within Holocene to late Pleistocene young alluvial fan deposits (Qyf) exposed at the surface within the northern parcel of the project site; planar view.

Figure 17. Volcanic clasts within Holocene to late Pleistocene young alluvial fan deposits (Qyf) exposed at the surface in the southwestern portion of the project site; planar view.

Provisional Reassignment of Paleontological Potential

Based on the results of this paleontological assessment, SWCA has provided provisional reassignment of the PFYC ranking of late to middle Pleistocene old alluvial fan deposits (Qof), which currently are assigned a ranking of unknown potential (PFYC Class U) by the BLM (Table 2). Additionally, SWCA has provided provisional reassignments for the overlying younger deposits, such as Holocene and late Pleistocene young alluvial fan deposits (Qyf) and Holocene to late Pleistocene young eolian and dune deposits (Qye), which the BLM classify as both having low potential (PFYC Class 2) (see Table 2). Justification for the provisional reassignments of PFYC is below.

Table 2. Revised Provisional Paleontological Sensitivity of Geologic Units in the Project Site and Vicinity

Geologic Unit Name	Geologic Unit Map Symbol	Age	BLM-assigned PFYC	SWCA-assigned Provisional PFYC
Alluvial fan deposits	Qf	Late Holocene	Class 2 – low	Class 2 – low
Young alluvial fan deposits	Qyf	Holocene to late Pleistocene	Class 2 – low	Class 2 – low overlying Class 3 – moderate
Young eolian and dune deposits	Qye	Holocene to late Pleistocene	Class 2 – low	Class 1 – very low
Old alluvial fan deposits	Qof	Late to middle Pleistocene	Class U – unknown	Class 2 – low overlying Class 3 – moderate
Formations of volcanic origin	Tv	Tertiary [Neogene]	Class 1 – very low	Class 1 – very low
Old granitic and other intrusive rocks	gr	Mesozoic and older	Class 1 – very low	Class 1 – very low

Geology source: Bedrossian et al. (2012); PFYC sources: BLM (2016, 2022b)

Qof are visible along the base of the surrounding mountains, elevated in comparison to the middle of the site. Where Qof are exposed, they consist of the coarsest sediments encountered within the project site and are found near the apex of the fan bordering the highlands; however, both the geotechnical investigation results and the field observations noted here indicate that relatively finer sediments underlie coarser sediments. The depth to this transition to finer-grained sediments likes varies across the site but may be as shallow as 4.5 feet bgs based on observations noted during the pedestrian reconnaissance survey within channels and washes dissecting Qof; the results of the geotechnical investigation suggest fining downward within the alluvial fan extends at depth. Although the very coarse-grained sediments of Qof at the surface may not typically preserve intact fossils, the underlying finer-grained sediments may be conducive to the preservation of paleontological resources. Therefore, SWCA recommends provisional reassignment of the paleontological potential Qof from unknown potential (PFYC Class U) to low to moderate potential, increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth, e.g., 4.5 feet bgs).

Additionally, it should be noted that where alluvial channels cut through Qyf near the base of the surrounding highlands, veneers of coarser-grained sediments overlie finer-grained sand and gravels, generally corroborating the results of the geotechnical investigation. Therefore, SWCA has reassigned provisional PFYC rankings for Qyf from low potential (PFYC Class 2) to low to moderate potential increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth, e.g., 4.5 feet bgs).

The area where Qye are mapped at the surface contains partially metamorphosed igneous bedrock with very fine-grained sandy windblown sediments deposited in the crevices between the rocks and veneered over portions of the rock. This igneous bedrock may be Tertiary (Neogene) age formations of volcanic origin (Tv) and/or Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr), both

of which are mapped near the project site. Although the BLM classifies Qye (and most other eolian deposits in general) as low potential (PFYC Class 2), both Tv and gr have very low paleontological potential (PFYC Class 1). Since Qye only form a veneer over Tv and/or gr, Qye are provisionally reassigned from low potential (PFYC Class 2) to very low potential (PFYC Class 1).

SWCA's provisional reassignments of PFYC are mapped in Figure 18.

IMPACT ASSESSMENT

SWCA conducted this assessment to analyze the potential for significant impacts to paleontological resources resulting from implementation or construction of the project. SWCA analyzed the existing data and conducted a pedestrian reconnaissance survey to determine the geologic units likely to be present at the surface and in the subsurface at relevant depths, and to determine the potential for paleontological resources to be impacted by the project. Based on preliminary geotechnical investigations for an earlier phase of the project (DYA 2010), there was a noticeable fining of grain size downward within the southern and eastern portions of the project site starting at approximately 7 to 10 feet bgs, and field observations note fining downward of sediments starting at depths as shallow as 4.5 feet bgs throughout the project site.

The results of this assessment indicate that the project site varies in its paleontological sensitivity classification from very low potential (PFYC Class 1) to moderate potential (PFYC Class 3). Ground-disturbing activities in geologic units of very low potential (PFYC Class 1) or low potential (PFYC 2) are unlikely to result in potentially significant impacts to scientifically significant or important paleontological resources. Specifically, ground disturbances in late Holocene alluvial fan deposits (Qf) (PFYC Class 2), Holocene to late Pleistocene young eolian and dune deposits (Qye) (provisionally assigned PFYC Class 1), Tertiary (Neogene) age formations of volcanic origin (Tv) (PFYC Class 1), and Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr) (PFYC Class 1) are unlikely to result in potentially significant impacts.

Conversely, ground-disturbing activities in geologic units provisionally assigned low potential to moderate potential, increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth) may not impact potentially significant paleontological resources in the uppermost 4.5 feet of sediments. However, ground disturbances greater than 4.5 feet may result in potentially significant impacts. Geologic units with low to moderate potential, increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth), include Holocene to late Pleistocene young alluvial fan deposits (Qyf) and late to middle Pleistocene old alluvial fan deposits (Qof).

There would be approximately 630,000 cubic yards of cut and 180,100 cubic yards of fill, thus requiring approximately 449,900 cubic yards of cut on site. Ground-disturbing activities that impact previously undisturbed sediments greater than 4.5 feet bgs in areas mapped as Qyf or Qof may result in the inadvertent discovery of paleontological resources (see Figures 4, 5, and 18). Following the BLM's (2008, 2022a) guidelines more generally, any paleontological resources encountered during ground disturbances in previously undisturbed sediments of moderate to high paleontological sensitivity (PFYC 3, 4, and/or 5) would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA.

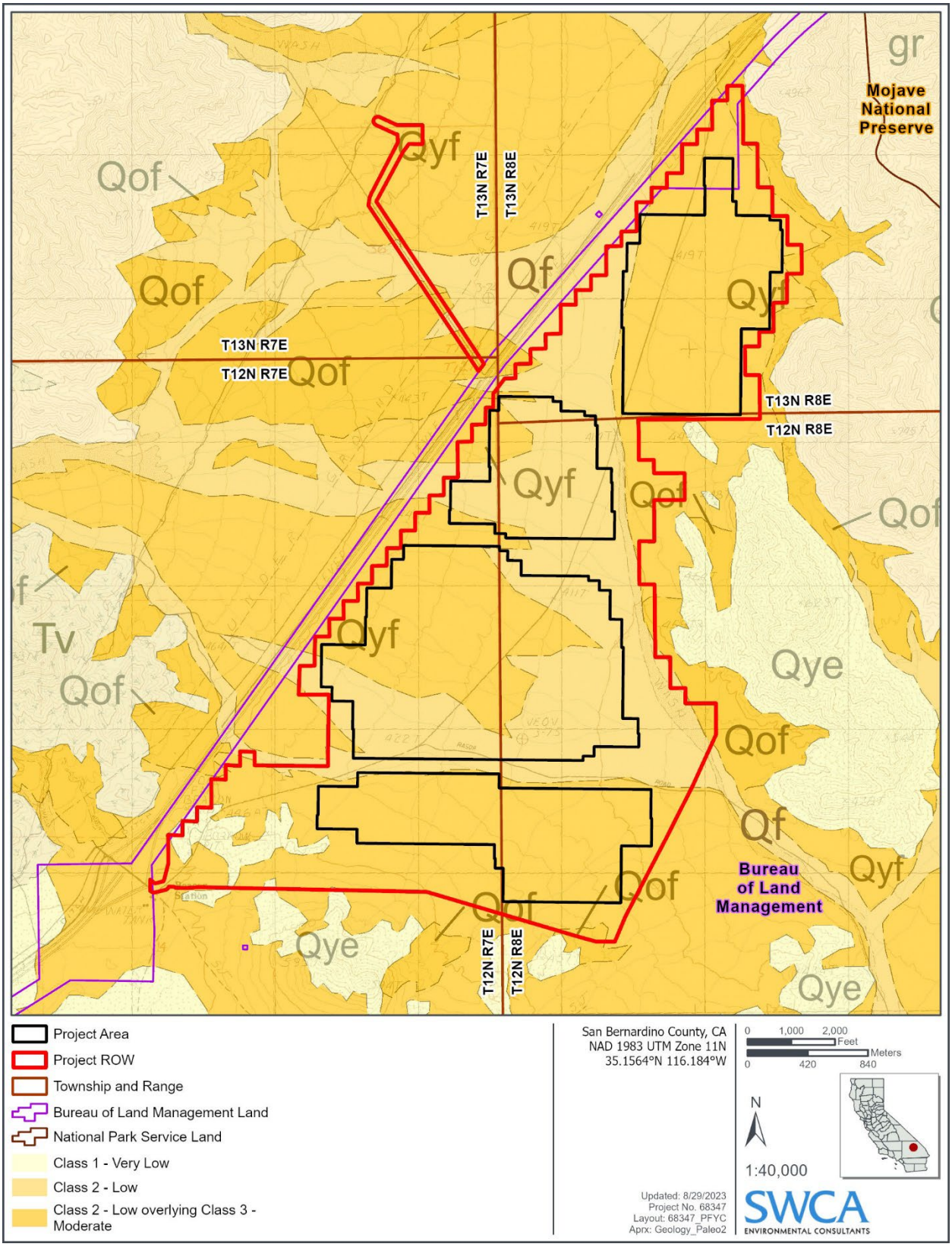

Figure 18. SWCA-assigned provisional PFYC within the project site and its vicinity.

CONCLUSIONS AND RECOMMENDATIONS

SWCA conducted an analysis of existing data, including a review of geologic maps, geotechnical investigation data, scientific literature, results of museum records searches, the BLM's PFYC mapping, and the results of a reconnaissance survey, to classify the paleontological potential of the geologic units present at the surface and subsurface and to determine the potential for significant impacts to scientifically significant or important paleontological resources due to implementation or construction of the project.

Geologic mapping by Bedrossian and others (2012) indicates that the surface of the project site consists of late Holocene alluvial fan deposits (Qf), Holocene to late Pleistocene young alluvial fan deposits (Qyf), Holocene to late Pleistocene young eolian and dune deposits (Qye), and late to middle Pleistocene old alluvial fan deposits (Qof). According to the BLM's PFYC (2022b), Qf, Qyf, and Qye all have low potential (PFYC Class 2), and Qof has unknown potential (PFYC Class U). Additionally, Tertiary (Neogene) age formations of volcanic origin (Tv) and Mesozoic and older granitic and other intrusive crystalline rocks of all ages (gr) are also present within the Soda Mountains and likely extend into the project site in areas mapped as Qye (Bedrossian et al. 2012). Both Tv and gr have very low potential (PFYC Class 1) (BLM 2022b). The results of the geotechnical analysis, scientific literature review, museum records searches, and reconnaissance survey indicate that the geologic units at the surface or in the subsurface of the project site may have paleontological potential rankings that differ from those assigned by the BLM (2022b). SWCA has provisionally reassigned both Qyf and Qof as low to moderate potential, increasing with depth (PFYC Class 2 to PFYC Class 3, increasing with depth [e.g., 4.5 feet bgs]), and Qye as very low (PFYC Class 1) based on the presence of Tv and/or gr at the surface in these areas.

Based on the results of this assessment and the components of the project, ground-disturbing activities that impact previously undisturbed sediments greater than 4.5 feet bgs in areas mapped as Qyf or Qof may result in the inadvertent discovery of paleontological resources. Following the BLM's (2008, 2022a) guidelines more generally, any paleontological resources encountered during ground disturbances in previously undisturbed sediments of moderate to high paleontological sensitivity (PFYC 3, 4, and/or 5) would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA. The implementation of appropriate mitigation measures will ensure that paleontological resources, if encountered, are assessed for significance and, if deemed significant, salvaged and curated with an accredited repository. These actions will reduce impacts to paleontological resources to less-than-significant levels, pursuant federal, state, and local regulations. Accordingly, SWCA recommends the following mitigation measures, which have been developed in accordance with the mitigation measures in the *Proposed Plan Amendment/ Final Environmental Impact Statement/ Environmental Impact Report for the Soda Mountain Solar Project* (BLM 2015); the BLM's (2008a, 2008b, 2016, 2022a, 2022b) guidelines; federal, state, and local regulations; and best practices in mitigation paleontology (Murphey et al. 2019).

1. **Retain a BLM-Permitted Principal Investigator (Project Paleontologist):** A Project Paleontologist listed as a Principal Investigator on a current California BLM Permit for Paleontological Investigations who meets or exceeds the standards of the BLM (2008a) will be retained to oversee the execution of all paleontological mitigation measures. The Project Paleontologist should obtain a curatorial arrangement with a qualified repository prior to construction in the event of significant paleontological resource discoveries during construction.
2. **Conduct Worker Training:** The Project Paleontologist should develop Worker Environmental Awareness Program training to educate the project personnel on the legal requirements for preserving fossil resources, the recognition of the types of

paleontological resources that could be encountered within the requested ROW boundary, and the procedures to be followed in the event of a fossil discovery. This training program should be given by the Project Paleontologist or their designee to the crew before ground-disturbing work commences and should include handouts to be given to new workers as needed.

3. **Prepare a Paleontological Resources Monitoring and Mitigation Plan (PRMMP):** The Project Paleontologist will develop a comprehensive PRMMP that incorporates the latest project description, engineering plans, and project site. The PRMMP will consider the results of previous paleontological resources assessments, including but not limited to the results of the geologic map review, geotechnical investigation, scientific literature review, museum records searches, reconnaissance surveys, and the accepted provisional paleontological sensitivity classification. The PRMMP will specify locations and depth thresholds that require paleontological monitoring during ground-disturbing activities. The PRMMP will discuss paleontological monitoring of ground-disturbing activities in previously undisturbed sediments identified as having moderate or higher sensitivity, whether present at the surface or anticipated to be present at depth in the subsurface. Geologic units of low and very low paleontological sensitivity, as well as all previously disturbed sediments, regardless of depth, should not be subject to paleontological monitoring unless anticipated to be underlain by previously undisturbed geologic units of relatively higher paleontological sensitivity that could be impacted by earthwork activities at depth. Appropriate mitigation methods may include full-time paleontological monitoring, screening of sediment samples for small fossils, or additional field surveys in the event of changes to the project site boundaries.

   Monitoring will be conducted by a BLM-approved paleontological monitor working under the supervision of a BLM-permitted Field Agent or BLM-permitted Principal Investigator (i.e., the Project Paleontologist) in the field, with the overall implementation of the PRMMP overseen by a BLM-permitted Principal Investigator. If field observations of surface or subsurface geologic conditions during construction activities would indicate a differing paleontological sensitivity ranking than that previously assigned, the Project Paleontologist may consult with the BLM, the CDFW, other relevant overseeing agencies, and Soda Mountain Solar, LLC, to recommend adjustments to the level of monitoring in response to subsurface conditions. Full-time (or on-site) monitoring can be reduced to part-time inspections (or spot checks) or ceased entirely if this is determined adequate by the Project Paleontologist and approved by all parties. This change can be done verbally and then documented via email or another written format to the BLM, CDFW, other relevant overseeing agencies, and Soda Mountain Solar, LLC. The paleontological monitor will have authority to temporarily divert activity away from exposed fossils to evaluate the significance of the find and, should the Project Paleontologist or Field Agent determine that the fossils are potentially significant, professionally and efficiently recover the fossil specimens for laboratory evaluation, and collect associated data following the procedures and guidelines of the BLM (2008a) and in accordance with the requirements stipulated in the California BLM Permit for Paleontological Investigations and Fieldwork Authorization permit(s). Nonsignificant fossils will be documented and recorded in the field but not collected. Any potentially significant fossil that is collected for further evaluation will be returned to the discovery site or retained for educational purposes if after laboratory analysis it is determined to be a nonsignificant resource. The disposal of the fossil will depend on the requirements of the agency administering the land on which the fossil was discovered. Paleontological monitors will record pertinent geologic and geographic data from any fossil localities.

4. **Unanticipated Discovery Protocols:** In the event of a fossil discovery, whether by the permitted and approved paleontological field staff or a member of the construction crew, all work will cease in a 50-foot radius of the find while the Project Paleontologist or Field Agent assess the significance of the fossil and documents its discovery. Should the Project Paleontologist or Field Agent determine that the fossil locality is potentially significant, it will be salvaged following the procedures and guidelines of the BLM (2008a) and in accordance with the requirements stipulated in the California BLM Permit for Paleontological Investigations and Fieldwork Authorization permit(s). Nonsignificant fossils will be documented and recorded in the field but not collected. Potentially significant fossils that were collected in the field that were determined to be nonsignificant after laboratory analysis will be returned to the site or retained for educational purposes (depending on the requirements of the overseeing agency administering the land on which the fossil was discovered). Significant fossils will be prepared to the point of morphological identification and/or taxonomic identification to facilitate the requirements of the curation in an accredited repository pre-approved by the BLM, CDFW, and/or another overseeing agency.
5. **Prepare a Final Paleontological Resources Monitoring Report:** Upon conclusion of ground-disturbing activities, the Project Paleontologist will prepare a final report detailing the methods and results of implementing the PRMMP, including full documentation of all fossils found, significance assessment of those fossils, repository details for significant fossils, and any recommendations for future work within the project site. If paleontological resources are curated, the final monitoring report and any associated data pertinent to the curated specimen(s) should be submitted to the designated repository. A copy of the final monitoring report should be filed with the BLM, CDFW, and/or another overseeing agency.

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APPENDIX A

Natural History Museum of Los Angeles County
Paleontological Records Search

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APPENDIX B

San Bernardino County Museum
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