Paleontological Resources Technical Report for the Seville 5 Solar Project, Imperial County, California

FEBRUARY 2025

PREPARED FOR

Apex Energy Solutions, LLC

PREPARED BY

SWCA Environmental Consultants

PALEONTOLOGICAL RESOURCES TECHNICAL REPORT FOR THE SEVILLE 5 SOLAR PROJECT, IMPERIAL COUNTY, CALIFORNIA

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SWCA Project No. 79383

February 2025

EXECUTIVE SUMMARY

Purpose and Scope: Apex Energy Solutions, LLC (Apex Energy) retained SWCA Environmental Consultants (SWCA) to prepare a paleontological resources technical report in support of the Seville 5 Solar Energy Project (project), located in unincorporated Imperial County, California. The California Environmental Quality Act (CEQA) requires the assessment of potentially significant impacts to the environment caused by construction or implementation of the project. Therefore, SWCA has prepared this technical report to summarize the results of a paleontological resources assessment, which includes a review of geologic maps, scientific literature, confidential fossil locality records from the San Diego Natural History Museum (SDNHM), field survey, and other relevant information. The purpose of this technical report is to discuss the potential impacts to scientifically significant paleontological resources and to provide mitigation recommendations to reduce potential impacts to less-than-significant levels, pursuant to CEQA.

Dates of Investigation: SWCA reviewed the relevant maps and literature in February and March 2023 and received the results of a museum records search from the SDNHM on April 11, 2023. SWCA conducted the paleontological pedestrian field reconnaissance survey on April 3 and 4, 2023.

Summary of Findings: According to geologic mapping, the entire surface of the project area is contains Holocene age undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc). Although not mapped, artificial fill may also be present at the surface, potentially to depths of 2 to 3 feet. Additionally, older sedimentary units may be present at depth as the Lake Cahuilla sediments within the project area may be thin. During the field survey, numerous nonsignificant invertebrate specimens were observed evenly distributed across the surface of the project area but not collected; therefore, although present across the site, no discrete fossil localities were recorded during the survey.

Based on this assessment, artificial fill has no paleontological sensitivity and the undifferentiated alluvial sand, gravel, silt and clay of valley areas and Cahuilla Beds (Qa-Qc) has high paleontological sensitivity. Ground-disturbing activities associated with the project are expected to reach geologic units of high paleontological sensitivity and have the potential to impact any scientifically significant paleontological resources they may contain.

Conclusions and Recommendations: To ensure that potential impacts to scientifically important paleontological resources are less than significant, SWCA recommends the following mitigation measures, which have been developed in accordance with, and incorporate the performance standards of, the Society of Vertebrate Paleontology (SVP) (2010) and best practices in mitigation paleontology (Murphey et al. 2019).

- **Paleo-1: Retain a Qualified Professional Paleontologist.** Prior to the issuance of a grading permit, the project applicant shall retain a qualified professional paleontologist, who meets the SVP qualifications for Principal Investigator or Project Paleontologist, to carry out all regulatory compliance measures and protocols related to paleontological resources. The Project Paleontologist shall provide a letter of retention to the project applicant, which shall be submitted to the lead agency. The letter shall include a resume for the Project Paleontologist that demonstrates fulfillment of the SVP standards.
- **Paleo-2: Prepare a Paleontological Resources Impact Mitigation Program.** Before any grading activities start, the Project Paleontologist shall prepare a Paleontological Resources Impact Mitigation Program (PRIMP). This PRIMP shall contain specific monitoring and mitigation requirements including construction worker training; protocols to follow in the event of an unanticipated discovery; and procedures for monitoring, fossil and data collection, and fossil treatment. The PRIMP shall identify curation facilities for any significant fossils that may

be salvaged and require a final report summarizing the results of the program. The PRIMP shall adhere to and incorporate the performance standards and practices from the 2010 SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. The Project Paleontologist shall submit the final PRIMP to the project applicant and the lead agency for their records before project excavation activities start.

- **Paleo-3: Conduct Worker Environmental Awareness Training.** The Project Paleontologist shall develop worker environmental awareness program training to educate the construction crew on the legal requirements for preserving fossil resources as well as the procedures to follow in the event of a fossil discovery. This training program shall be presented by the Project Paleontologist (or his/her representative, such as the qualified paleontological monitor) to the crew before ground-disturbing work commences.
- **Paleo-4: Monitor for Paleontological Resources.** Full-time paleontological monitoring shall occur during ground-disturbing activities that impact undisturbed native sediments of the undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc). Monitoring shall not be required when ground-disturbing activities would impact only previously disturbed sediments and/or artificial fill regardless of depth. Monitoring shall be conducted by a qualified paleontological monitor who meets the standards of the SVP and who shall be supervised by the Project Paleontologist. The Project Paleontologist may periodically inspect construction activities and increase, decrease, or cease monitoring in response to subsurface conditions, as appropriate.
- **Paleo-5: Treat Fossil Discoveries.** In the event of a fossil discovery, whether by the qualified paleontological monitor or a member of the construction crew, the qualified paleontological monitor shall have the authority to temporarily divert construction activity, and all work shall cease in a 50-foot radius of the discovery. The Project Paleontologist will evaluate the scientific significance of the find and, if appropriate, professionally and efficiently collect the fossil specimens and associated data. Paleontological monitors shall record pertinent geologic data and collect sediment samples from the fossil localities. Recovered fossils shall be prepared to the point of curation, identified by qualified experts, listed in a database to facilitate analysis, and deposited in a designated paleontological curation facility. The Project Paleontologist shall obtain a curatorial arrangement with an accredited repository with research, exhibit, and/or outreach interest in the specimens (e.g., SDNHM), and scientifically significant fossils shall be donated to this institution.
- **Paleo-6: Prepare a Paleontological Resources Monitoring Report.** At the conclusion of ground-disturbing activities, the Project Paleontologist shall prepare a final monitoring report that documents the methods and results of all efforts completed under the PRIMP including monitoring; treatment of paleontological resources; results of specimen processing, analysis, and research; and final curation arrangements, as applicable. The report shall be completed within 6 months of the completion of paleontological monitoring for the project. If paleontological resources are curated, the final monitoring report and any associated data pertinent to the curated specimen(s) shall be submitted to the designated repository. A copy of the final monitoring report shall be filed with the lead agency.

Disposition of Data: This report will remain on file with Apex Energy, the lead agency, and SWCA's Pasadena office.

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INTRODUCTION

Apex Energy Solutions, LLC (Apex Energy) retained SWCA Environmental Consultants (SWCA) to prepare a paleontological resources technical report in support of the Seville 5 Solar Project (project), located in unincorporated Imperial County, California (Figure 1). The California Environmental Quality Act (CEQA) requires the assessment of potentially significant impacts to the environment caused by construction or implementation of the project. Therefore, SWCA has prepared this technical report to summarize the results of a paleontological resources assessment, which includes a review of geologic maps, scientific literature, confidential fossil locality records from the San Diego Natural History Museum (SDNHM), field survey, and other relevant information. The purpose of this technical report is to discuss the potential impacts to scientifically significant paleontological resources and to provide mitigation recommendations to reduce potential impacts to less-than-significant levels, pursuant to CEQA. This study follows the guidelines of the Society of Vertebrate Paleontology (SVP) and best practices in mitigation paleontology (Murphey et al. 2019; SVP 2010).

SWCA Paleontology Team Lead Mathew Carson, M.S., and SWCA Staff Paleontologists Kristina Akesson, B.S., and Jasmyn Nolasco, M.S., conducted the paleontological pedestrian field reconnaissance survey, and Ms. Nolasco also conducted the background research and authored this report. SWCA Assistant Project Paleontologist Jake Biewer, M.S., co-authored this report. SWCA Senior Lead Paleontologist Heather Clifford, M.S., provided technical review of the report. SWCA Lead Biologist Lori Coleman, B.S., PMP, served as project manager and provided additional quality assurance/quality control. Figures were generated by SWCA Geographic Information System (GIS) Specialist Marty Kooistra, M.A, and SWCA Senior Geospatial Scientist Aramis Respall. Copies of the report are on file with SWCA's Pasadena office.

PROJECT LOCATION AND DESCRIPTION

Apex Energy proposes to construct a 65-megawatt (MW) solar facility with a 130-MW battery energy storage system (BESS) on approximately 267 acres located in unincorporated Imperial County, California (project area) (see Figure 1). The proposed project is located just south of State Route (SR) 78, approximately 7 miles east of Ocotillo Wells and approximately 9 miles west of SR 86 (Figure 2). The project area is also approximately 14 miles from the southern tip of the Salton Sea and 4 miles east of the Imperial County–San Diego County line. The project is located on one privately owned parcel, Imperial County Assessor's Parcel Number (APN) 018-010-043.

The project area is partially situated on San Felipe Creek, and the general area surrounding the site is either vacant land consisting of sand dunes and local washes or developed solar fields (see Figure 2). The project is bound to the north by SR 78, with Ocotillo Wells OHV State Recreation Area on the north side of SR 78. Vacant land is to the east. Developed portions of Seville 1 and Seville 2 Solar facilities are located immediately to the southeast of the project, and the Titan 1 Solar facility is located further southeast. The proposed Seville 4 Solar project is immediately to the south, on currently vacant land. Vacant land is to the west, with the Ocotillo Recreational Vehicle (RV) Resort approximately 0.5-mile west. The site exhibits a generally planar and flat-lying topography, which can be partially attributed to previous agricultural activities that included in-filling of the former creek bottom of San Felipe Creek.

The project area is in Sections 15 and 22, Township 12 South, Range 9 East (San Bernardino Baseline and Meridian), as depicted on the U.S. Geological Survey (USGS) Borrego Mountain SE, California, 7.5-minute topographic quadrangle (USGS 1982) (Figure 3).

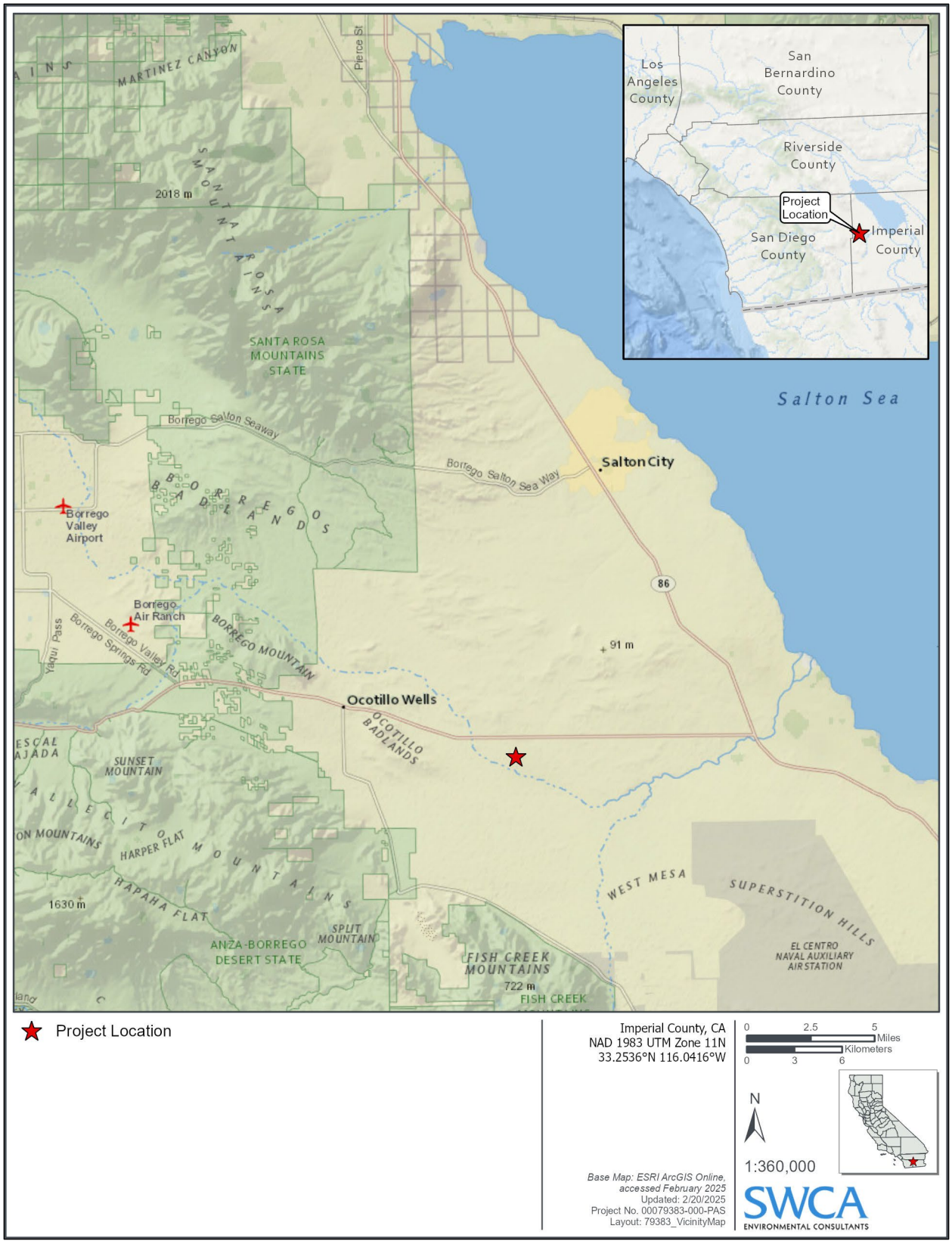

Figure 1. Project area vicinity.

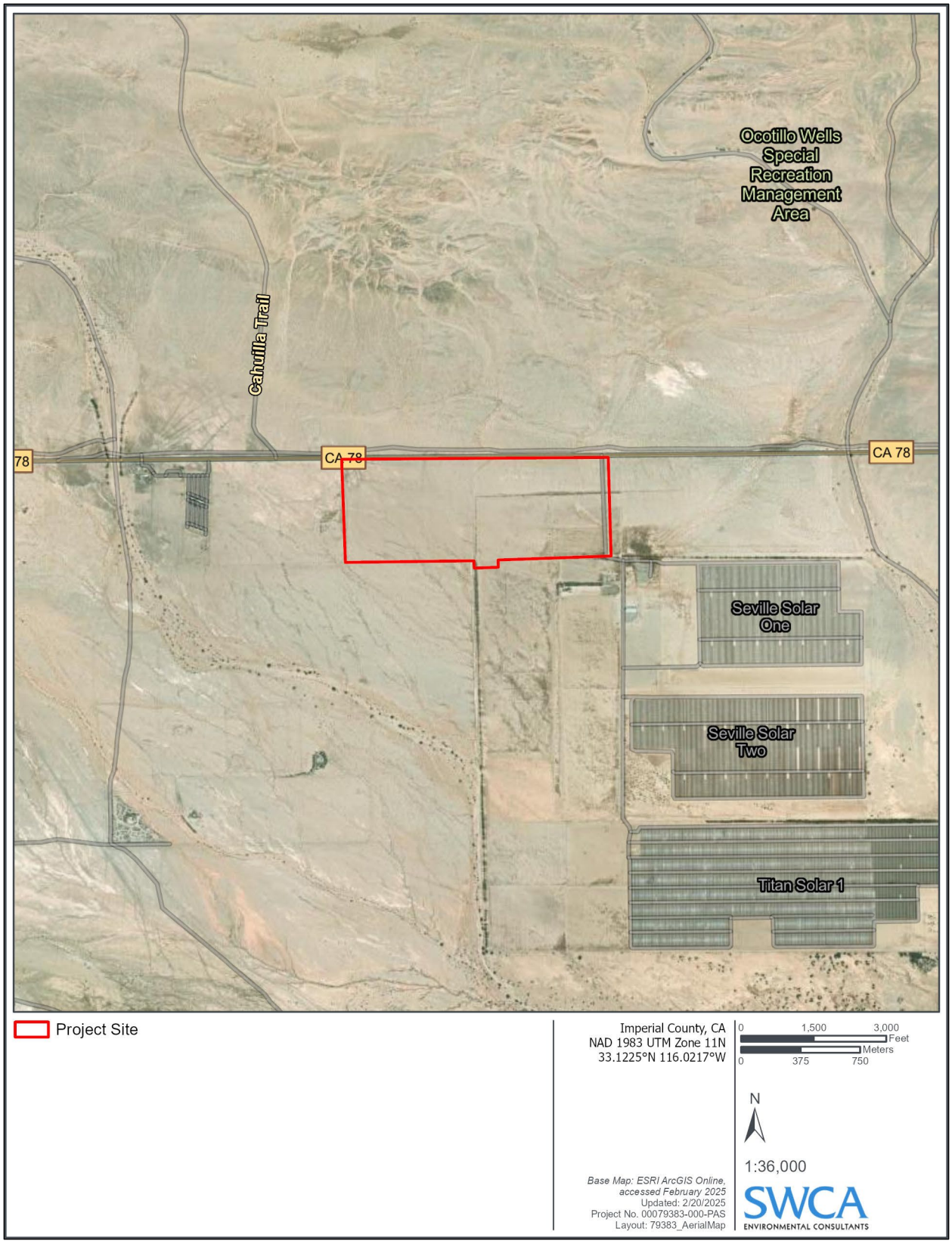

Figure 2. Project area for Seville 5 as depicted on an aerial photograph.

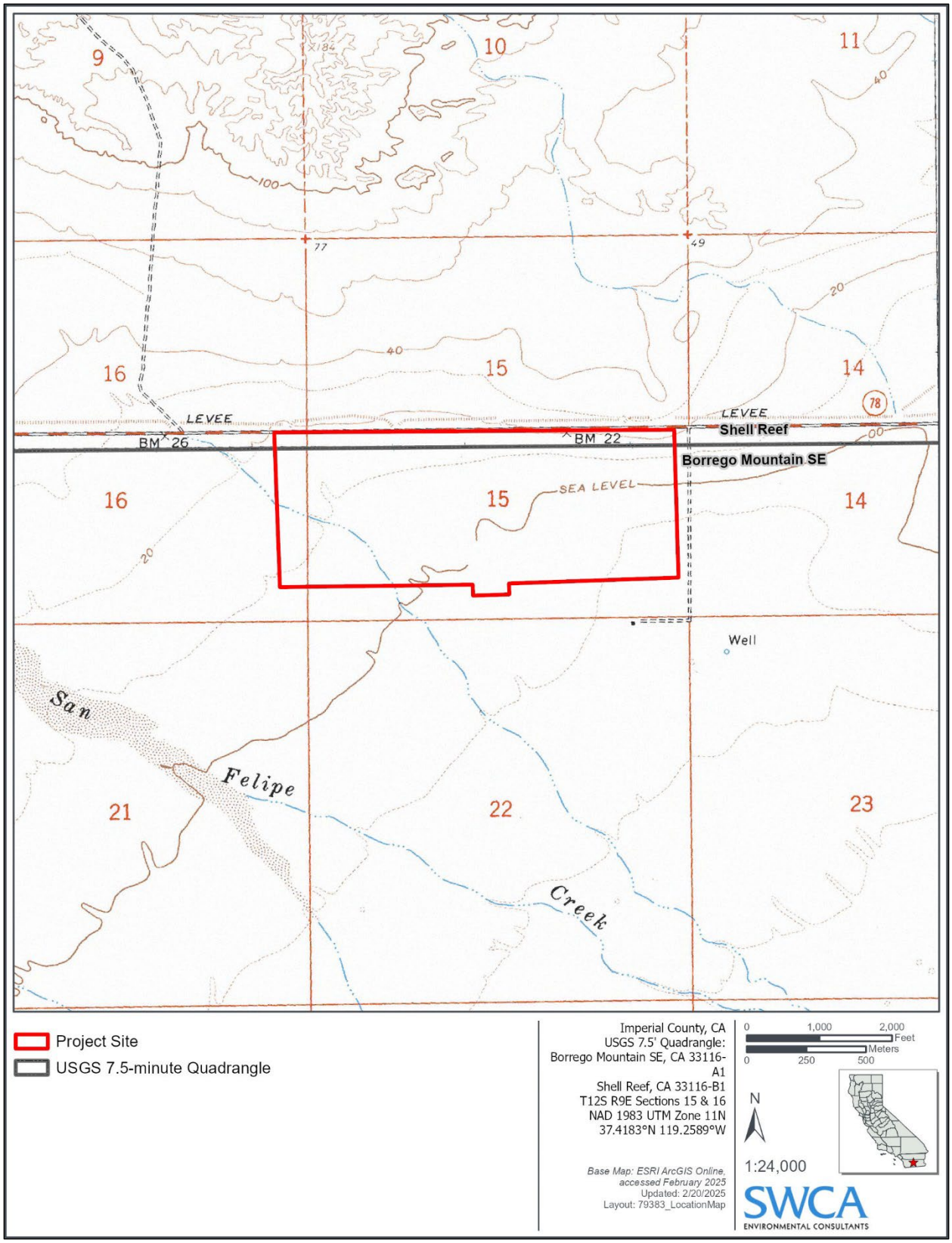

Figure 3. Project area for Seville 5 as depicted on the Borrego Mountain SE, California, 7.5-minute quadrangle.

Apex Energy proposes improvements for the 90-MW solar project that will consist of solar photovoltaic (PV) arrays, inverter transformer stations, a 180-MW BESS, numerous underground cable raceways, a substation, maintenance access roads, and maintenance buildings. The project proposes to use solar PV technology modules mounted on horizontal single-axis tracker systems. The fixed-frame PV module arrays would be mounted on racks that would be supported by driven piles, arranged in arrays spaced up to 30 feet apart (pile to pile) to maximize performance and to allow access for panel cleaning. Solar modules would be a maximum of 10 feet high. These arrays would be separated from each other and the perimeter security fence by at least 20-foot-wide interior roads to provide access to all areas for maintenance and emergency vehicles.

Electricity generated by the PV modules would be collected by a direct current (DC) collection system routed underground in trenches. This DC power would be delivered to pad-mounted inverters in weatherproof enclosures located within the arrays. Underground or overhead collection lines would transmit electricity to the new on-site Seville 4 substation, proposed to be located on the southeast corner of APN 018-170-064. From the Seville 4 substation, the project would connect to a 92-kV generation tie (gen-tie) line on the eastern site boundary that extends east to a substation within the Titan Solar project.

The proposed BESS will be constructed adjacent to the project's solar facilities and will consist of either lithium ion or flow batteries. Underground trenches with conduits would be used to connect the batteries to the control and monitoring systems, and inverters would be used to convert the PV-produced DC power to alternating current (AC) power.

Due to the relatively flat-lying topography, site grading is expected to entail minor cuts and fills to provide access roads, site drainage, and building sites for structures. An estimated 90% of ground disturbance would consist of excavation and post installation, as well as trenching for underground utilities and drainage culverts performed using mechanical methods. The remaining 10% of ground disturbance would be caused by overland travel for improvements and maintenance of solar panel blocks with solar PV arrays and various inverter transformer stations.

All proposed treatment areas, including roads, trails, access roads, and staging areas, are located on previously disturbed soils. Ground disturbance is not anticipated to exceed a depth of 8 feet by vibratory pile hammer and is not anticipated to exceed 48 inches for utilities trenching for underground utilities and would be a result of heavy equipment use. The project lifespan is 20 to 25 years.

Buffer zones will be established around all biologically and culturally sensitive resources, as necessary. In addition, a 50-foot-wide buffer will be established around all streams and floodplains.

PROFESSIONAL STANDARDS

The SVP has established standard guidelines that outline professional protocols and practices for conducting paleontological resource assessments and surveys; monitoring and mitigation; data and fossil recovery; sampling procedures; and specimen preparation, identification, analysis, and curation (SVP 2010). Most practicing professional mitigation paleontologists in California adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological laws, ordinances, regulations, and standards accept and use the professional standards set forth by the SVP.

Scientific Significance

Numerous paleontological studies have developed criteria for the assessment of scientific significance for fossil discoveries (e.g., Eisentraut and Cooper 2002; Murphey et al. 2019; Scott and Springer 2003). In general, these studies assess fossils as significant if one or more of the following criteria apply:

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

As defined by the SVP, scientifically significant paleontological resources are:

> fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about [4,200 years ago (Cohen et al. 2024)]). (SVP 2010:11)

Geologic units known to preserve significant fossils or fossil localities are likely to contain additional undiscovered and potentially significant fossils and are generally considered sensitive for paleontological resources throughout their areal and stratigraphic extent.

Paleontological Sensitivity

Paleontological potential ("sensitivity") is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. The sensitivity ranking provides the basis for determining which mitigation measures or recommendations, if any, are appropriate for a particular project.

In *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010:1–2), the SVP defines four categories of paleontological sensitivity for rock units: high, low, undetermined, and no potential:

> **High Potential**. Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ash or tephra), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils

(e.g., middle Holocene and older, fine-grained fluvial sandstone, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstone, fine-grained marine sandstone, etc.). Paleontological potential consists of both a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units that may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

Low Potential. Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e.g., basalt flows or recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.

Undetermined Potential. Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine whether these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a Paleontological Resources Impact Mitigation Program (PRIMP) can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategic excavations into subsurface stratigraphy.

No Potential. Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection or impact mitigation measures relative to paleontological resources.

REGULATORY SETTING

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

State Regulations

California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the state of California and is codified at California Public Resources Code (PRC) Section 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. The *State CEQA Guidelines* for the implementation of CEQA (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.

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.

METHODS

Literature Review

SWCA reviewed geologic maps and relevant geological and paleontological literature to determine which geologic units are present in the project area and whether fossils have been recovered from those geologic units elsewhere in the region. SWCA also reviewed geotechnical data relevant to the project area. The geologic mapping used in this analysis is from Dibblee (2008) at a scale of 1:62,500. As geologic units may extend over large geographic areas and contain similar lithologies and fossils, the literature review includes areas beyond the project area. The results of this literature review include a discussion of the geology and paleontological sensitivity (or potential) of the geologic units in the project area.

Museum Records Search

The purpose of a museum records search is to establish the status and extent of previously recorded paleontological resources within and adjacent to the study area for a given project. This search provides another line of inquiry to assist in determining paleontological sensitivity of geologic units as not all information regarding fossil collections has been documented and published. Generally, this search is conducted through the closest, regional institution that would have collections and information relevant to a project. The museum records search request was submitted to the SDNHM on March 28, 2023. The results were received on April 11, 2023, and have been incorporated into the Results section of this report. Appendix A (confidential) provides a copy of the museum records search results letter.

Reconnaissance Survey

To supplement the results of the literature review, SWCA conducted a pedestrian field survey of the project area on April 3 and 4, 2023. The field survey was conducted by SWCA Paleontology Team Lead Mathew Carson, M.S., and SWCA Staff Paleontologists Jasmyn Nolasco, M.S., and Kristina Akesson,

B.S. The purpose of the field survey was to 1) confirm the geologic mapping by Dibblee (2008); 2) assess the status of previously recorded paleontological localities noted in the museum records search results, if any; 3) inspect exposures of previously undisturbed sediments or bedrock outcrops within the project area, if any, to assess their potential to preserve paleontological resources; and 4) record newly identified or previously unrecorded paleontological localities that may be present within the project area, if any. The results of the field survey are incorporated into the *Results* section of this report.

RESULTS

Literature Review

Regional Geology

The project area is located in the Colorado Desert geomorphic province of California, which extends from the Mojave Desert to the north, the Colorado River on the east, the Peninsular Ranges on the west, and south into Mexico. Dominant features within the Colorado Desert include the Salton Trough; the Colorado River; and the Orocopia, Chocolate, Palo Verde, and Chuckwalla Mountains (Norris and Webb 1990). Specifically, the project is located within the Imperial Valley of the Salton Trough, a large structural depression that extends from the San Gorgonio Pass in the north to the Gulf of Mexico in the south. The Salton Trough is a graben structure, bounded by roughly parallel north-west-trending faults, including the San Andreas fault zone to the north and the San Jacinto and Elsinore faults to the southeast (Alles 2011; Norris and Webb 1990). During the Pliocene, the Salton Trough formed due to spreading and subsidence associated with the rift system that opened the Gulf of California, which still continues to undergo approximately 48 millimeters per year of spreading. The Salton Trough, including the Imperial Valley, would currently be under water as part of the Gulf of California if not for millions of years of sedimentation from the Colorado River (Alles 2011). During the Pliocene to early Pleistocene, sedimentation along the Colorado River resulted in the build-up of a substantial delta, which eventually separated the marine waters of the Gulf of California from the brackish and fresh waters of the Salton Trough (Alles 2011). Since the late Pleistocene, the Salton Trough was periodically occupied by the freshwater Lake Cahuilla. The lake formed, drained, and reformed between approximately 37,000 to 300 years before present as a result of fluctuations in the course of the Colorado River and the subsequent diversion of the river's mouth from the Gulf of California to the Salton Trough (Deméré 2002; Norris 1979).

Local Geology and Paleontology

Geologic mapping by Dibblee (2008) indicates that the project area is mapped with undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc) (Figure 4). Although not mapped by Dibblee (2008), the geotechnical report prepared for the overarching Seville solar energy facility project, which included the proposed project area, indicated that artificial fill was present at the surface of the area from the in-filling of San Felipe Creek and farming activities (Petra Geotechnical Inc. [Petra] 2012). Additionally, according to the SDNHM records search results letter, older sedimentary units (such as the Pleistocene Ocotillo Conglomerate), may be present at relatively shallow depth in the project area.

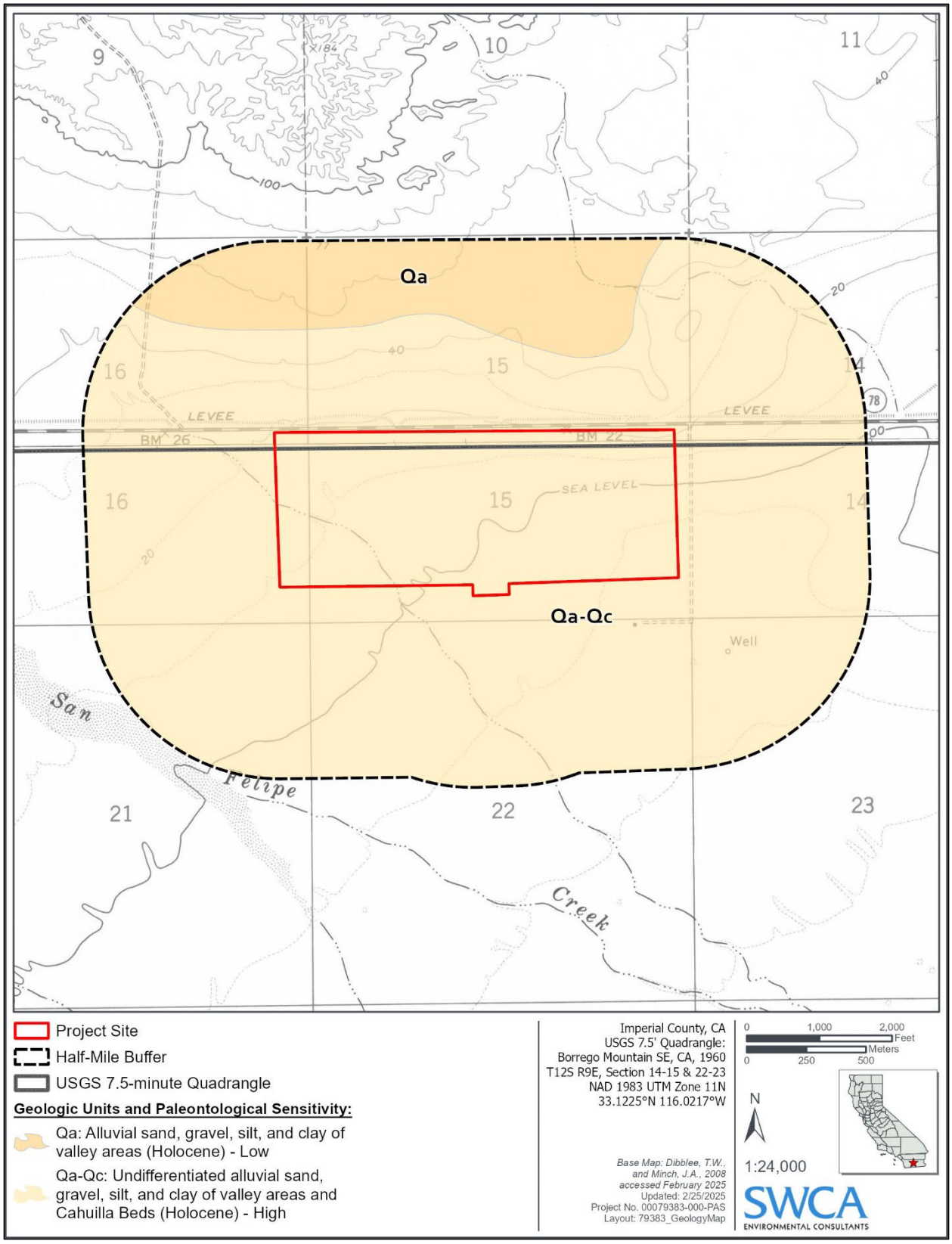

Figure 4. Geologic units in the vicinity of the Seville 5 project area.

These geologic units and their paleontological sensitivities are described in more detail below. Dates for the geologic time intervals used in this report are derived from the *International Chronostratigraphic Chart* prepared by the International Commission on Stratigraphy (Cohen et al. 2024).

ARTIFICIAL FILL

Artificial fill consists of sediments that have been removed from one location and transported to another location by human activity rather than by natural means. The transportation distance can vary from a few feet to many miles, and composition is dependent on the source and purpose. The three borings performed for the geotechnical report that were located within the boundaries of the proposed project area did not indicate the presence of artificial fill; however, artificial fill was identified from borings surrounding the project area at the surface to depths of 2 to 3 feet and may be present elsewhere in the project area (Petra 2012). Whereas artificial fill may contain fossils, these fossils are out of stratigraphic context and not important for scientific study. Therefore, artificial fill is considered to have no paleontological sensitivity.

UNDIFFERENTIATED ALLUVIAL SAND, GRAVEL, SILT, AND CLAY OF VALLEY AREAS AND CAHUILLA BEDS (QA-QC)

The undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds are Holocene in age (less than 11,700 years ago) and consist of recently deposited surficial alluvial sediments as well as tan-gray claystone, sand, and gravel deposited in Lake Cahuilla, an ancient freshwater lake that previously occupied a major portion of the Salton Trough (Dibblee 2008). Dibblee (2008) notes that the alluvial sand, gravel, silt, and clay of valley areas (Qa) is locally undifferentiated from the Cahuilla Beds (Qc) and maps the two units combined (Qa-Qc) within the project area (see Figure 4).

According to the SVP (2010), only the remains of plants and animals from the middle to early Holocene (4,200 to 11,700 years ago) are considered scientifically important and fossils from this time are not very common. While the Paleobiology Database (PBDB) and the University of California Museum of Paleontology (UCMP) report no fossil localities from similar Holocene-age alluvial deposits near the project area (PBDB 2023; UCMP 2023), fossils are known specifically from the Holocene-age sediments of Lake Cahuilla (Hubbs and Miller 1948; Jefferson 1991a, 1991b; Lander 2010; Reynolds and Buffington 2008; Stearns 1901; Waters 1983; Whistler et al. 1995) Additionally, older, Pleistocene-age Lake Cahuilla sediments likely underlie these Holocene deposits at a moderate depth, which have also produced numerous fossils. The depth of the contact between the Holocene-age and Pleistocene-age Lake Cahuilla deposits in the project area is currently unknown; however, the Pleistocene-age ancient Lake Cahuilla sediments are likely to be present at a relatively shallow depth (Waters 1983). Fossils from both the Holocene and Pleistocene sediments of ancient Lake Cahuilla include freshwater invertebrates and fish; reptiles and amphibians; birds such as finches, owls, and ducks; small mammals including shrews, vole, mice, squirrel, kangaroo rat, woodrat, gopher, muskrat, and rabbit; and larger mammals such as mustelid, coyote, and bighorn sheep (Hubbs and Miller 1948; Jefferson 1991a, 1991b; Lander 2010; Reynolds and Buffington 2008; Stearns 1901; Whistler et al. 1995. Due to the abundant remains of freshwater invertebrate and vertebrate fossils from the sediments of ancient Lake Cahuilla, the undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc) have a high paleontological sensitivity.

Museum Records Search

The SDNHM performed a museum records search for fossil localities within the vicinity of the project area. Based on the results of the museum records search, the SDNHM does not possess records of paleontological resources from within a mile of the project area; however, they note high paleontological sensitivity of the geologic units anticipated to be present either at the surface or in the subsurface within

the project area. Appendix A (confidential) provides a copy of the museum records search results.

Reconnaissance Survey

SWCA Paleontology Team Lead Mathew Carson, M.S., and SWCA Staff Paleontologists Kristina Akesson, B.S., and Jasmyn Nolasco, M.S., conducted the paleontological pedestrian field reconnaissance survey to determine if sediments observed at the surface are conducive to the preservation of paleontological resources and to record any previously unrecorded paleontological resources that may be at the surface.

The topographic relief within the site is low with shallow washes (Figure 5). Wind removed recent eolian sediments, exposing deposits of the undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc) along the western side of the site. Vegetation is sparse and consists of bushes and desert shrub or chapparal (Figures 5 and 6). There is evidence of prior disturbance based on remnants of agricultural development (Figure 7), and the presence of existing transmission structures with associated access roads and small buildings (Figure 8). The site is relatively more disturbed in the south than in the north.

Previously undisturbed sediments are observed at the surface throughout most of the project area. Freshly exposed surfaces of the undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc) showed consolidated silt and clay, with angular to subrounded sand, pebbles, and cobbles composed of igneous and low-grade metamorphic clasts, with a yellowish-gray, poorly to moderately lithified matrix (Figure 9). Exposures of native sediments are covered by sparse vegetation with no discernable bedding observed. Bivalve fragments were identified in the site; however, they are too young to be considered fossilized and were not recorded as fossil localities nor collected (Figure 10).

No newly identified significant paleontological resources were observed or recorded during the pedestrian reconnaissance survey; however, sedimentary deposits with the potential to preserve paleontological resources (i.e., undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds [Qa-Qc]) were observed within the project area.

Figure 5. Overview showing land topography and ground cover, consisting of eolian deposits or berms, shallow washes, and desert scrub. View facing west.

Figure 6. Areas lacking berms or active aeolian deposits are covered by bushes, shrubs, and vehicle tracks. View facing south.

Figure 7. Evidence of prior disturbance based on remnants of agricultural development. View facing west.

Figure 8. View showing further prior site disturbance in the form of structures and associated access roads. View facing south.

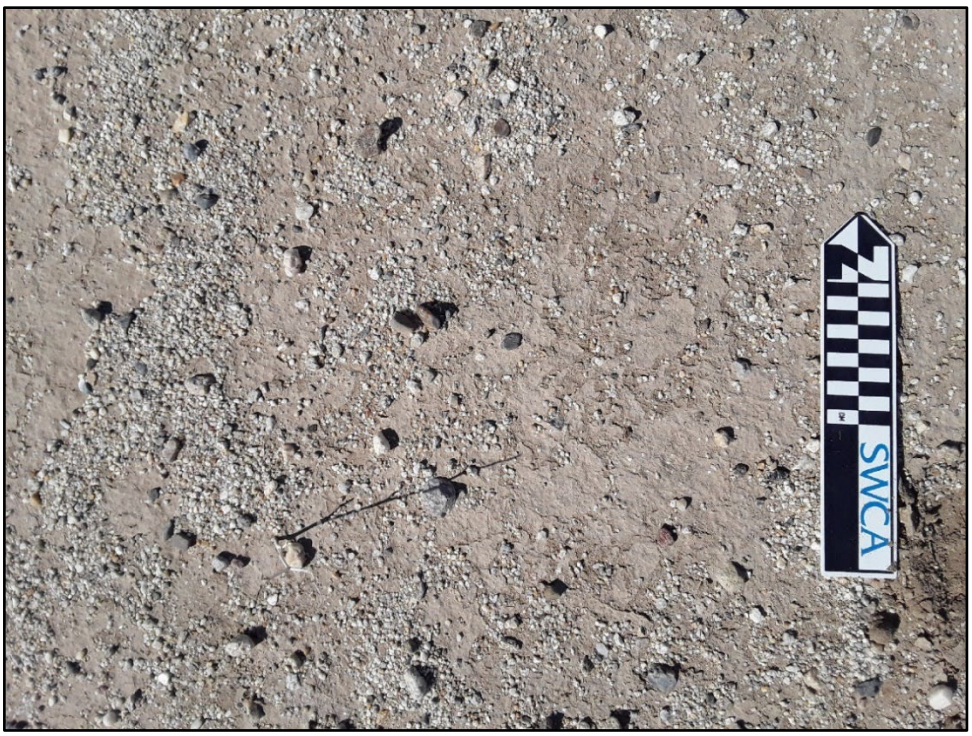

Figure 9. Plan view of undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc). Note the silty-clay sediment with sand and pebble clasts of igneous and metamorphic origin.

Figure 10. Bivalve fragments found in the project area that were determined to be too young to be fossilized and classified as nonsignificant. No collection or further treatment is necessary.

IMPACT ASSESSMENT

The project area contains artificial fill which has no paleontological sensitivity, and undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc) that have high paleontological sensitivity. Construction activities associated with the project are expected to disturb geologic units of high paleontological sensitivity and have the potential to impact scientifically significant paleontological resources they may contain.

RECOMMENDATIONS

To ensure that potential impacts to scientifically important paleontological resources are less than significant, SWCA recommends the following mitigation measures, which have been developed in accordance with, and incorporate the performance standards of, the SVP (2010) and best practices in mitigation paleontology (Murphey et al. 2019).

- **Paleo-1: Retain a Qualified Professional Paleontologist.** Prior to the issuance of a grading permit, the project applicant shall retain a qualified professional paleontologist, who meets the SVP qualifications for Principal Investigator or Project Paleontologist, to carry out all regulatory compliance measures and protocols related to paleontological resources. The Project Paleontologist shall provide a letter of retention to the project applicant, which shall be submitted to the lead agency. The letter shall include a resume for the Project Paleontologist that demonstrates fulfillment of the SVP standards.
- **Paleo-2: Prepare a Paleontological Resources Impact Mitigation Program.** Before any grading activities start, the Project Paleontologist shall prepare a Paleontological Resources Impact Mitigation Program (PRIMP). This PRIMP shall contain specific monitoring and mitigation requirements including construction worker training; protocols to follow in the event of an unanticipated discovery; procedures for monitoring, fossil and data collection, and fossil treatment. The PRIMP shall identify curation facilities for any significant fossils that may be salvaged and require a final report summarizing the results of the program. The PRIMP shall adhere to and incorporate the performance standards and practices from the 2010 SVP *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. The Project Paleontologist shall submit the final PRIMP to the project applicant and the lead agency for their records before project excavation activities start.
- **Paleo-3: Conduct Worker Environmental Awareness Training.** The Project Paleontologist shall develop worker environmental awareness program training to educate the construction crew on the legal requirements for preserving fossil resources as well as the procedures to follow in the event of a fossil discovery. This training program shall be presented by the Project Paleontologist (or his/her representative, such as the qualified paleontological monitor) to the crew before ground-disturbing work commences.
- **Paleo-4: Monitor for Paleontological Resources.** Full-time paleontological monitoring shall occur during ground-disturbing activities that impact undisturbed native sediments of the undifferentiated alluvial sand, gravel, silt, and clay of valley areas and Cahuilla Beds (Qa-Qc). Monitoring shall not be required when ground-disturbing activities would impact only previously disturbed sediments and/or artificial fill regardless of depth. Monitoring shall be conducted by a qualified paleontological monitor who meets the standards of the SVP and who shall be supervised by the Project Paleontologist. The Project Paleontologist may periodically inspect construction activities and increase, decrease, or cease monitoring in response to subsurface conditions, as appropriate.

- **Paleo-5: Treat Fossil Discoveries.** In the event of a fossil discovery, whether by the qualified paleontological monitor or a member of the construction crew, the qualified paleontological monitor shall have the authority to temporarily divert construction activity, and all work shall cease in a 50-foot radius of the discovery. The Project Paleontologist will evaluate the scientific significance of the find and, if appropriate, professionally and efficiently collect the fossil specimens and associated data. Paleontological monitors shall record pertinent geologic data and collect sediment samples from the fossil localities. Recovered fossils shall be prepared to the point of curation, identified by qualified experts, listed in a database to facilitate analysis, and deposited in a designated paleontological curation facility. The Project Paleontologist shall obtain a curatorial arrangement with an accredited repository with research, exhibit, and/or outreach interest in the specimens (e.g., SDNHM), and scientifically significant fossils shall be donated to this institution.
- **Paleo-6: Prepare a Paleontological Resources Monitoring Report.** At the conclusion of ground-disturbing activities, the Project Paleontologist shall prepare a final monitoring report that documents the methods and results of all efforts completed under the PRIMP including monitoring, treatment of paleontological resources, results of specimen processing, analysis, and research, and final curation arrangements, as applicable. The report shall be completed within 6 months of the completion of paleontological monitoring for the project. If paleontological resources are curated, the final monitoring report and any associated data pertinent to the curated specimen(s) shall be submitted to the designated repository. A copy of the final monitoring report shall be filed with the lead agency.

By implementing the recommended mitigation measures, project impacts to scientifically important paleontological resources would be reduced to a level that is less than significant.

LITERATURE CITED

Alles, D.L. 2011. Geology of the Salton Trough. Western Washington University, unpublished manuscript. Available at: http://fire.biol.wwu.edu/trent/alles/GeologySaltonTrough.pdf. Accessed February 2025.

Cohen, K.M., S.C. Finney, P.L. Gibbard, and J.-X. Fan. 2024. The ICS International Chronostratigraphic Chart. (2013; Updated December 2024). *Episodes* 36:199–204.

Deméré, T.A. 2002. Silent Beaches – Ancient Lake Cahuilla and its geologic setting. Biodiversity Research Center of the Californias, Paleontology, San Diego Natural History Museum. Available at: http://www.sdnhm.org/archive/research/paleontology/lakecahuilla.html. Accessed February 2025.

Dibblee, T.W. 2008. Geologic map of the Borrego & Borrego Mountain 15 minute quadrangles, San Diego and Imperial Counties, California. John A. Minch, ed. Dibblee Geological Foundation, Map DF-409, scale 1:62,500.

Eisentraut, P.J., and J.D. Cooper. 2002. *Development of a Model Curation Program for Orange County's Archaeological and Paleontological Collections – Final Report*. Submitted to the County of Orange, California.

Hubbs, C.L., and R.R. Miller. 1948. The Great Basin. Part II, The zoological evidence. University of Utah, Bulletin 38: 18-144.

Jefferson, G.T. 1991a. *A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa*. Technical Reports No. 5. Los Angeles, California: Natural History Museum of Los Angeles County.

———. 1991b. *A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals*. Technical Reports No. 7. Los Angeles, California: Natural History Museum of Los Angeles County.

Lander, E.B. 2010. Paleontologic resources impact mitigation program final technical report of results and findings prepared in support of Miles Avenue Bridge construction project Indio, Riverside County, California. *Document on file Department of Parks and Recreation, Colorado Desert District Stout Research Center*, Borrego Springs, California 28 p.

Murphey, P.C., G.E. Knauss, L.H. Fisk, T.A. Deméré, and R.E. Reynolds. 2019. Best practices in mitigation paleontology. *Proceedings of the San Diego Society of Natural History* 47.

Norris, R.M. 1979. Lake Cahuilla High Shorelines. In *Rifting, Transpression, and Neotectonics in the Mecca Hills, Salton Trough*, edited by A.G. Sylvester. Fall Field Trip Guide Book, September 25-26, 1999, Society for Sedimentary Geology, Pacific Section.

Norris, R.M., and R.W. Webb. 1990. *Geology of California*. Second Edition. Santa Barbara, California: John Wiley & Sons, Inc.

Paleobiology Database (PBDB). 2023. The Paleobiology Database. Available at: https://paleobiodb.org/#/. Accessed October 2, 2023.

Petra Geotechnical Inc. (Petra). 2012. Preliminary Geotechnical Investigation, Proposed Seville Solar Energy Facility, Allegretii Farms Site, Located East of Ocotillo Wells and South of SR-78, Imperial County, California. 216 p.

Reynolds, R.E., and K. Buffington 2008. The Park Place assemblage (Irvine, Orange County, California). Western Association of Vertebrate Paleontologists Annual Meeting, Abstracts and Program.

Scott, E., and K. Springer. 2003. CEQA and fossil preservation in California. *Environmental Monitor* Fall:4-10. Sacramento, California: Association of Environmental Professionals.

Stearns, R.E.C. 1901. The fossil fresh-water shells of the Colorado Desert, their distribution, environment, and variation. *Proceedings of the U.S. National Museum*, 24(1256): 271-299.

Society of Vertebrate Paleontology (SVP). 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. Available at: https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf. Accessed August 15, 2021.

University of California Museum of Paleontology (UCMP). 2023. Fossil Locality Database. Available at: https://ucmp.berkeley.edu/collections/databases/. Accessed October 2, 2023.

U.S. Geological Survey (USGS). 1982. Borrego Mountain SE, California, 7.5-minute quadrangle. United States Geological Survey, Denver, Colorado.

Waters, M.R. 1983. Late Holocene lacustrine chronology and archaeology of ancient Lake Cahuilla, California. *Quaternary Research* 19(3):373–387.

Whistler, D. P., E.B. Lander, and M.A. Roeder. 1995. A diverse record of microfossils and fossil plants, invertebrates, and small vertebrates from the Late Holocene Lake Cahuilla beds, Riverside County, California: *In* Remeika, P. and Sturz, A. (eds.), *Paleontology and Geology of the Western Salton Trough Detachment*, Anza-Borrego Desert State Park, California, vol. 1:109-118.

APPENDIX A

San Diego Natural History Museum
Paleontological Records Search

CONFIDENTIAL – NOT FOR PUBLIC RELEASE

11 April 2023

Matthew Carson
SWCA
320 North Halstead Street, Suite 120
Pasadena, CA 91107

RE: Paleontological Records Search – Seville Solar Project

Dear Mr. Carson:

This letter presents the results of a paleontological records search conducted for the Seville Solar Project (Project) located in the western portion of Imperial County, California. The Project site is located south of Ocotillo Wells State Vehicular Recreation Area (SVRA) along the south side of State Route 78 (Figure 1).

Methods

A review of published geological maps covering the Project site and surrounding area was conducted to determine the specific geologic units underlying the Project site. Each geologic unit was subsequently assigned a paleontological resource potential following guidelines developed by the Society of Vertebrate Paleontology (SVP, 2010). In addition, a search of the paleontological collection records housed at the San Diego Natural History Museum (SDNHM) was conducted in order to determine if any documented fossil collection localities occur at the Project site or within the immediate surrounding area.

Results

Published geological reports (e.g., Dibblee & Minch, 2008) covering the Project area indicate that the proposed Project has the potential to impact the late Pleistocene- to Holocene-age Lake Cahuilla Beds, and could also impact the early to middle Pleistocene-age Ocotillo Conglomerate, which may be present in the subsurface. These geologic units and their paleontological potential are summarized below.

The SDNHM does not have any recorded fossil localities that lie within one mile of the Project site.

Lake Cahuilla Beds – Lake Cahuilla was a former freshwater lake that periodically occupied a major portion of the Salton Trough during late Pleistocene to Holocene time (approximately 37,000 to 240 years ago), depositing sediments that underlie the entirety of the Project site. Generally, Lake Cahuilla sediments consist of an interbedded sequence of both freshwater lacustrine (lake) and fluvial (river/stream) deposits. There are no recorded SDNHM fossil collection localities from these deposits within a one-mile radius of the Project site. The Lake Cahuilla Beds have yielded well-preserved subfossil remains of freshwater clams and snails (Stearns, 1901) and sparse remains of freshwater fish (Hubbs and Miller, 1948). The paleontological resources of the Lake Cahuilla Beds are considered significant because of the paleoclimatic and paleoecological information they can provide (Jefferson, 2006), and these deposits are therefore assigned a high paleontological potential.

Ocotillo Conglomerate – Deposits of the early to middle Pleistocene-age Ocotillo Conglomerate (approximately 1.2 to 0.4 million year old) are exposed in the vicinity of the Project site and may underlie the Lake Cahuilla Beds within the Project boundaries. Generally, the Ocotillo Conglomerate consists of thickly bedded, gray pebble conglomerates and medium- to coarse-grained sandstones that were deposited in an arid alluvial depositional environment. There are no recorded SDNHM fossil collection localities from these deposits within a one-mile radius of the Project site. Elsewhere in the Colorado Desert, the Ocotillo Conglomerate has yielded well-preserved fossil remains of turtle, bird, ground sloth, rabbit, rodents, wolf, bear, bobcat, lion, sabertooth cat, mammoth, zebra, horse, camel, llama, deer, antelope, and ox (Remeika and Lindsay 1992). Based on the large and diverse assemblages of terrestrial vertebrates recovered from the Ocotillo Conglomerate, this geologic unit is assigned a high paleontological potential.

Summary and Recommendations

The high paleontological potential of the Lake Cahuilla Beds and the Ocotillo Conglomerate (SVP, 2010) suggests that construction of the proposed Project could result in impacts to paleontological resources. Any proposed excavation activities that extend deep enough to encounter previously undisturbed deposits of these geologic units have the potential to impact the paleontological resources preserved therein. For these reasons, implementation of a complete paleontological resource mitigation program during ground-disturbing activities is recommended.

If you have any questions concerning these findings please feel free to contact me at kmueller@sdnhm.org.

Sincerely,

Kirstin Mueller
Assistant Report Writer
San Diego Natural History Museum

Enc: Figure 1: Records search map.

Literature Cited

Dibblee, T.W., Jr., and J.A. Minch. 2008. Geologic map of the Borrego & Borrego Mountain 15-minute quadrangles, San Diego and Imperial Counties, California. Santa Barbara, CA, Santa Barbara Museum of Natural History: Dibblee Geological Foundation, Dibblee Foundation Map DF-409, scale 1:62,500.

Hubbs, C.L. and R.R. Miller. 1948. The Great Basin. Part II, The zoological evidence. University of Utah, Bulletin 38: 18-144.

Jefferson, G.T. 2006. Review of Salton Sea Restoration Program Draft Programmatic Environmental Impact Report. On file at the Colorado Desert District Stout Research Center, Anza-Borrego Desert State Park.

Remeika, P., and D.L. Lindsay. 1992. Geology of Anza-Borrego: Edge of Creation. Kendall/Hunt Publishing Co., Dubuque, Iowa, 208 p.

SDNHM, unpublished paleontological collections data.

Stearns, R.E.C. 1901. The fossil fresh-water shells of the Colorado Desert, their distribution, environment, and variation, U.S. National Museum, Proceedings 24(1256): 271-299.

SVP. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology: 1–11.

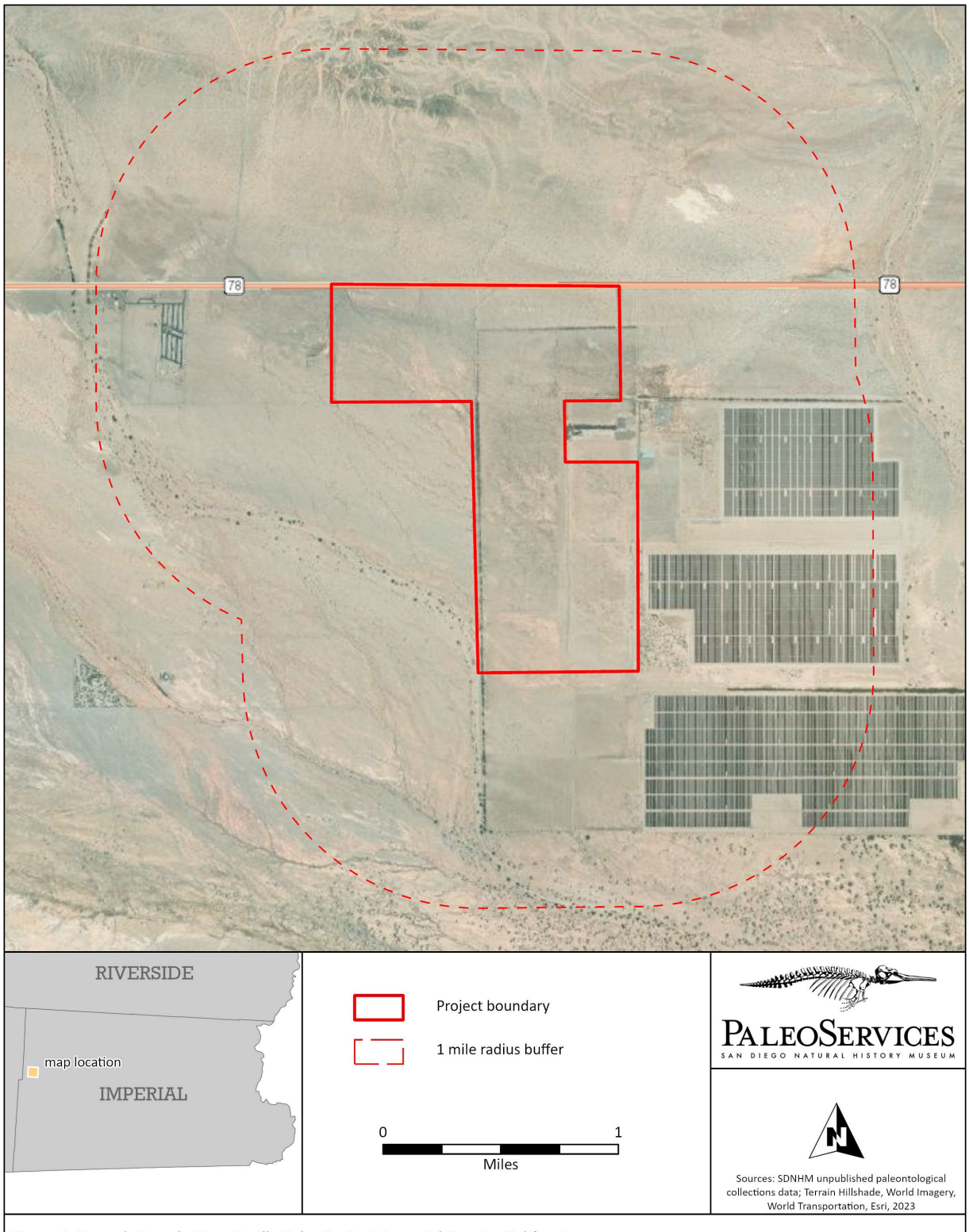

Figure 1: Records Search Map, Seville Solar Project, Imperial County, California