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Document Title:	Appendix T Paleontological Resources Assessment_Darden Clean Energy
Description:	Provides a literature review, museum records search, paleontological sensitivity assessment, and reporting consistent with the standards of the California Energy Commission (CEC) (Title 20, California Code of Regulations, Section 1704, Appendix B) and Society of Vertebrate Paleontology to determine whether the Darden Clean Energy Project would result in significant impacts to paleontological resources under federal, state, and local environmental regulations.
Filer:	Megan Knight
Organization:	Rincon Consultants, Inc.
Submitter Role:	Applicant Consultant
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Appendix T

Paleo Resources Assessment

Darden Clean Energy Project

Paleontological Resources Assessment

prepared for

IP Darden I, LCC and Affiliates
c/o Intersect Power, LLC
9450 SW Gemini Drive, PMB #68743
Beaverton, Oregon 97008

prepared by

Rincon Consultants, Inc.
7080 North Whitney Avenue, Suite 101
Fresno, California 93720

October 2023

RINCON CONSULTANTS, INC.
Environmental Scientists | Planners | Engineers
rinconconsultants.com

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Executive Summary

Purpose and Scope

Rincon Consultants, Inc. (Rincon) was retained by IP Darden I, LLC and Affiliates, wholly owned subsidiaries of Intersect Power, LLC, to conduct a Paleontological Resources Assessment (PRA) for the Darden Clean Energy Project (Project) in Fresno County, California. This PRA includes a literature review, museum records search, paleontological sensitivity assessment, and reporting consistent with the standards of the California Energy Commission (CEC) (Title 20, California Code of Regulations, Section 1704, Appendix B) and Society of Vertebrate Paleontology (SVP; 2010) to determine whether the Project would result in significant impacts to paleontological resources under federal, state, and local environmental regulations.

The Project includes the construction of a solar photovoltaic (PV) facility, step-up substation, battery energy storage system (BESS), green hydrogen facility, generation intertie (gen-tie) line, and utility switchyard.

Results of Investigation

The Project site is directly underlain by three geologic units: Quaternary basin deposits, Quaternary fan deposits, and Quaternary older alluvium (Dibblee and Minch 2007; Jennings and Strand 1958). A fourth geologic unit, the Tulare Formation, is not found at the surface directly beneath any Project components but may be impacted by subsurface excavations. Quaternary older alluvium and the Tulare Formation have high paleontological sensitivity due to the history of these geologic units producing scientifically significant paleontological resources (Jefferson 2010; Paleobiology Database 2023; University of California Museum of Paleontology 2023). Quaternary basin deposits and Quaternary fan deposits are generally considered too young (i.e., less than 5,000 years old) to preserve paleontological resources (SVP 2010), and therefore, are considered to have low paleontological sensitivity. However, in the subsurface, these sediments will become old enough to preserve paleontological resources. Based on the depth and radiometrically determined age of the Corcoran Clay Member of the Tulare Formation near the Project site, it is estimated that sediments occurring at 4.9 feet below the surface and deeper become 5,000 years old (i.e., old enough to preserve paleontological resources) (Dalrymple 1980; Miller et al. 1971). Therefore, areas mapped as Quaternary basin deposits and Quaternary fan deposits have low paleontological sensitivity from the surface to 5 feet in depth and high paleontological sensitivity below 5 feet.

A records search of the University of California Museum of Paleontology recovered no known fossil localities within the Project site (Holroyd 2023).

Impacts and Recommendations

The Project site is underlain by four geologic units, two of which have high paleontological sensitivity (Quaternary older alluvium and Tulare Formation) and two of which have low paleontological sensitivity from 0 to 5 feet below the surface and high paleontological sensitivity below 5 feet (Quaternary basin deposits and Quaternary fan deposits). The only area where Quaternary older alluvium or Tulare Formation are exposed at the surface is in the western portion

of the proposed utility switchyard. Ground-disturbing construction activities that affect previously undisturbed portions of these geologic units could result in significant impacts to currently unknown paleontological resources. Ground-disturbing activities that could impact paleontological resources include any reaching more than 5 feet below current grade within the Project site and all ground disturbance in areas mapped as Quaternary older alluvium or Tulare Formation.

Mitigation Measures PAL-1 through PAL-4 are recommended to mitigate potential impacts to paleontological resources. These mitigation measures involve a paleontological Worker Environmental Awareness Program, paleontological monitoring for ground-disturbing activities within previously undisturbed sediments with high paleontological sensitivity, procedures to be followed in the event of a paleontological resource discovery, and preparation of a paleontological monitoring report.

1 Introduction

Rincon Consultants, Inc. (Rincon) was retained by IP Darden I, LLC and Affiliates, wholly owned subsidiaries of Intersect Power, LLC, to conduct a Paleontological Resources Assessment (PRA) for the Darden Clean Energy Project (Project) in Fresno County, California to determine the potential impacts to paleontological resources consistent with California Energy Commission (CEC) requirements for Opt-In Applications (Title 20, California Code of Regulations (CCR), Section 1704, Appendix B). This assessment includes a literature review, paleontological records search, paleontological sensitivity assessment, and reporting consistent with the professional standards of the Society of Vertebrate Paleontology (SVP; 2010).

Paleontological resources (i.e., fossils) are the remains or traces of prehistoric life. Fossils are typically preserved in layered sedimentary rocks, and the distribution of fossils across the landscape is controlled by the distribution and exposure of the fossiliferous sedimentary rock units at and near the surface. Construction-related impacts that typically affect or have the potential to affect paleontological resources include mass excavation operations, drilling/borehole excavations, trenching/tunneling, and grading. Ground-disturbing construction activities associated with the Project would mainly consist of grading, boring, trenching, and excavation. This PRA provides a list of the geologic units mapped at the surface within the Project site and formations that underlie those mapped at the surface that may be impacted by Project construction activities.

1.1 Project Overview

The Darden Clean Energy Project (Project) consists of the construction, operation, and eventual repowering or decommissioning of a 1,150 megawatt (MW) solar photovoltaic (PV) facility, an up-to 4,600 megawatt-hour (MWh) battery energy storage system (BESS), an up-to 1,150 MW green hydrogen facility, a 34.5-500 kilovolt (kV) grid step-up substation, a 10 to 15-mile 500 kV generation intertie (gen-tie) line, a 500 kV utility switchyard along the Pacific Gas and Electric Company (PG&E) Los Banos-Midway #2 500 kV transmission line, and appurtenances.

Construction of the Project is anticipated to take between 18 and 36 months to complete and the Project would be operational by 2027 or 2028. The Project would include the following major components:

- **Solar Facility, Substation, and Gen-tie**
  - Construct a 1,150 MW solar PV facility, consisting of approximately 3,100,000 solar panels, inverter-transformer stations, and an electrical collection system. The collection cables would be buried underground in a trench about 4 feet deep, with segments installed overhead on wood poles to connect the solar facility development areas to the on-site substation.
  - Construct a new step-up substation to step-up the medium voltage of the PV collector system from 34.5 kV to 500 kV, located on approximately 20 acres. Two locations (Options 1 and 2 sites) are being considered for the step-up substation.
  - Construct an operations and maintenance (O&M) facilities.
  - Construct an approximately 10 to 15-mile-long 500 kV gen-tie line, consisting of either monopole tubular steel poles or steel H-frame structures and dead-end structures, to

interconnect the step-up substation to the new utility switchyard. The gen-tie line would be located within an up to 275-foot corridor.

- **BESS Facility**
  - Construct a battery storage system capable of storing up to 1,150 MW of electricity for four hours (up to 4,600 MWh), located on approximately 35 acres. Two locations (Options 1 and 2 sites) are being considered for the battery storage system.
- **Green Hydrogen Facility**
  - Construct an up-to 1,150 MW green hydrogen facility, consisting of an electrolyzer and water treatment plant with reverse osmosis and Electrodeionization, and ancillary equipment such as filters, storage tanks, backwash systems and chemical dosing systems. Three locations are being considered for the green hydrogen facility. Option 1 or Option 2 sites would be approximately 225 acres in size and would be located within the solar facility. In addition, an approximately 100-acre alternate site located west of Interstate 5 is being considered. If the alternate site is selected, it would generate 800 to 1,000 MW and include the construction of an 8,000 square foot O&M building within the facility boundaries, as well as a substation and switchyard on approximately 20 additional acres.
- **Utility Switching Station**
  - Construct a PG&E-owned switchyard, consisting of high-voltage circuit breakers, switches, and series capacitor line compensation equipment in a breaker-and-half configuration, to electrically connect the Project's generation onto PG&E's 500 kV transmission network. The utility switchyard would be located on approximately 40 acres.

The Project would operate for approximately 35 years, at which time Project facilities would be either repowered or decommissioned. Following decommissioning, the Project site would be restored and reclaimed to the extent practicable to pre-construction conditions consistent with site lease agreements.

1.2 Project Location

The Project site is an irregular shape, located in an agricultural area of unincorporated Fresno County south of the community of Cantua Creek (Figure 1). The proposed solar facility, BESS, step-up substation, and green hydrogen facility site (Options 1 and 2) would be located on approximately 9,100 acres of land owned by Westlands Water District, between South Sonoma Avenue to the west and South Butte Avenue to the east. The proposed approximately 10 to 15-mile gen-tie line would span west from the intersection of South Sonoma Avenue and West Harlan Avenue to immediately west of Interstate 5, where it would connect to the proposed utility switchyard along PG&E's Los Banos-Midway #2 500 kV transmission line (Figure 2). The alternate green hydrogen facility site being considered is located adjacent to the proposed utility switchyard site.

Land cover types include fallow lands, tilled and disked fields containing ruderal vegetation, and some active farming on the Project site. Surrounding properties include fallow and agricultural lands. The Project's gen-tie line spans privately-owned land on the western portion of the Project site with land-cover types including active agriculture and fallow fields. The California Aqueduct bisects the gen-tie parcels, running generally north-south. Compacted dirt and paved roads border and separate each land-cover type.

Figure 1 Regional Location

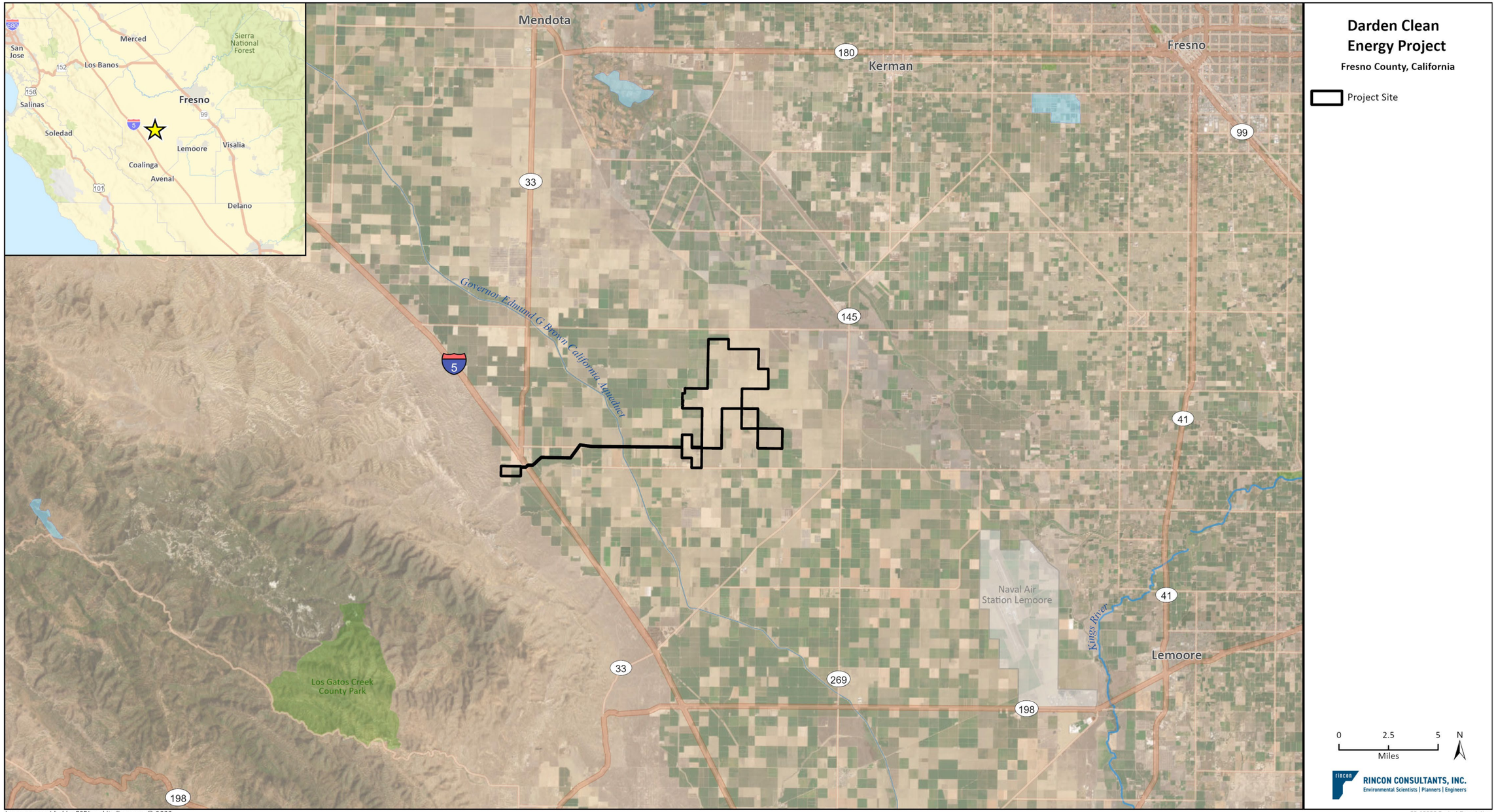

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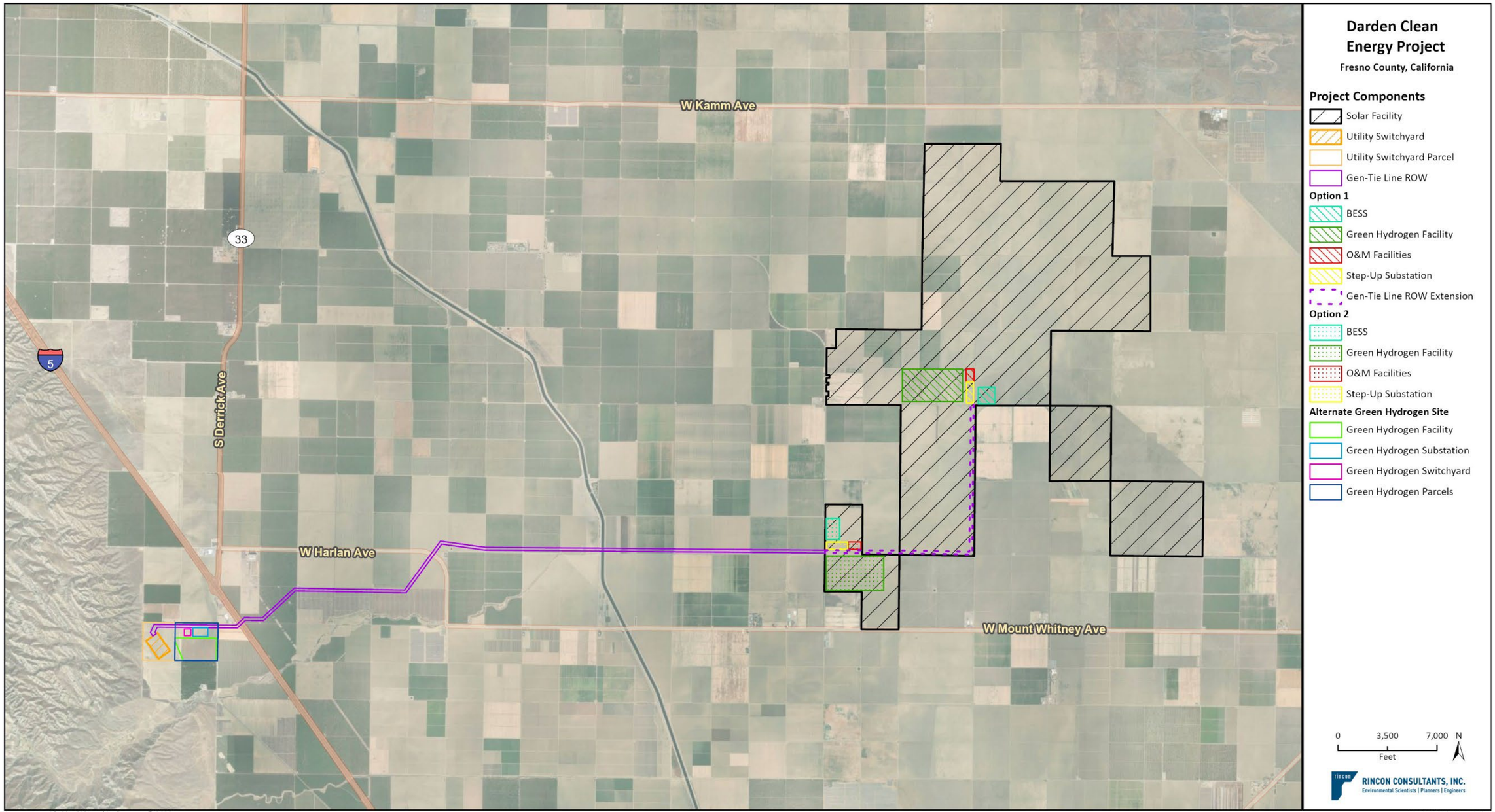
Figure 2 Project Site and Parcel Map



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22-12530 Project Description
Fig X Project Site

2 Regulations

2.1 Federal Regulations

Federal regulatory protection for paleontological resources would apply if a specific project involves federally owned or managed lands, a federal license, permit, approval or funding, and/or crosses federal lands. The Project site does not cross federally owned or managed lands, thus, federal protection does not apply to the Project.

2.2 State Regulations

California Code of Regulations

The CEC requires that Opt-In Applications include the information required in Title 20, CCR, Section 1704, Appendix B, which includes an assessment of a Project's potential impacts to paleontological resources. This assessment must include:

- Identification of the physiographic province and a brief summary of the geologic setting, formations, and stratigraphy of the project area. The size of the paleontological study area may vary depending on the depositional history of the region.
- A discussion of the sensitivity of the project area described in subsection (g)(16)(A) and the presence and significance of any known paleontologic localities or other paleontologic resources within or adjacent to the project. Include a discussion of sensitivity for each geologic unit identified on the most recent geologic map at a scale of 1:24,000. Provide rationale as to why the sensitivity was assigned.
- A summary of all local museums, literature searches and field surveys used to provide information about paleontologic resources in the project area described in subsection (g)(16)(A). Identify the dates of the surveys, methods used in completing the surveys, and the names and qualifications of the individuals conducting the surveys.
- Information on the specific location of known paleontologic resources, survey reports, locality records, and maps at a scale of 1:24,000, showing occurrences of fossil finds, if known, within a one-mile radius of the project and related facilities shall be included in a separate appendix to the Application and submitted to the Commission under a request for confidentiality, pursuant to Title 20 CCR § 2501 et seq.
- A discussion of any educational programs proposed to enhance awareness of potential impacts to paleontological resources by employees, measures proposed for mitigation of impacts to known paleontologic resources, and a set of contingency measures for mitigation of potential impacts to currently unknown paleontologic resources.

California Environmental Quality Act

CEQA requires state and local government agencies to inform decision makers and the public about the potential environmental impacts of the Project and to reduce environmental impacts to the extent feasible. Under CEQA, a project would "normally" have a significant effect on the environment if its effects exceed an identified threshold of significance (CEQA Guidelines Section 15064.7[a]). Appendix G of the CEQA Guidelines (the Environmental Checklist Form) provides

suggested thresholds of significance for evaluating a project's environmental impacts, including impacts to paleontological resources. In Section VII(f) of Appendix G of the CEQA Guidelines, the following question is posed: "Will the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" To determine the uniqueness of a given paleontological resource, it must first be identified or recovered (i.e., salvaged).

CEQA does not define "a unique paleontological resource or site." However, the SVP (2010) has defined a "significant paleontological resource" in the context of environmental review as follows:

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 typically older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years) (SVP 2010).

The loss of paleontological resources meeting the criteria outlined above (i.e., a significant paleontological resource) would be a significant impact under CEQA.

California Public Resources Code

California Public Resources Code Section 5097.5 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.

Here "public lands" means those owned by, or under the jurisdiction of, the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with Public Resources Code Section 5097.5 for their own activities, including construction and maintenance, and for permit actions (e.g., encroachment permits) undertaken by others. The Project is not located on government-owned land. Therefore, this regulation is not applicable.

2.3 Regional and Local Regulations

2000 Fresno County General Plan

Fresno County addresses paleontological resources within the Fresno County General Plan, Open Space and Conservation Element, Section J, Historical, Cultural, and Geologic Resources (County of Fresno 2000). In areas of known paleontological resources, the County is to identify and protect these resources when feasible. The specific Open Space and Conservation Element goals and policies related to paleontological resources are:

> **Goal OS-J.** To identify, protect, and enhance Fresno County's important historical, archeological, paleontological, geological, and cultural sites and their contributing environment.
>
> **Policy OS-J.1.** The County shall require that discretionary development Projects, as part of any required CEQA review, identify and protect important historical, archeological, paleontological, and cultural sites and their contributing environment from damage, destruction, and abuse to

the maximum extent feasible. Project-level mitigation shall include accurate site surveys, consideration of Project alternatives to preserve archeological and historic resources, and provision for resource recovery and preservation when displacement is unavoidable.

3 Paleontological Resources Assessment Guidelines

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under state and local laws and regulations. This PRA satisfies CEC requirements for Opt-In Applications (Title 20, California Code of Regulations, Section 1704, Appendix B) and follows guidelines and significance criteria specified by the SVP (2010).

3.1 Paleontological Sensitivity

Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into the geologic deposits within which fossils are buried and physically destroy the fossils. Because fossils are the remains of prehistoric animal and plant life, they are considered to be nonrenewable. These activities may constitute significant impacts under CEQA or adverse effects under federal environmental protection laws and may require mitigation. Sensitivity 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 discovery of a vertebrate fossil locality is of greater significance than that of an invertebrate fossil locality, especially if it contains a microvertebrate assemblage. The recognition of new vertebrate fossil locations could provide important information on the geographical range of the taxa, their radiometric age, evolutionary characteristics, depositional environment, and other important scientific research questions. Vertebrate fossils are almost always significant because they occur more rarely than invertebrates or plants. Thus, geologic units having the potential to contain vertebrate fossils are considered the most sensitive.

3.2 Resource Assessment Criteria

In its Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources, the SVP outlines guidelines for categorizing paleontological sensitivity of geologic units within a project site. The SVP describes sedimentary rock units as having a high, low, undetermined, or no potential for containing significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrates or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. Significant paleontological resources are fossils or assemblages of fossils that are unique, unusual, rare, or uncommon diagnostically, stratigraphically, taxonomically, or regionally (SVP 2010). The paleontological sensitivity of the Project site has been evaluated according to the following SVP (2010) categories:

- **High Potential (Sensitivity).** Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent and sedimentary rock units temporally or lithologically suitable for the preservation of

fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical, and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant. Full-time monitoring is typically recommended during any project-related ground disturbance in geologic units with high sensitivity.

- **Low Potential (Sensitivity).** Sedimentary rock units that are potentially fossiliferous but have not yielded fossils in the past or contain common and/or widespread invertebrate fossils of well-documented and understood taphonomic processes (those affecting an organism following death, burial, and removal from the ground), phylogenetic species (evolutionary relationships among organisms), and habitat ecology. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potential for yielding significant fossils prior to the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations.
- **Undetermined Potential (Sensitivity).** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potential of the rock units are required before programs of impact mitigation for such areas may be developed.
- **No Potential.** Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources.

4 Methods

Rincon reviewed published geologic maps to identify the geologic units present at and below the surface within the Project site (Dibblee and Minch 2007; Jennings and Strand 1958; Miller et al. 1971). Rincon requested a records search of the University of California Museum of Paleontology (UCMP) on April 18, 2023, to identify any fossil localities known from within the Project site or nearby fossil localities known from the same geologic units as those underlying the Project site. Rincon reviewed the online paleontological collections database of the UCMP (2023) and Paleobiology Database (PBDB; 2023) and consulted primary literature to assess the paleontological sensitivity of the Project site.

Based on a review of historical and modern aerial imagery, the Project site contains no bedrock exposures and has been extensively disturbed with grading and agricultural activities. Therefore, a paleontological resources field survey was not conducted.

Paleontological sensitivity ratings of the geological formations were assigned based on the findings of the records search and literature review and based on the potential effects to nonrenewable paleontological resources from Project construction and operation following SVP (2010) guidelines.

5 Description of Resources

5.1 Geologic Setting

The Project site is located in the Great Valley geomorphic province, one of the eleven geomorphic provinces of California. The Great Valley is an elongate lowland approximately 50 miles wide and 400 miles long. It is bounded to the east by the Sierra Nevada Range and to the west by the Coast Range (California Geological Survey 2002). A relatively undeformed basin, the Great Valley rises from about sea level to approximately 400 feet in elevation at the north and south ends. The northern portion of the valley, referred to as the Sacramento Valley, is drained by the Sacramento River, while the southern portion of the valley, referred to as the San Joaquin Valley, is drained by the San Joaquin River. Both rivers converge in the Central Valley and drain into San Francisco Bay. The Great Valley is predominantly alluvial, flood, and delta plains formed by these two major river systems.

The sedimentary record in the Great Valley includes typically shallow water marine units from the late Jurassic and Cretaceous, thick units of marine sediments from the Miocene, and brackish and freshwater lake deposits from the late Cenozoic. The San Joaquin Valley was likely an open deepwater marine embayment throughout the Oligocene and Miocene (Addicott 1970), and the thickest sequences of Miocene marine sediments were likely deposited in narrow, deep seaways extending into the Pacific Ocean across the current area of the Coast Ranges in the southern portion of the San Joaquin Valley (Norris and Webb 1976). By the Pliocene, the southern connection to the Pacific Ocean had closed and uplift had drained the San Joaquin Valley to the north through the Carquinez Strait. Pliocene-Pleistocene deposits consist of alluvial sediments including those associated with a number of ancient lake systems, Tulare Lake in the central San Joaquin Valley being the most recent of the ancient systems.

Locally, the Project site is in the western San Joaquin Valley on the Cantua alluvial fan, which is deposited by Cantua Creek as it flows northeastward out of the Diablo Range toward the San Joaquin River, though under modern climatic conditions Cantua Creek very rarely reaches the river. The proposed utility switchyard and alternate green hydrogen components would border the foothills of the Ciervo Hills, which form the eastern border of the Coast Ranges. The Project site is located on the *Lillis Ranch*, *Tres Picos Farms*, *Westside*, and *San Joaquin*, United States Geological Survey 7.5-minute quadrangles.

5.2 Geology of the Project Site

The geology of the region around the Project site was mapped by Dibblee and Minch (2007), Jennings and Strand (1958), and Miller et al. (1971), who identified three geologic units directly underlying the Project site, Quaternary basin deposits, Quaternary fan deposits, and Quaternary older alluvium, and two additional geologic units, Tulare Formation and Oro Loma Formation within a one-mile radius of the Project site (Figure 3).

Quaternary Basin Deposits

Quaternary basin deposits underlie much of the eastern part of the solar facility (Figure 3). Quaternary basin deposits consist of fine-grained sediments that are deposited during flooding

events of the major streams and rivers of the San Joaquin Valley (Jennings and Strand 1958). These sediments are late Holocene in age and, therefore, too young (i.e., less than 5,000 years old) to preserve paleontological resources. As a result, Quaternary basin deposits have low paleontological sensitivity from the surface to a depth of 5 feet.

Quaternary Fan Deposits

Quaternary fan deposits underlie the majority of the Project site, including much of the solar facility site; all of the gen-tie route; most of the utility switchyard; Options 1 and 2 step-up substation, BESS, and green hydrogen sites; and the alternate green hydrogen components (Figure 3). In this region, Quaternary fan deposits consist of a variety of sediments ranging from coarse- to fine-grained and represent alluvial fan sediments deposited by ephemeral streams and mudslides/debris flows originating from the Coast Ranges that form the western border of the San Joaquin Valley (Jennings and Strand 1958; Miller et al. 1971). These sediments are late Holocene in age and, therefore, too young (i.e., less than 5,000 years old) to preserve paleontological resources. As a result, Quaternary fan deposits have low paleontological sensitivity from the surface to a depth of 5 feet.

Quaternary Older Alluvium

Quaternary older alluvium underlies the western edge of the proposed utility switchyard and much of the southwestern part of the utility switchyard parcel (Figure 3). Quaternary older alluvium consists of Pleistocene-aged, dissected gravel and sand (Dibblee and Minch 2007). Pleistocene alluvial sediments have produced scientifically significant paleontological resources throughout California, including in Fresno County, yielding taxa such as bison (*Bison*), horse (*Equus*), deer (*Cervus*, *Odocoileus*), coyote (*Canis latrans*), jackrabbit (*Lepus*), rodents, reptiles, and fish (Jefferson 2010; PBDB 2023; UCMP 2023). Given this fossil-producing history, Quaternary older alluvium has high paleontological sensitivity.

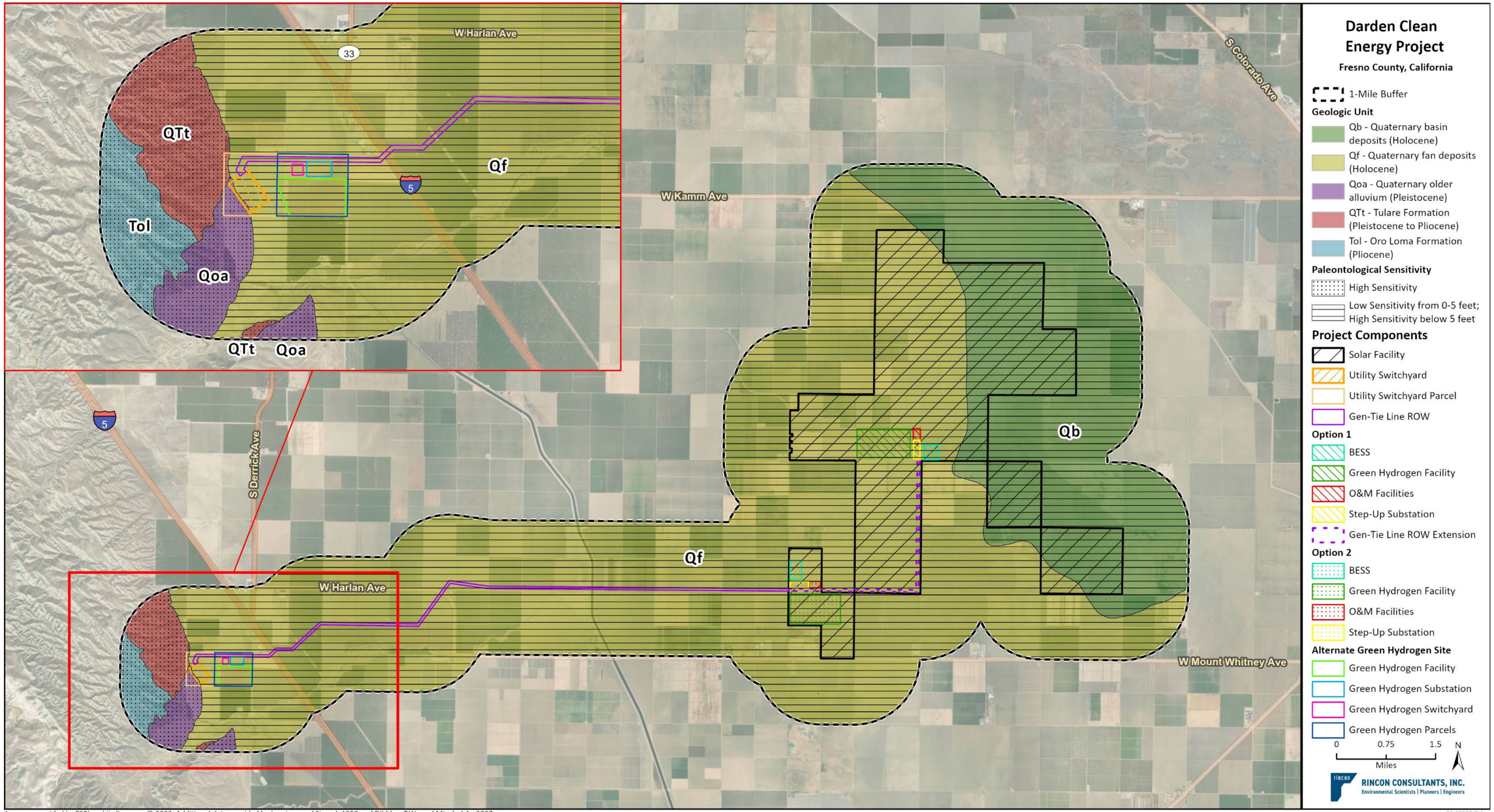
Tulare Formation

The Tulare Formation is located immediately west of the westernmost part of the utility switchyard . (Figure 3). The Tulare Formation consists of weakly lithified, gravel, sand, and clay beds that are late Pliocene and Pleistocene in age (Dibblee and Minch 2007). The Tulare Formation has produced several scientifically significant fossils in the San Joaquin Valley, including taxa such as river dolphin (*Parapontoporia*), horse (*Equus*), camel (*Hemiauchenia*), rodents, turtle, birds, fish, and invertebrates (Jefferson 2010; PBDB 2023; UCMP 2023). Given this fossil-producing history, the Tulare Formation has high paleontological sensitivity.

Oro Loma Formation

The Oro Loma Formation is found west of the Project site but within the study area (Figure 3). The Oro Loma Formation consists of gray to red pebble conglomerate, sandstone, and claystone, and is Pliocene in age (Dibblee and Minch 2007). The Oro Loma Formation is considered part of the Etchegoin Formation by some authors (e.g., Miller et al. 1971). The Oro Loma/Etchegoin Formation has produced many scientifically significant fossils in Fresno County including taxa such as horse (*Pliohippus*, *Neohipparion*), elephant (*Gomphotherium*), and cat (*Pseudaelurus*) (PBDB 2023; UCMP 2023). Given this fossil-producing history, the Oro Loma Formation has high paleontological sensitivity.

Figure 3 Geologic Map and Paleontological Sensitivity of Project Site



Imagery provided by ESRI and its licensors © 2023. Additional data provided by Jennings and Strand, 1958 and Dibblee, T.W., and Minch, J.A., 2007.

22-12530 Paleo
Fig X Geologic Units and Paleosensitivity 20230905

Subsurface Geology

Holocene-aged sediments are generally considered to have low paleontological sensitivity due to their young age. However, at a certain depth in the subsurface, these sediments become old enough to preserve paleontological resources (i.e., 5,000 years old; SVP 2010). It is difficult to estimate absolute age from test borings or well logs because there is no expected change in sediment type across this 5,000-year boundary. However, there are deeper geologic units in this region with known absolute ages that can be used to estimate the relationship of age to depth. Miller et al. (1971) reported the Corcoran Clay Member of the Tulare Formation at a depth of approximately 600 feet near the community of Cantua Creek, which is less than 5 miles north and northwest of the Project site and approximately the same distance from the Ciervo Hills as the southwestern edge of the solar facility. The Friant Pumice Member of the Turlock Lake Formation, which conformably overlies the Corcoran Clay Member has been radiometrically (K-Ar) dated to 615,000 +/- 22,000 years old (Dalrymple 1980) giving a minimum age for the Corcoran Clay Member. Assuming a constant rate of deposition since that time yields an estimate that sediments in this area will reach 5,000 years old at a depth of approximately 4.9 feet. Moving northeast (i.e., further from the Ciervo Hills), the depth of the Corcoran Clay Member does not notably change (Miller et al. 1971), so it is assumed that this 4.9-foot depth is relatively consistent throughout the Project site. Given this age-depth estimate, Holocene-aged sediments in the Project site (i.e., Quaternary fan deposits and Quaternary basin deposits) are considered to have low paleontological sensitivity from the surface to a depth of 5 feet and high paleontological sensitivity below 5 feet.

Below this 5-foot-depth, these sediments would be considered Quaternary older alluvium or, potentially, the Tulare Formation (Miller et al. 1971), both of which have high paleontological sensitivity. Miller et al. (1971) did not identify the Oro Loma Formation (or Etchegoin Formation) in any of their sediment cores that extended several hundred feet deeper than the anticipated depth of ground disturbance for this Project. Therefore, it is highly unlikely that ground-disturbing activities will impact the Oro Loma Formation.

The entire Project site was previously used for agriculture, and it is assumed that prior agricultural activities disturbed the uppermost 18 inches of sediment.

5.3 Paleontology of the Project Site

A formal fossil locality search of the UCMP identified no confirmed fossil localities inside or within a one-mile radius of the Project site (Holroyd 2023).

UCMP invertebrate locality 3074 is labeled as “reef beds north of Cantua Creek”. Cantua Creek runs through the Project site, meaning it is possible that this locality could occur near the Project Site. However, the fossils recovered from this locality represent the marine echinoid (sea urchin) *Scutella merriami*. Per Holroyd, the presence of *S. merriami* makes it unlikely that this locality originates from any of the geologic units underlying the Project site and that the site “more likely occurs on the west side of the highway in what we could now call the Temblor or Santa Margarita formations” (2023).

There are no known paleontological resources found inside or within a one-mile radius of the Project site. Therefore, no map depicting known fossil localities is included with this PRA.

6 Evaluation, Impacts, and Recommendations

6.1 Paleontological Sensitivity Evaluation

The Project site is underlain by four geologic units: Quaternary basin deposits, Quaternary fan deposits, Quaternary older alluvium, and Tulare Formation (Figure 3). Of these geologic units, Quaternary older alluvium and Tulare Formation have high paleontological sensitivity. Quaternary basin deposits and Quaternary fan deposits have low sensitivity from 0 to 5 feet in depth. However, these geologic units have high paleontological sensitivity below 5 feet because it is estimated that at this depth the sediments are old enough (i.e., 5,000 years old; SVP 2010) to preserve paleontological resources based on the depth of the reliably dated Corcoran Clay Member and Friant Pumice Member of the Tulare Formation in this region (Dalrymple 1980; Miller et al. 1971).

Solar Facility, Step-Up Substation, and Gen-Tie

The eastern portion of the proposed solar facility is underlain by Quaternary basin deposits, whereas the western portion is underlain by Quaternary fan deposits (Figure 2; Figure 3). These geologic units have low paleontological sensitivity from the surface to 5 feet below the surface and high paleontological sensitivity below 5 feet in depth.

The Options 1 and 2 step-up substation and gen-tie line corridor are underlain by Quaternary fan deposits (Figure 2; Figure 3). This geologic unit has low paleontological sensitivity from the surface to 5 feet below the surface and high paleontological sensitivity below 5 feet in depth.

BESS

The Options 1 and 2 BESS component are underlain by Quaternary fan deposits (Figure 2; Figure 3). This geologic unit has low paleontological sensitivity from the surface to 5 feet below the surface and high paleontological sensitivity below 5 feet in depth.

Green Hydrogen

The Options 1 and 2 green hydrogen component, and the alternate component site are underlain by Quaternary fan deposits (Figure 2; Figure 3). This geologic unit has low paleontological sensitivity from the surface to 5 feet below the surface and high paleontological sensitivity below 5 feet in depth.

Utility Switchyard

The central and eastern parts of the proposed utility switchyard are underlain by Quaternary fan deposits, whereas the western part is underlain by Quaternary older alluvium (Figure 3). Quaternary fan deposits have low paleontological sensitivity from the surface to 5 feet below the surface and high paleontological sensitivity below 5 feet in depth. Quaternary older alluvium has high paleontological sensitivity.

6.2 Impacts

There are no known paleontological resources within the Project site (Holroyd 2023). During construction, ground-disturbing activities (i.e., grading, excavating, trenching, boring) in previously undisturbed sediments with high paleontological sensitivity may result in significant impacts to previously unknown paleontological resources.

If construction activities result in the destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data, they would be considered as having a significant impact or adverse effect on paleontological resources. For this Project, high-sensitivity sediments include all sediments in areas mapped as Quaternary older alluvium or the Tulare Formation and sediments greater than 5 feet below the surface in areas mapped as Quaternary basin deposits or Quaternary fan deposits (Figure 3).

Solar Facility, Step-Up Substation, and Gen-Tie

Construction

Ground-disturbing activities associated with construction of the solar facility would consist of driving piles for solar panels using pneumatic techniques and reaching-between 6 and 15 feet below the surface, which will be driven into the ground using pneumatic techniques. The O&M building for the solar facility would be a one-story building with a concrete foundation, which would require grading of the site to make it level. Additionally, collection cables, which would connect the solar panels to the Options 1 and 2 step-up substation component, would be installed underground in a trench that would typically be 4 feet deep, but could be up to 6 feet deep. Some collection cable segments would be installed in areas where multiple circuits must cross over each other. These segments would be supported by wooden poles between 12 and 20 inches in diameter and require excavations up to 15 feet below the surface.

The Options 1 and 2 step-up substation site would be graded and would require dead-end structures to connect the substation to the grid. Each dead-end structure would be up to 100 feet tall and require foundations excavated to a depth of 20 feet or more. Up to two microwave towers would be constructed in the substation. These towers would be up to 200 feet tall and have an 18-foot by 18-foot base. The foundations for these towers would require foundations excavated to a depth of 20 feet or more.

Ground-disturbing activities for the gen-tie line would include drilling foundation holes for approximately 80 gen-tie poles. These foundations would be drilled to an average of 40 feet deep and would be 30 to 40 feet in diameter.

Ground-disturbing activities described above for the solar facility, Options 1 and 2 step-up substation, and gen-tie line corridor could result in significant impacts to paleontological resources due to the depth of proposed ground-disturbing activities and location within high-sensitivity sediments.

Operation

O&M activities associated with the solar facility, Options 1 and 2 step-up substation, and gen-tie line components would not involve ground-disturbing activities that would have the potential to result in significant impacts to paleontological resources. Therefore, no operational impacts to paleontological resources would occur as a result of these Project components.

BESS

Construction

The Options 1 and 2 BESS component would be located on Quaternary fan deposits (Figure 2; Figure 3). This Project component site would be graded to be level. Additionally, drainage components would be excavated to capture and direct stormwater around the BESS facility.

Since Quaternary fan deposits have low paleontological sensitivity from the surface to 5 feet below the surface, construction of the BESS is not anticipated to disturb paleontological resources. However, ground-disturbing activities for the BESS still could have the potential to result in significant impacts to paleontological resources due to the location within high-sensitivity sediments.

Operation

O&M activities associated with the BESS would not involve ground-disturbing activities that would have the potential to result in significant impacts to paleontological resources. Therefore, no operational impacts to paleontological resources would occur as a result of this Project component.

Green Hydrogen

Construction

The Options 1 and 2 green hydrogen component, and the alternate component site would be located on Quaternary fan deposits (Figure 2; Figure 3). The site for this Project component would be graded to be level. Additionally, drainage components would be excavated to capture and direct stormwater around the green hydrogen facilities.

Ground-disturbing activities for this Project component could result in significant impacts to paleontological resources due to the depth of proposed ground-disturbing activities and location within high-sensitivity sediments.

Operation

O&M activities for the Project would not involve ground-disturbing activities that would have the potential to result in significant impacts to paleontological resources. Therefore, no operational impacts to paleontological resources would occur as a result of the Project. No mitigation is required.

Utility Switchyard

Construction

Ground-disturbing activities associated with construction of the utility switchyard would include site grading and excavation of a 1,000-foot by 100-foot stormwater retention pond. The utility switchyard would also require 20 dead-end structures to connect the substation to the grid. Each dead-end structure would require foundations that are excavated to a depth of 20 feet or more. A microwave tower would be constructed in the switchyard, which would be 140 feet tall and would require foundations excavated to a depth of 20 feet or more.

Ground-disturbing activities for the utility switchyard could result in significant impacts to paleontological resources due to the depth of proposed ground-disturbing activities and location within high-sensitivity sediments.

Operation

O&M activities for the Project would not involve ground-disturbing activities that would have the potential to result in significant impacts to paleontological resources. Therefore, no operational impacts to paleontological resources would occur as a result of the Project. No mitigation is required.

6.3 Recommendations

The following proposed mitigation measures would address potentially significant impacts to paleontological resources. Implementation of Mitigation Measures PAL-1 through PAL-5 would effectively reduce the Project's potentially significant impacts to these resources through the recovery, identification, and curation, of previously unrecovered fossils.

PAL-1 Paleontological Resources Specialist

Prior to the start of construction, the Project applicant shall submit the name and resume of an individual to the CEC for review and approval as the Project's Paleontological Resources Specialist. The PRS shall be an individual with a degree in paleontology or geology and at least three years of paleontological resource mitigation and field experience in California, including at least one year of leading paleontological resource mitigation and field activities. The PRS shall be responsible for directing all paleontological mitigation efforts for the Project.

PAL-2 Paleontological Worker Environmental Awareness Program

The PRS or their designee shall conduct a paleontological Worker Environmental Awareness Program (WEAP) training for construction personnel regarding the appearance of fossils and the procedures for notifying paleontological staff should fossils be discovered by construction personnel.

PAL-3 Paleontological Monitoring

Full-time paleontological monitoring shall be conducted during trenching, excavation, grading, and drilling (if borehole is 2 feet or more in diameter) when ground disturbing depths exceed 18 inches, within previously undisturbed sediments with high paleontological sensitivity (i.e., Quaternary older alluvium) to mitigate for potential impacts to currently unknown paleontological resources. Full-time paleontological monitoring shall also be conducted during trenching, excavation, grading, and drilling (if borehole is 2 feet or more in diameter) activities reaching deeper than 5 feet below current grade in sediments assigned a low paleontological sensitivity from 0 to 5 feet and high paleontological sensitivity below 5 feet (i.e., Quaternary basin deposits and Quaternary fan deposits). Pile driving and drilling for boreholes less than 2 feet in diameter do not require paleontological monitoring as the data required to accompany scientifically valuable paleontological resources cannot be collected under the conditions of typical drilling and pile driving activity.

Monitoring shall be conducted by a paleontological monitor with experience with collection and salvage of paleontological resources and who meets the minimum standards of the Society of Vertebrate Paleontology (2010) for a Paleontological Resources Monitor. The PRS in coordination

with the CEC may recommend that monitoring be reduced in frequency or ceased entirely based on geologic observations.

In the event of the discovery of a previously unknown paleontological resource by the paleontological monitor or construction personnel, all construction activity within 50 feet of the find shall cease, and the PRS shall evaluate the find. If the fossil(s) is (are) not scientifically significant, then construction activity may resume. If it is determined that the fossil(s) is (are) scientifically significant, Mitigation Measure PAL-4 shall be enacted.

PAL-4 Paleontological Resource Salvage and Curation

If a paleontological resource is determined to be potentially scientifically significant, the paleontological monitor shall salvage (i.e., excavate and recover) the fossil to protect it from damage/destruction. Typically, fossils can be safely salvaged quickly by a single paleontological monitor with minimal disruption to construction activity. In some cases, larger fossils (such as complete skeletons or large mammal fossils) require more extensive excavation and longer salvage periods. Bulk matrix sampling may be necessary to recover small invertebrates or microvertebrates from within paleontologically sensitive deposits. After the fossil(s) is (are) salvaged, construction activity may resume.

Fossils shall be identified to the lowest (i.e., most-specific) possible taxonomic level, prepared to a curation-ready condition, and curated in a scientific institution with a permanent paleontological collection along with all pertinent field notes, photos, data, and maps. Fossils of undetermined significance at the time of collection may also warrant curation at the discretion of the PRS.

PAL-5 Paleontological Mitigation Report

Upon completion of ground-disturbing activities (or laboratory preparation and curation of fossils, if necessary), the PRS shall prepare a final report describing the results of the paleontological monitoring efforts. The report shall include a summary of the field and laboratory methods employed; an overview of Project geology; and, if fossils were discovered, an analysis of the fossils, including physical description, taxonomic identification, and scientific significance. The report shall be submitted to the CEC and, if fossil curation is required, the designated scientific institution.

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8 List of Preparers

Rincon Consultants, Inc.

Primary Author

- Andrew McGrath, Paleontologist/Assistant Project Manager

Technical Review

- Jennifer DiCenzo, Senior Paleontologist/Paleontological Program Manager

Principal Review

- Nichole Jordan, Principal

Publishing Support

- Debra Jane Seltzer, Publishing Manager Specialist
- Yaritza Ramirez, Publishing Specialist

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