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CalCapture CCS Project

Paleontological Resources Assessment

Stantec Consulting Services Inc.

Prepared for:
Carbon TerraVault Holdings, LLC, a carbon management subsidiary of California Resources Corporation

Prepared by:
Stantec Consulting Services Inc.
2646 Santa Maria Way, Suite 107
Santa Maria, CA 93455

October 2025

Project/File:
185806775

Revision Schedule

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date

Disclaimer

Prepared by: ______________________
Signature

Joey Raum, B.S.; Paleontologist

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Signature

Joseph Kobler, B.A.; Paleontologist

Approved by: Alyssa Bell
Signature

Alyssa Bell, Ph.D.; Project Paleontologist

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Acronyms / Abbreviations

Acronym / Abbreviation	Full Name
AMNH	American Museum of Natural History
CalGEM	California Geologic Energy Management Division
CARB	California Air Resources Board
CCS	Carbon Capture and Sequestration
CCU	Carbon Capture Unit
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO_2	carbon dioxide
CRC	California Resources Corporation
CTV	Carbon TerraVault Holdings, LLC
CTV I	Carbon TerraVault I
CUP	Conditional Use Permit
the CUP	Collectively, CUP No. 13, Map 118; CUP No. 14, Map 118; CUP No. 5, Map 119; CUP No. 3, Map 120; CUP No. 2, Map 138; and CUP No. 6, Map 119
HDD	Horizontal Directional Drilling
EFG+	Econamine FG
EHOF	Elk Hills Oilfield
EHPP	Elk Hills Power Plant
GIS	Geographic Information System
GT	gas turbine
HRSG	heat recovery steam generator
Kern County	Kern County Planning and Natural Resources Department
kV	kilovolt
LACM	Natural History Museum of Los Angeles County
M	magnitude
Ma	million years ago
MDB&M	Mount Diablo Base and Meridian
MM	mitigation measure
MMTPY	million metric tons per year
MTPD	metric tons per day
MWe	megawatt equivalent
NMNH	National Museum of Natural History
NOD	Notice of Determination
PMMP	Paleontological Monitoring and Mitigation Plan
PRC	Public Resources Code
Project	CalCapture Carbon Capture and Sequestration Project
RO	reverse osmosis
ST	steam turbine
Stantec	Stantec Consulting Services Inc.
Study Area	25-foot buffer around Project components

Acronym / Abbreviation	Full Name
SVP	Society of Vertebrate Paleontology
UCMP	University of California Museum of Paleontology
UIC	Underground Injection Control
U.S. EPA	U.S. Environmental Protection Agency
WEAP	Worker’s Environmental Awareness Program
WSAC	Wet Surface Air Coolers

Glossary

Term	Definition
Paleontological Technician	An individual who has academic training (B.S., B.A., M.A., or M.S.) with an emphasis in paleontology or demonstrated equivalent experience (a minimum of two years of cumulative professional or nonprofessional work in laboratory preparation, curation, or field work related to paleontology, as well as documented self-taught knowledge of the discipline of paleontology). [Murphey et al. 2019]
Paleontological Monitoring	Observation of construction activities by a paleontological technician, under supervision of the Project Paleontologist. Monitoring may be full time (observation of the entire duration of a particular activity) or consist of a spot check (observation of a portion of the activity or of an area following the activity).
Paleontological Resource	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 5,000 radiocarbon years). [Society of Vertebrate Paleontology 2010: 11]
Project Paleontologist	An individual with an advanced academic degree (M.A., M.S. or Ph.D.) with an emphasis in paleontology or demonstrated equivalent professional experience (e.g., minimum of 3 years [or 75 projects] of project experience with paleontological mitigation is considered equivalent to a graduate degree), in combination with 2 years (or 50 projects) of demonstrated professional experience and competency with paleontological resource mitigation projects at the level of field supervisor. [Murphey et al. 2019]

1 Introduction

Stantec Consulting Services Inc. (Stantec) conducted a paleontological resources assessment on behalf of Carbon TerraVault Holdings, LLC (CTV) a carbon management subsidiary of California Resources Corporation (CRC) for the CalCapture Carbon Capture and Storage (CCS) Project (the Project) located in the Elk Hills Oilfield (EHOF), in Kern County, California. The Regional Location and Project Location are shown in Figures 1 and 2.

The lead agency for this Project is the California Energy Commission (CEC). The CEC environmental review process under the Warren-Alquist Act is equivalent to that of the California Environmental Quality Act (CEQA) (Public Resources Code Sections 21000 et seq.). As part of CEC and CEQA compliance, a paleontological resources assessment was conducted to assess potential impacts of the proposed Project on paleontological resources. This assessment consisted of an analysis of existing data, a pedestrian survey of the Study area, and an assessment of Project plans for potential impacts to paleontological resources.

1.1 Project Description

The proposed Project would capture carbon dioxide (CO_2) generated as a by-product by CRC's 550-megawatt-equivalent (MWe) Elk Hills Power Plant (EHPP), located in the EHOF near Tupman, Kern County, California. The EHPP was commissioned in 2003 and is powered by two General Electric 7FA gas turbines (GTs), with two heat recovery steam generators (HRSGs) providing steam to a General Electric D11 steam turbine (ST). The Carbon Capture Unit (CCU), not including pipelines or temporary staging and parking areas, would be located immediately south of the EHPP in a 7.64-acre existing disturbed area.

Implementation of the Project will require approval of a Petition for Modification Application from the California Energy Commission (CEC), who has the exclusive authority for licensing thermal power plants of 50 MW or larger, as well as related transmission lines, fuel supply lines, and other facilities.

The CCU would utilize Fluor's Econamine FG Plus℠ (EFG+) process to capture and concentrate the CO_2. The EFG+ process is designed to capture 95 percent of the CO_2 from the total flue gas feed to the unit. The EFG+ CCU can be divided into seven primary subsystems or sections: Flue Gas Cooling, CO_2 Absorption, Solvent Regeneration, Solvent Maintenance, Chemical Storage and Supply, CO_2 Compression, and Utility Support Systems. The treated flue gas is vented to the atmosphere directly from the EFG+ CCU plant absorber. The concentrated CO_2 would then be compressed, dehydrated, and stripped of oxygen prior to conveyance to the permitted manifold pad, permitted as part of the approved Carbon TerraVault I (CTV I) project (State Clearinghouse No. 2022030180), which will direct the CO_2 to the U.S. Environmental Protection Agency (U.S. EPA) approved Class VI Underground Injection Control (UIC) wells to be injected into a depleted oil and gas reservoir located on the CRC property and approved as part of the CTV I project. The previously approved CTV I manifold pad, injection wells, depleted oil and gas reservoir and related facilities further discussed in Section 1.2 below are not part of the CalCapture CCS Project analyzed in this report.

A new, approximately 0.5-mile, 8- to 10-inch pipeline, installed primarily below ground utilizing either trenching or horizontal directional drilling (HDD) techniques, would transport the CO_2 from the CCU to the tie-in with the Carbon TerraVault I (CTV I) permitted 35R manifold facility (pad). It is anticipated that the proposed Project would capture approximately 4,400 metric tons of CO_2 per day (MTPD) (1.6 million metric tons of CO_2 per year [MMTPY]). The proposed Project is estimated to be in operation for up to 26 years.[1]

Water use during operation of the CalCapture CCU would be minimized by the inclusion of a hybrid cooling system (Wet Surface Air Coolers [WSAC], air coolers, secondary glycol cooling, and water cooling). Additionally, the CCU would be equipped with a water treatment system, consisting of a reverse osmosis (RO) Unit that is designed to recover and reuse water from the Cooling Tower blowdown. The recovered water is utilized as make-up to the CO_2 absorption system and the Wash Water WSAC Basin. A wastewater stream (less than 10 gallons per minute) would be collected at the CalCapture CCU and transferred by a new surface pipeline to the EHPP for disposal via an existing UIC Class I injection well.

The proposed Project includes a single connection to the CRC Power System and would include a connection of a new 115-kilovolt (kV) transmission line to a new CRC electrical substation. The proposed Project would require a new transmission tie line to connect the Project switching station to the existing CRC substation. Electrical power would be supplied to the CalCapture Substation with a new dedicated electrical transformer. The new 115-kV transmission tie line is expected to be built using pre-engineered steel poles with anchor bolt foundation designs.

During construction, temporary offices and existing parking areas would be used by construction personnel. Temporary office and parking areas have been designated on previously disturbed areas to the south and northeast of the Project site. Two additional areas are located approximately 5.5 miles southeast of the Project site. There are no permanent new buildings proposed for the Project, and no grading would occur within the temporary office and parking areas. The total temporary staging and parking area would be approximately 30.74 acres.

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[1]The life of the project is dependent on the sources permitted for injection into the CTV I approved storage reservoir, the ability of the project year by year to obtain CO_2 and inject at the maximum 2,210,000 million tons per year, and the total estimated storage capacity of up to 48 million tons of CO_2.

Project Area

0 2 4 Miles
(At original document size of 8.5x11)
1:253,440

N

Stantec

Project Location
Kern County, CA

Prepared by MMD on 2025-07-02
TR by CT 2025-07-02
IR by ES on 2025-07-02

Client/Project
185806775
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
1

Title
Regional Location

Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec, USGS, 2025.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org Copyright:©2013 National Geographic Society, i-cubed

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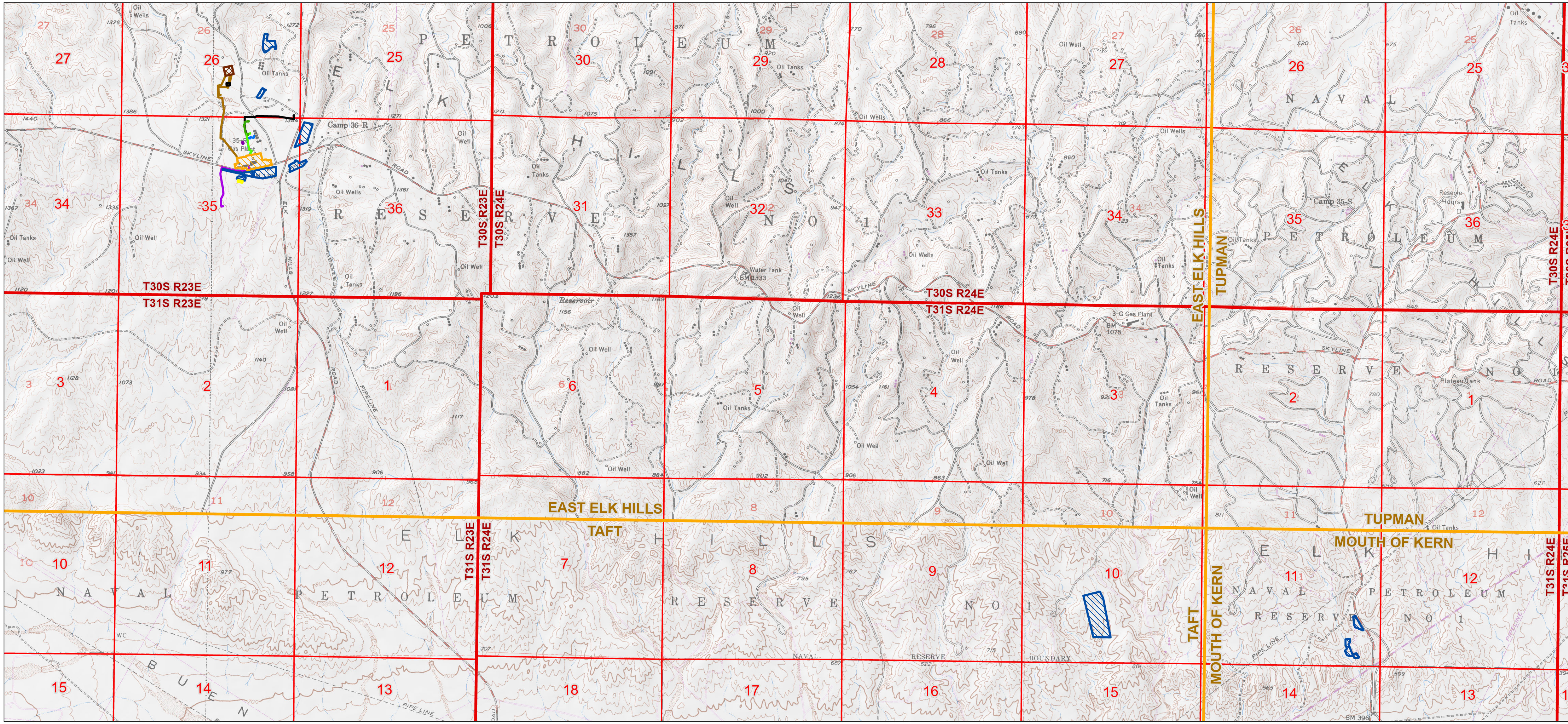

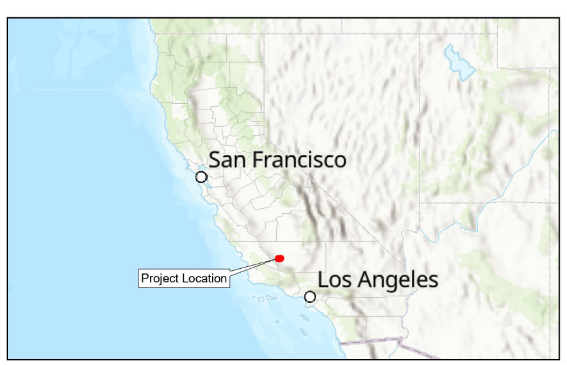

USGS 7.5' Quadrangle
Township and Range
Section

Project Areas
Capture Facility
Temporary Parking, Office, and Staging Areas
Proposed Sub Location (250 x 250)
Substation Extension Proposal
New BPSTG & Transformer
Warehouse
Cooling Water Sump

Electrical Lines
CO2 Line
CWR Line
CWS Line
Condensate Line
HP Steam Line
LP Steam Line
Raw Water Line
RO Permeate Stream Pipeline
CWS Line Alternative

0 1,500 3,000 Feet
(At original document size of 11x17)
1:36,000

N

Stantec

Project Location
Kern County, CA

Prepared by MMD on 2025-08-04
TR by CT 2025-08-04
IR by ES on 2025-08-04

Client/Project
185806775
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
2

Title
Study Area Vicinity

Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec 2025, Township/Section/ data from BLM 2018. Quadrangle data from USGS 2017.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org

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1.2 CTV I Background Information

On December 31, 2024, the U.S. EPA issued four UIC Class VI well permits to CTV, a carbon management subsidiary of CRC.

The specific U.S. EPA permits issued for the four wells are as follows:

- R9UIC-CA6-FY22 1.1 for well 373-35R
- R9UIC-CA6-FY22 1.2 for well 345C-36R
- R9UIC-CA6-FY22 1.3 for well 353XC-35R
- R9UIC-CA6-FY22 1.4 for well 363C-27R

These four wells would be utilized to inject the CO_2 captured from the proposed Project into the Monterey Formation 26R storage reservoir located approximately 6,000 feet below the ground surface. The CTV I project area is located within the EHOF, which is a suitable area for long-term CO_2 storage and sequestration. The CTV I project was designed to implement sustainable CCS in support of California's initiative to combat climate change by reducing CO_2 levels in the atmosphere.

In addition to the Class VI Permit, CTV obtained a land use permit from the Kern County Planning and Natural Resources Department (Kern County) in 2024. Specifically, the CTV I project was approved by the Kern County Board of Supervisors on October 21, 2024, based on a final Environmental Impact Report (EIR, State Clearinghouse #2022030180) prepared by Kern County and certified by it on the same date. A Notice of Determination was filed with the Kern County Clerk on October 22, 2024. The CTV I project is subject to the terms, conditions and restrictions set forth in the Conditional Use Permits (CUP) issued by Kern County and identified as CUP No. 13, Map 118; CUP No. 14, Map 118; CUP No. 5, Map 119; CUP No. 3, Map 120; CUP No. 2, Map 138; and CUP No. 6, Map 119 (collectively, "the CUP"). Implementation of the CUP authorizes the construction and operation of underground CO_2 facility pipelines to support the CTV I CCS facility and related infrastructure (e.g., injection/monitoring wells, CO_2 manifold piping and metering facilities) within the 9,104-acre project site, located within the EHOF.

Four monitoring wells permitted by the California Geologic Energy Management Division (CalGEM), as part of the CUP issued by Kern County for the CTV I project would be used for CO_2 monitoring. In addition, six CTV I permitted wells would be used to monitor for seismic activity. The seismic monitoring wells will be used to detect seismic events at or above magnitude (M) 1.0 in real time as required by the California Air Resources Board (CARB) CCS Protocol under the Low Carbon Fuel Standard (LCFS) (C.4.3.2.3). Additionally, the California Integrated Seismic Network will be monitored continuously for indication of a 2.7 M or greater earthquake or greater occurring within a 1-mile radius of injection operations from commencement of injection activity to its completion.

Monitoring activities would extend beyond the injection phase of the Project pursuant to Code of Federal Regulation (CFR) Title 40 Section 146.93 until site closure is granted. Monitoring requirements during post-injection are similar to those during injection, with activities such as sampling occurring quarterly and monitoring well integrity testing at frequency per U.S. EPA requirement.

As noted above, the facilities approved as part of the CTV I project, including but not limited to the manifold, pad, injection wells, monitoring wells and related transmission lines, pipelines and other related facilities that have already been approved by applicable agencies with jurisdiction over those facilities, including the U.S. EPA, CalGEM and Kern County, are not included as part of the proposed Project. Accordingly, such facilities are not analyzed in this report.

1.3 Project Location

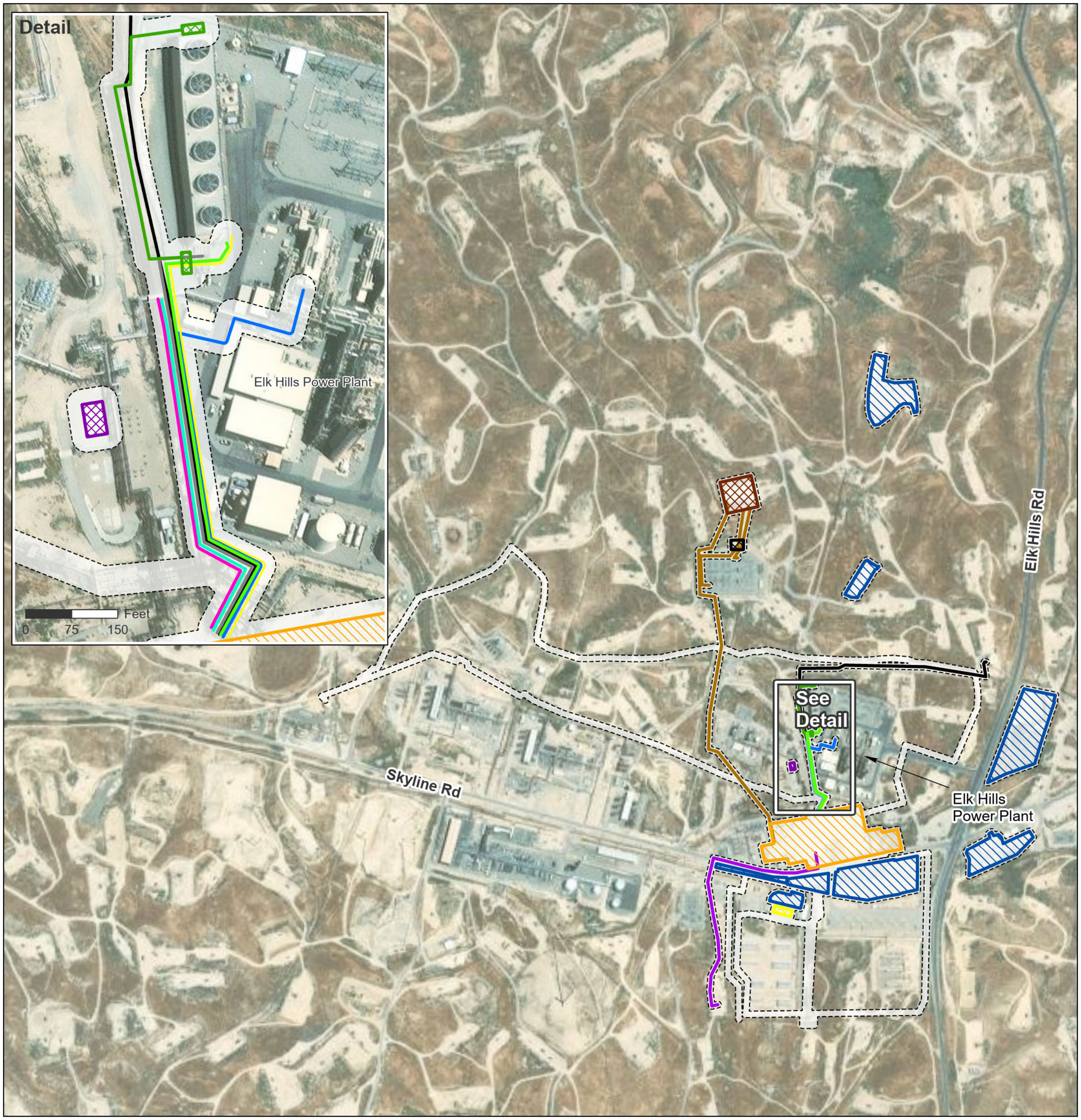
The Project is located within the EHOF in the southwestern edge of the San Joaquin Valley near Tupman in Kern County, California. The Project comprises portions of six parcels owned by CRC. The Project is contained within the following sections of EHOF: sections 26, 34, and 35 of Township 30 South, Range 23 East and sections 10 and 11 of Township 31 South, Range 24 East, Mount Diablo Base and Meridian (MDB&M), Kern County, State of California (Table 1). The proposed Project would be located on approximately 52 acres within the identified parcels.

Table 1 Project Parcel Data

Assessor's Parcel Number	Section/ Township/ Range	Acreage*
158-090-19	Section 35/ Township 30S/ Range 23E	590.61
158-090-16	Section 35/ Township 30S/ Range 23E	14.78
158-090-02	Section 26/ Township 30S/ Range 23E	640
158-090-04	Section 34/ Township 30S/ Range 23E	682.86
298-070-05	Section 11/Township 31S/Range 24E	640
298-070-06	Section 10/Township 31S/Range 24E	640

Notes:
Assessor's parcel acreages from Kern County Web Map (Kern County GIS, 2025).

The Study Area for this assessment is defined as a 25-foot buffer around Project components, which includes Project components that were evaluated during the initial field survey prior to removal from the Project. The Study Area totals 88.73 acres (Figures 3 and 4).



Study Area

Project Areas

- Capture Facility
- Temporary Parking, Office, and Staging Areas
- Proposed Sub Location (250 x 250)
- Substation Extension Proposal
- New BPSTG & Transformer
- Warehouse
- Cooling Water Sump

- Electrical Lines
- CO2 Line
- CWR Line
- CWS Line
- Condensate Line
- HP Steam Line
- LP Steam Line
- Raw Water Line
- RO Permeate Stream Pipeline
- CWS Line Alternative

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Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec, 2025.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org

Stantec

Project Location
Kern County, CA

Prepared by MMD on 2025-08-04
TR by CT 2025-08-04
IR by ES on 2025-08-04

Client/Project
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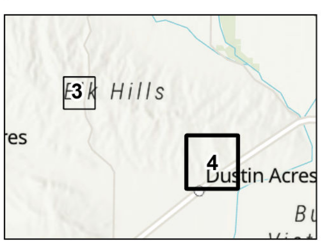
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
3

Title
Study Area Overview



Study Area

Project Areas

Temporary Parking, Office, and Staging Areas

0 800 1,600 Feet

(At original document size of 8.5x11)
1:19,200

N

Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec, 2025.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org
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Stantec

Project Location
Kern County, CA

Prepared by MMD on 2025-07-02
TR by CT 2025-07-02
IR by ES on 2025-07-02

Client/Project
185806775
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
4

Title
Study Area Overview

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2 Paleontological Resources

Fossils are evidence of ancient life, defined by the Society of Vertebrate Paleontology (SVP) (2010) as being over 5,000 years in age, or middle Holocene. This includes the remains of the body of an organism, such as bones, skin impressions, shell, or leaves, as well as traces of an organism's activity, such as footprints or burrows, called trace fossils. Fossils have scientific and educational value, and as such are protected by federal, state, and local regulations as nonrenewable natural resources. Once damaged, destroyed, or improperly collected, fossils lose their scientific and educational value.

As CEQA does not define what constitutes a unique paleontological resource, the standards of the SVP (2010) are often used in the absence of a legal definition. The SVP defines scientifically important fossils as:

> 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 5,000 radiocarbon years). [SVP 2010:11]

Using this definition, the concept of scientific importance is included in the definition of paleontological resources; thus, not all fossils are considered to be paleontological resources. The threshold for scientific importance varies with factors such as geologic unit, geographic area, the current state of scientific research, and may also vary between different agencies (Murphey et al. 2019). Paleontological studies have developed criteria for the assessment of scientific importance of fossil discoveries (e.g., Murphey et al. 2019; Eisentraut and Cooper 2002; Scott and Springer 2003). In general, these studies assess fossils as scientifically important if one or more of the following criteria apply:

- The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct.
- The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events, through biochronology or biostratigraphy and the correlation with isotopic dating.
- The fossils provide ecological data, such as the development of biological communities, the interaction between paleobotanical and paleozoological biotas, or the biogeography of lineages.
- The fossils demonstrate unusual or spectacular circumstances in the history of life.
- The fossils provide information on the preservational pathways of paleontological resources, including taphonomy, diagenesis, or preservational biases in the fossil record.
- The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.
- The fossils inform our understanding of anthropogenic effects to global environments or climate.

3 Professional Standards

A variety of professional guidelines have been developed that outline protocols and practices for conducting mitigation paleontology. In particular, some studies have focused on establishing best practices for conducting mitigation paleontology, including resource assessments and surveys, monitoring and other forms of mitigation, and data and fossil recovery in a mitigation context, which differs from academic paleontology in the constraints of working on construction sites and schedules as well as the purpose of mitigation paleontology as a tool for regulatory compliance (Landon 2006; Murphey et al. 2014, 2019; Scott and Springer 2003; SVP 2010). Furthermore, a robust body of scientific literature exists outlining best practices for paleontological data collection and management of fossils and fossil localities, some of which is authored by agency representatives (Lucas et al. 2006 and references therein; Santucci and McClelland 2001 references therein; Santucci and Koch 2003; Santucci et al. 2009).

This study conforms to these industry best practices.

4 Regulatory Framework

California and Kern County have enacted multiple laws, regulations, and policies that provide for the protection of paleontological resources. The paleontological resources assessment described herein was conducted to meet these requirements regarding paleontological resources on the lands proposed for development.

4.1 California Environmental Quality Act

CEQA (Public Resources Code [PRC] Section 21000 et seq) requires that before approving most discretionary projects, the Lead Agency must identify and examine any significant adverse environmental impacts that may result from activities associated with such projects. As updated in 2016, CEQA separates the consideration of paleontological resources from cultural resources (PRC Section 21083.09). The Appendix G checklist (Title 14, Division 6, Chapter 3, California Code of Regulations 15000 et seq.) requires an answer to the question, “Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?”

4.2 Kern County

The Kern County General Plan recognizes the importance of paleontological resources in Policy 25, which states the County “will promote the preservation of cultural and historic resources which provide ties with the past and constitute a heritage value to residents and visitors” (Section 1.10.3, Archaeological, Paleontological, Cultural, and Historical Provisions). This policy includes one implementation measure designed to protect paleontological resources, which states, "in areas of known paleontological resources, the County should address the preservation of these resources where feasible" (Implementation Measure M; Kern County 2009).

5 Methodology

The paleontological resources assessment reported herein is consistent with SVP (2010) guidelines and consisted of a pedestrian survey and an analysis of existing data. To assess if paleontological resources are likely to be encountered in a given area, the paleontological potential of the geologic units present in the area is assessed. Paleontological potential is derived from the paleontological data collected from the geologic unit as a whole, not just from a specific survey or study. Paleontological potential of a geologic unit consists of both (a) the potential for yielding abundant vertebrate fossils or for yielding scientifically important fossils, whether large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and scientifically important taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data (SVP 2010).

The paleontological assessment presented here was conducted under the supervision of Stantec Principal Paleontologist Alyssa Bell, Ph.D., who served as the Project Paleontologist. The field survey was conducted by Paleontologist Joey Raum, B.S., and Paleontological Technicians Elyse Dilloway, B.S., and Olive Latham, B.S. This report was authored by Mr. Raum with the assistance of Paleontological Technician Joshua Broussard, M.S., and was reviewed by Paleontologist Joe Kobler, B.S. Geographic Information System (GIS) maps were drafted by GIS Analyst Quin Smith, M.S., E.S.M. Stantec's work in support of the Project was managed by Project Manager Eric Snelling, M.S., and Crystahl Taylor, B.S., who coordinated Stantec's work and provided quality assurance and control.

5.1 Analysis of Existing Data

To assess the paleontological potential of the Study Area, geologic mapping was consulted to identify the geologic units present at the surface or likely present in the subsurface. A records search was requested from the Natural History Museum of Los Angeles County (LACM) on December 9, 2024, with results received on January 5, 2025 (Appendix A). A records search was also requested from the University of California Museum of Paleontology (UCMP) on December 9, 2024, although no response has been received at this time. The LACM search returned the closest known paleontological localities of the LACM to the Study Area from geological units present in the Study Area, either at the surface or in the subsurface. A review of the scientific literature was conducted to assess the history of the geologic units mapped as present at the surface or likely present in the subsurface of the Study Area for preserving paleontological resources. A search was conducted of the UCMP, National Museum of Natural History (NMNH), and the American Museum of Natural History (AMNH) online databases on February 4, 2025, for fossil localities recorded from the Tulare Formation in Kern County, California. Of these, the UCMP and NMNH online searches yielded results. The NMNH and UCMP databases do not provide specific geographic locations beyond the county the fossils were recovered from but do include locality names that can sometimes be used to infer the general area of the locality.

5.2 Pedestrian Survey

To evaluate the sedimentological characteristics of the surficial geologic units and search for fossils in the Study Area, Stantec conducted a pedestrian field survey on January 13 and 14, 2025, with a second deployment on February 19, 2025, and a third deployment on April 14, 2025, to address revisions to the Project site that expanded the Study Area. Activities proposed in the expanded Study Area are restricted to previously disturbed sediments; therefore, an additional pedestrian survey was not conducted for the areas affected by these revisions.

Within the Study Area, survey was limited to previously undisturbed areas. Stantec used aerial imagery to identify previously undisturbed areas in which geologic units with the potential to preserve fossils are mapped at the surface as the target of the pedestrian survey. This removed areas from the pedestrian survey where the surface has no or low potential to preserve paleontological resources, such as previously disturbed areas. As such, the wastewater line, which is proposed for construction aboveground atop existing infrastructure, as well portions of parking areas and staging areas that are previously paved or graded, or have existing infrastructure on the surface, were not surveyed. During survey, if additional areas were found to be previously disturbed, these were documented as such but were not subject to close inspection. The pedestrian survey was conducted on foot, with the paleontologists walking those portions of the Study Area and recording observations of lithology, as well as searching for exposed fossils on the surface. The Study Area extends beyond areas directly affected by Project plans, as data from these locations is pertinent to understanding the geology and paleontological potential of the sediments underlying the Study Area as a whole.

Data were recorded on survey forms with the use of an iPhone running Survey123 and Field Maps by ArcGIS (ESRI), paired to a Bad Elf GPS receiver with 2- to 4-meter accuracy.

5.3 Paleontological Potential

The results of the analysis of existing data and pedestrian survey were used to assign the paleontological potential rankings of the SVP (2010) to the geologic units in the Study Area. These rankings are designed to inform the development of appropriate mitigation measures (MMs) for the protection of paleontological resources and are widely accepted as industry standards in paleontological mitigation (Murphey et al. 2019; Scott and Springer 2003). These rankings are as follows:

> **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. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations that are temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.), some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks.

Undetermined Potential. Rock units for which little information is available in the literature or museum records concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study and field work is necessary to determine if these rock units have high or low potential to contain significant paleontological resources.

Low Potential. Rock units that are poorly represented by fossil specimens in institutional collections or, based on general scientific consensus, only preserve fossils in rare circumstances (e.g., basalt flows or Recent colluvium) have low paleontological potential.

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).

5.4 Paleontological Impacts Assessment

Following the assessment of paleontological potential, an impacts assessment was conducted comparing planned Project activities in terms of locations, depths, and ground disturbance methods with mapped geologic units. Where potential adverse impacts from Project activities were identified, mitigation recommendations were developed to reduce those impacts to less than significant.

Impacts to paleontological resources can be classified as direct, indirect, or cumulative. Impacts can also be considered as adverse impacts or as beneficial impacts. Direct adverse impacts on paleontological resources are the result of damage or destruction of these nonrenewable resources by surface disturbing actions including construction excavations. Therefore, in areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact paleontological resources by damaging or destroying them and rendering them permanently unavailable to science and society. Beneficial direct impacts, however, may result when paleontological resources are identified during construction and appropriately documented and salvaged, thus ensuring the specimens are protected for future study and education.

Indirect impacts typically include those effects that result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given project area. Human activities that increase erosion can also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative adverse impacts can result from incrementally minor but collectively significant actions taking place over time. The incremental loss of paleontological resources over time from construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact, because it would result in the destruction of non-renewable paleontological resources and the associated irretrievable loss of scientific information.

The impact assessment conducted here takes into consideration planned Project activities in terms of aerial and subsurface extents, including the possibility of subsurface geologic units having a different paleontological potential than surficial units. For example, younger surficial sediments (alluvium, lacustrine, eolian, etc.) have low potential to preserve paleontological resources due to their age; yet sediments increase in age with depth and so these surficial deposits often overly older units that have high paleontological potential. In areas with this underlying geologic setting, surficial work may be of low risk for impacting paleontological resources, while activities that require excavations below the depth of the surficial deposits would be at greater risk of impacting paleontological resources. For this reason, the impact assessment takes into consideration both the surface and subsurface geology and is tailored to Project activities.

6 Results

6.1 Geologic Setting

The Study Area is located in the Great Valley geomorphic province. This region is bounded on the west by the Coast Ranges, to the east by the Sierra Nevada, to the north by the Klamath Mountains and Cascade Range, and to the south by the Transverse Ranges and Mojave Desert (Norris and Webb 1990). The Great Valley is an elongate basin extending for nearly 435 miles roughly north–northwest and averaging 50 miles wide (Bartow and Nilson 1990). The Great Valley consists primarily of alluvial plains or fans, with the far eastern margin yielding to the foothills of the Sierra Nevada (Page and LeBlanc 1969).

The Great Valley has been a depositional basin dating back to the late Jurassic, when the growing Sierra Nevada volcanic arc began shedding sediment to the west and southwest, into what was at the time a shallow sea that deepened westward across the basin (Nilsen 1990). Deposition continued into the Cenozoic, with the later initiation of mountain formation on the western side of the Great Valley in the Coast Ranges. By the Pliocene the basin had transitioned to entirely nonmarine deposition, with sediment input from the highlands on the eastern and western borders of the Great Valley (Bartow and Nilson 1990). The thickness of the sediments accumulated over this roughly 150-million-year period varies along the valley but is over 8 miles thick in places (Orme and Graham 2018). It is this latter part of the Great Valley's history that is of most relevance to the Study Area, in terms of the surficial geology.

Locally, the Study Area is in the southwestern portion of the San Joaquin Valley, approximately 25 miles southwest of Bakersfield, California, in the Elk Hills. The EHOF stretches across the western and eastern Elk Hills. Further to the south, beyond the Midway Valley, is the Temblor Range, considered to be the source of sediments found within the Elk Hills (Woodring et al. 1932). The Elk Hills are located within the en echelon fold-and-thrust belt that constitutes the southwestern side of the San Joaquin Valley, largely controlled by the San Andreas Fault (Nicholson 1990). The Elk Hills, along with the nearby Kettleman Hills, Coalinga, and Lost Hills, comprise large northwest-southeast trending antiforms, with the Elk Hills composed of three anticlines separated by reverse faults (Fiore et al. 2007). These anticlines are the result of strike-slip syn-depositional faulting that began in the Miocene and continues to present day; thus, the upper layers of the sediments that fill the larger San Joaquin Basin have been deformed in the Elk Hills (Fiore et al. 2007). The Study Area is located in the eastern Elk Hills along one of the three anticline structures that dip to the north and south on the flanks of the Elk Hills, exposing beds of Pliocene and Pleistocene sediments in the Study Area (Dibblee and Minch 2005; Woodring et al. 1932).

6.2 Museum Records Searches

Museum records search results were received from the LACM on January 5, 2025 (Appendix A). As of the time of writing, no response has been received from the UCMP. Several of the online databases searched as part of this study returned specimens from the unit searched. The NMNH database search returned 97 specimens from 18 localities from the Tulare Formation in Kern County, the highest number of specimens of the museums searched. The UCMP database search returned five specimens and five localities from the Tulare Formation in Kern County. The LACM records search returned at least three specimens from two localities from Tulare Formation in the Elk Hills and McKittrick Valley region; however, it should be noted that LACM results are limited to those within the vicinity of the Study Area and do not include all of Kern County. The AMNH online database did not return results.

These results are summarized in Table 2 and discussed further in Section 6.5, Paleontological Potential of Geologic Units in the Study Area.

Table 2 Museum database search results for Kern County, California

Geologic Unit	AMNH	UCMP	NMNH	LACM
Tulare Formation	None	Five localities preserving five specimens	18 localities preserving 97 specimens	Two localities preserving at least three specimens

6.3 Pedestrian Survey

The pedestrian survey was conducted on January 13 and 14, 2025; February 19, 2025; and April 14, 2025, within CRC's EHOF high production area. Stantec conducted survey of the portions of the Study Area underlying the following components: the CO_2 Line, Alternative Route, Alternative Route 1, 26R Route 1, HDD Route, HDD Exit Pit, HP Steam Line, LP Steam Line, CWS Line, CWR Line, Condensate Line, Raw Water Line, Substation Extension, Proposed Substation Location, Electrical Lines, Perimeter Road Route, and non-graded or paved portions of the Temporary Parking, Office, and Staging Areas (Figures 5 and 6). Stantec visually cleared and documented but did not survey the following components, as during field work these were located on previously disturbed or developed lands: the Field Offices; the Warehouse with HVAC; the Capture Facility, including the proposed 1,550-foot-long perimeter road; and the graded or paved portions of the Temporary Parking, Office, and Staging Areas. Following survey, the footprint of the Capture Facility was expanded to include an additional approximately 0.5 acres. Because the Capture Facility was noted to be located on previously disturbed lands during the initial survey, it was determined unnecessary to survey this additional portion following analysis of the updated footprint, which is within the area of previous disturbance. Stantec reviewed aerial imagery of the locations for two borrow pits added to the Project in June 2025. As these are also located on disturbed lands, they were excluded from the pedestrian survey but are included in the Study Area for the purposes of this report.

During the pedestrian survey, much of the ground surface was covered in previously disturbed sediments and infrastructure along roads, oil well pads, parking and staging areas, and active production facilities that occur within the EHOF high production area. The Study Area consists of low, gently sloping hills and flat areas with moderate to steep drainages, with outcrops along roads and infrastructure areas. Areas around roads and infrastructure were observed to be generally flatter, especially in the southern portion of the Study Area. Steeper drainages and outcrops were present throughout, being more common in the northern and northwestern portions of the Study Area.

The Study Area is, in general, moderately-to-heavily vegetated by plants typical of arid terrain. Vegetation coverage of the ground surface across the Study Area is on average approximately 30 percent to 60 percent, with some sparse vegetation in disturbed areas of 10 percent or less. The Capture Facility, Warehouse with HVAC, Field Offices, Temporary Parking, Staging Areas, existing well pads, and electrical substations are devoid of vegetation and are actively maintained to be weed free to prevent wildfires. Saltbush and other desert scrub comprise a majority of the flora, with minimal non-native grasses present.

Figure 5 Overview of Main CalCapture Portion of the Study Area During Survey
View from overflow parking area in eastern Study Area, facing northeast (A); overflow parking area, facing south (B); view from proposed HDD Route and Alt Route 2, facing north (C); portion of the removed 26R Route 1, west facing (D); Elk Hills Substation, facing southeast (E); EHPP, facing northwest (F); pad location for CCU, facing north (G); existing facility pad and lower lying oil well pad, facing east (H).

Figure 6 Overview of Study Area at the Additional Parking and Staging Areas During Survey
Eastern parking area with existing paved surface, from the southern end, facing northwest (A); from the northern end, facing south (B); western parking area with existing paved surface, from southern end, facing northwest (C); from northern end, facing south (D); western staging area from the northern end, facing south (E); from the south, facing north (F); hills with exposed Tulare Formation situated adjacent to staging area, facing west (G); view from northeast corner facing southwest, showing exposed Tulare Formation exposures along perimeter (H).

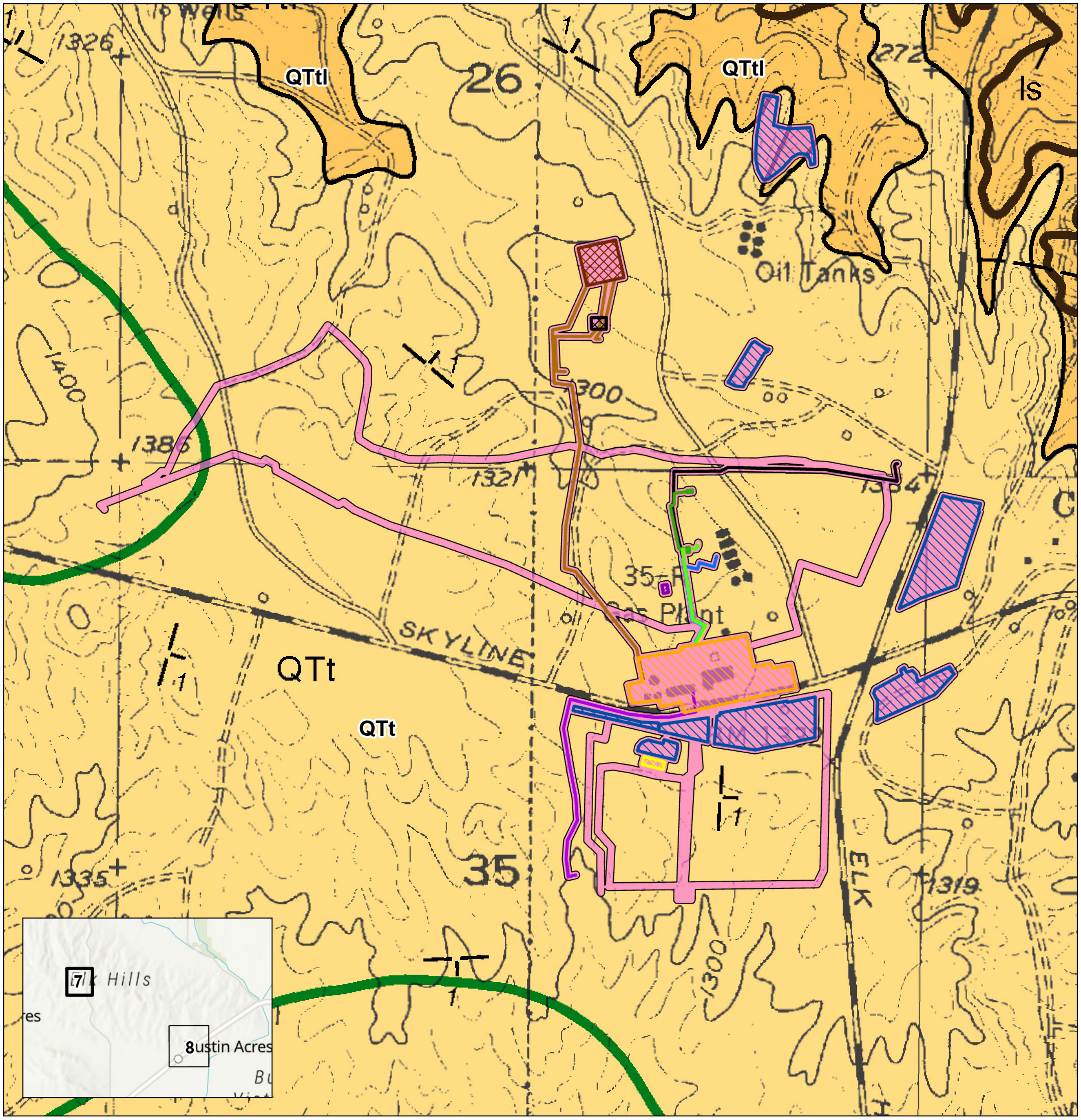
6.4 Study Area Geology

Prior to the pedestrian survey, Stantec conducted a review of geologic mapping. The Study Area is mapped by Dibblee and Minch (2005a, 2005b) at a scale of 1:24,000 and by Woodring et al. (1932) at a scale of 1: 31,680. Observations during the survey support these maps, which indicate the Study Area is underlain by the Tulare Formation (Figures 7 and 8). While Dibblee and Minch (2005a) use an undivided unit for the Tulare Formation in the main portion of the Study Area, Woodring et al. (1932) show this as the upper Tulare Formation. Additionally, Dibblee and Minch (2005a, 2005b) map the lower Tulare Formation at the southernmost parking and staging areas, as well as underlying a portion of the northernmost temporary staging area.

The Tulare Formation overlies the Etchegoin Formation and dates from the Pleistocene to the latest Pliocene (0.6 Ma to 2.5 Ma) (Boessenecker and Poust 2015; Woodring et al. 1932). The Tulare Formation was first described by Anderson (1905) for outcrops of nonmarine deposits in the Kettleman Hills southeast of Coalinga, California. The Tulare Formation records the first terrestrial sediments deposited in the San Joaquin Valley after the last marine transgression at the end of the Pliocene (Boessenecker and Poust 2015). Lithofacies of the Tulare Formation have been described as alluvial fan and plain, deltaic, and shallow lacustrine (Bowles 2016; Kiser et al. 1988; Pilsbry 1934; Woodring et al. 1932). The formation is sometimes divided into two members, the upper and lower (Bowles 2016; Woodring et al. 1932), with the division of the two marked by the lowest buff mudstone (Woodring et al 1932) or by the presence of the lacustrine Amnicola Clay, which in the Elk Hills, acts not only as the boundary of the upper and lower members but also as an important aquitard and confining layer of the Elk Hills anticline (Bowles 2016).

The upper member, which is mapped in the main portion of the Study Area, is composed of terrestrially derived beds of sand and mudstone, with a lowermost buff-colored sandstone denoting the beginning of the upper member in the eastern hillside outcroppings of the Tulare Formation (Woodring et al. 1932). The upper member includes a lower limestone that is sometimes used as a marker bed (Woodring et al. 1932). The lower member, which is mapped in the northernmost and southeasternmost portions of the Study Area in the additional parking and staging areas, is also composed of terrestrially derived beds of sand and mudstone, with an uppermost mudstone of olive gray color denoting the beginning of the lower member (Woodring et al. 1932). The lower member includes two limestone beds that crop out in the eastern Elk Hills (Woodring et al. 1932). The thickness of the Tulare Formation ranges widely but is greatest to the east of the Kettleman Hills, where it is approximately 4,000 feet thick (Page 1983). In the Elk Hills, the total stratigraphic thickness is 2,950 feet with a maximum thickness of 850 feet for the exposed beds (Woodring et al. 1932).

During the survey of the main Study Area, in situ sediments observed in drainages and outcrops consisted of flat lying, massively bedded siltstone and bedded to cross-bedded fluvial sandstone and conglomeratic sandstone beds. Exposures ranged from less than a few feet thick to approximately 30 feet thick, with the more prominent exposures occurring along hillside cuts adjacent to well pads (Figure 9). In areas where previous ground disturbance has occurred, the surface is covered by unknown depths of artificial fill. In areas where non-previously disturbed sediments are present, such as on hillslopes and



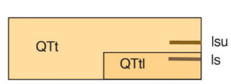
Study Area

Project Areas

- Capture Facility
- Temporary Parking, Office, and Staging Areas
- Proposed Sub Location (250 x 250)
- Substation Extension Proposal
- New BPSTG & Transformer
- Warehouse
- Cooling Water Sump

- Electrical Lines
- CO2 Line
- CWR Line
- CWS Line
- Condensate Line
- HP Steam Line
- LP Steam Line
- Raw Water Line
- RO Permeate Stream Pipeline
- CWS Line Alternative

- QTt - Tulare Formation
- QTtl - Lower Tulare Formation
- Qa - Alluvial gravel and sand of valley areas
- lsu - Upper limestone in Tulare Formation (QTt) and ls - Lower limestone in Tulare Formation (QTtl)



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Stantec

Project Location
Kern County, CA

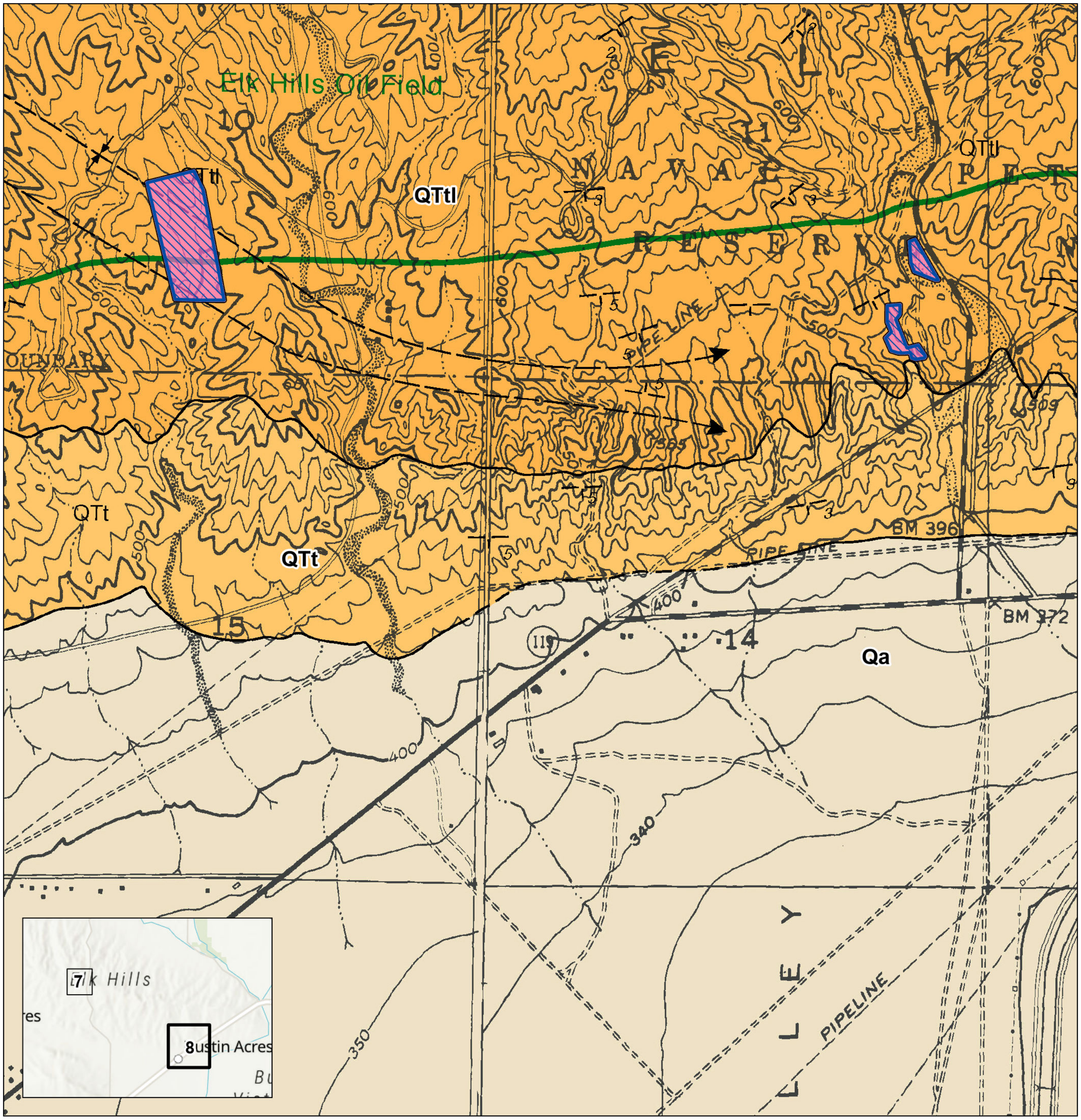
Prepared by MMD on 2025-08-04
TR by CT 2025-08-04
IR by ES on 2025-08-04

Client/Project
185806775
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
7

Title
Study Area Geology

Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec, 2025. Geologic Map Units from Dibblee, Jr., edited by Minch, 2005.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org



Study Area

Project Areas

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QTt QTtl lsu ls

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(At original document size of 8.5x11)
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N

Stantec

Project Location
Kern County, CA

Prepared by MMD on 2025-08-04
TR by CT 2025-08-04
IR by ES on 2025-08-04

Client/Project
185806775
California Resources Corporation
CalCapture Carbon Capture and Sequestration Project
Paleo Resources

Figure No.
8

Title
Study Area Geology

Notes
1. Coordinate System: NAD 1983 StatePlane California V FIPS 0405 Feet
2. Data Sources: Stantec, 2025. Geologic Map Units from Dibblee, Jr., edited by Minch, 2005.
3. Background: Esri. GEBCO, NOAA, National Geographic, Garin, HERE, Geonames.org

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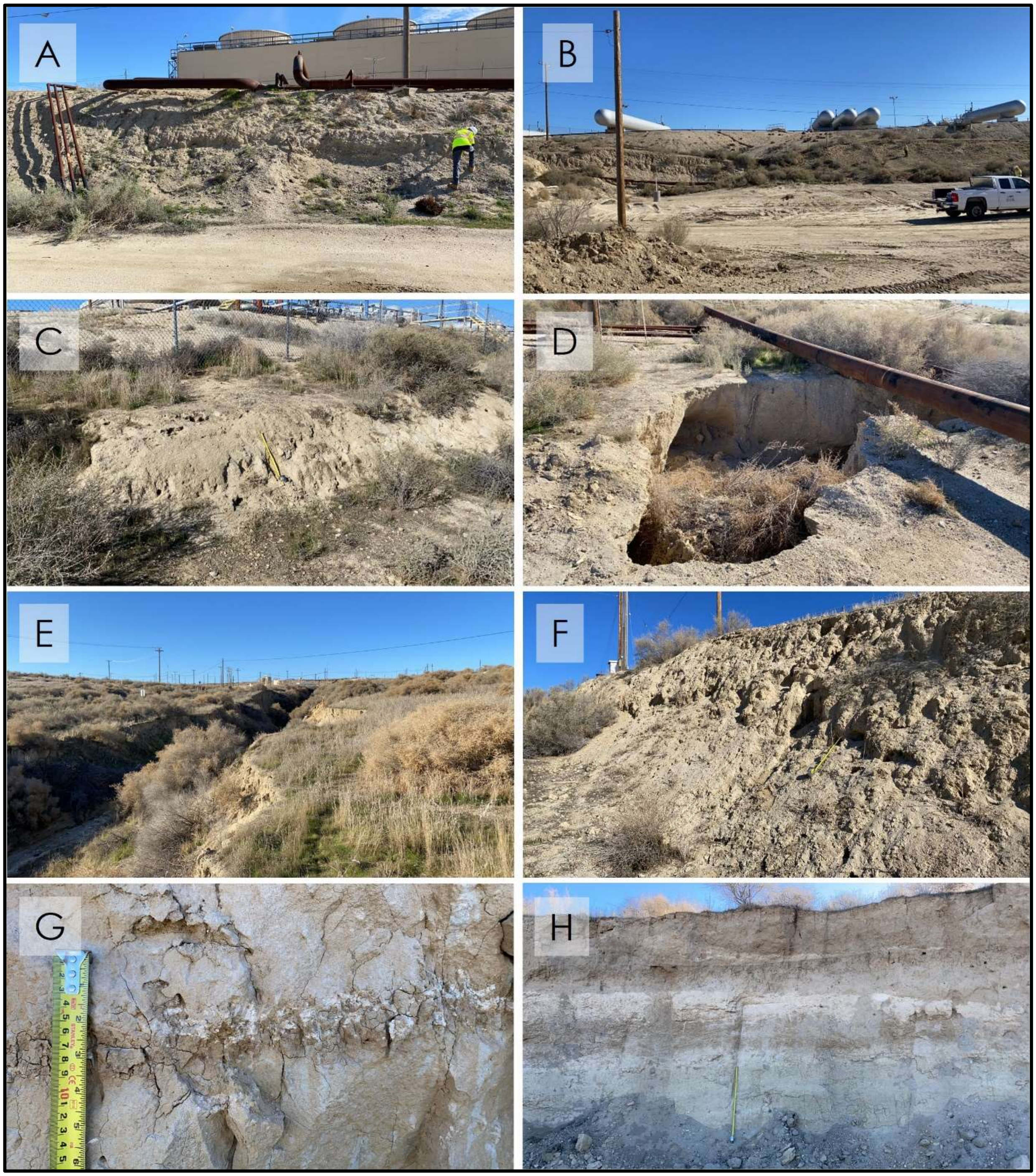

Figure 9 Siltstone of the Tulare Formation Observed During Survey
Outside of EHPP facility, northeast facing (A); at oil well pad, east facing (B); outside facility fencing, scale at 24 inches, east facing (C); in eroding drainage, southwest facing (D, E); along hillside, northeast facing (F); caliche development in siltstone (G, H).

drainages void of existing infrastructure, a thin veneer of sandy to silty topsoil, pale gray to medium brown in color, overlies sediments of the Tulare Formation. The thickness of the topsoil varies between less than a few inches to approximately 12 inches thick.

Siltstone beds are well sorted, consisting of mostly silt (approximately 85 percent) with lesser amounts of fine- to medium-grained sands (approximately 15 percent) and are buff or light brown to olive green in color, weathering to pale orange and pink, and often exhibit a mottled appearance. These deposits are moderately to well indurated and are massively bedded. Caliche mineralization was observed as both nodules and as continuous layers, the thickest of which is approximately 12 inches thick. Sandstone beds are moderately indurated, moderately sorted, and consist of very fine- to coarse-grained sand with variable amounts of clay and silt. Conglomeratic sandstone beds are moderately to poorly sorted, light to medium brown to buff in color, with the finer fraction constituting between 80 percent to 95 percent and larger clasts constituting 5 percent to 20 percent. The matrix consists of very fine- to coarse-grained sand, light to medium brown to buff in color, with variable amounts of clay and silt. Larger clasts consist of subangular to rounded granules and pebbles composed of plutonic and metamorphic rocks and white- to light-gray-colored shale. Gravel beds are common, typically ranging between 2 inches to 12 inches thick, interbedded with relatively better-sorted sand beds. Additionally, at a single outcrop, where approximately 10 feet of massively bedded siltstone overlies 20 feet of sandstone and conglomeratic sandstone, both trough and planar cross-bedding were observed in sandstone and conglomeratic sandstone beds (Figure 10). The cross-bedding is evident in both the gravel beds as well as the better sorted sand beds. Some cross-bedding was also observed at a smaller outcrop located in the northernmost portion of the Study Area, although the preservation of structure is not as distinct as what was observed at the larger 30-foot outcrop.

During survey of the southeastern portion of the Study Area, which consists of two parking areas and one staging area (Figure 10), in situ sediments consisting of flat-lying, massive mudstone with bedded to cross-bedded fluvial sandstone beds observed in the northern and western edges of the staging area. The sediments here crop out in a nearly vertical 13-foot section on the south- and southeast-facing hillside and are the only prominent exposure observed during survey of the three southeastern parking and staging areas (Figure 11). In situ sediments also occur along the western edge of the staging area where the toe of an approximately 30-foot-thick slope partially intrudes into the staging area boundary, exposing poorly bedded sandstone. In a small portion of the western parking area beneath a collapsed section of asphalt, a 4-foot-thick section of undisturbed, poorly bedded sandstone lies beneath asphalt and less than 12 inches of artificial fill. No in situ sediments were observed in the eastern parking area, and both parking areas are covered primarily by asphalt with some sections covered by artificial fill or gravel and small buildings. The staging area has been previously graded and is mostly covered by previously disturbed sediments, including artificial berms. Large piles of concrete rubble are located at the southern portion, indicating the area has been previously used as a dumping location for infrastructure debris. In the northern and western portions of the staging area, undisturbed sediments are partially obscured by a thin veneer of weathered, vegetated colluvium measuring less than a few inches thick.

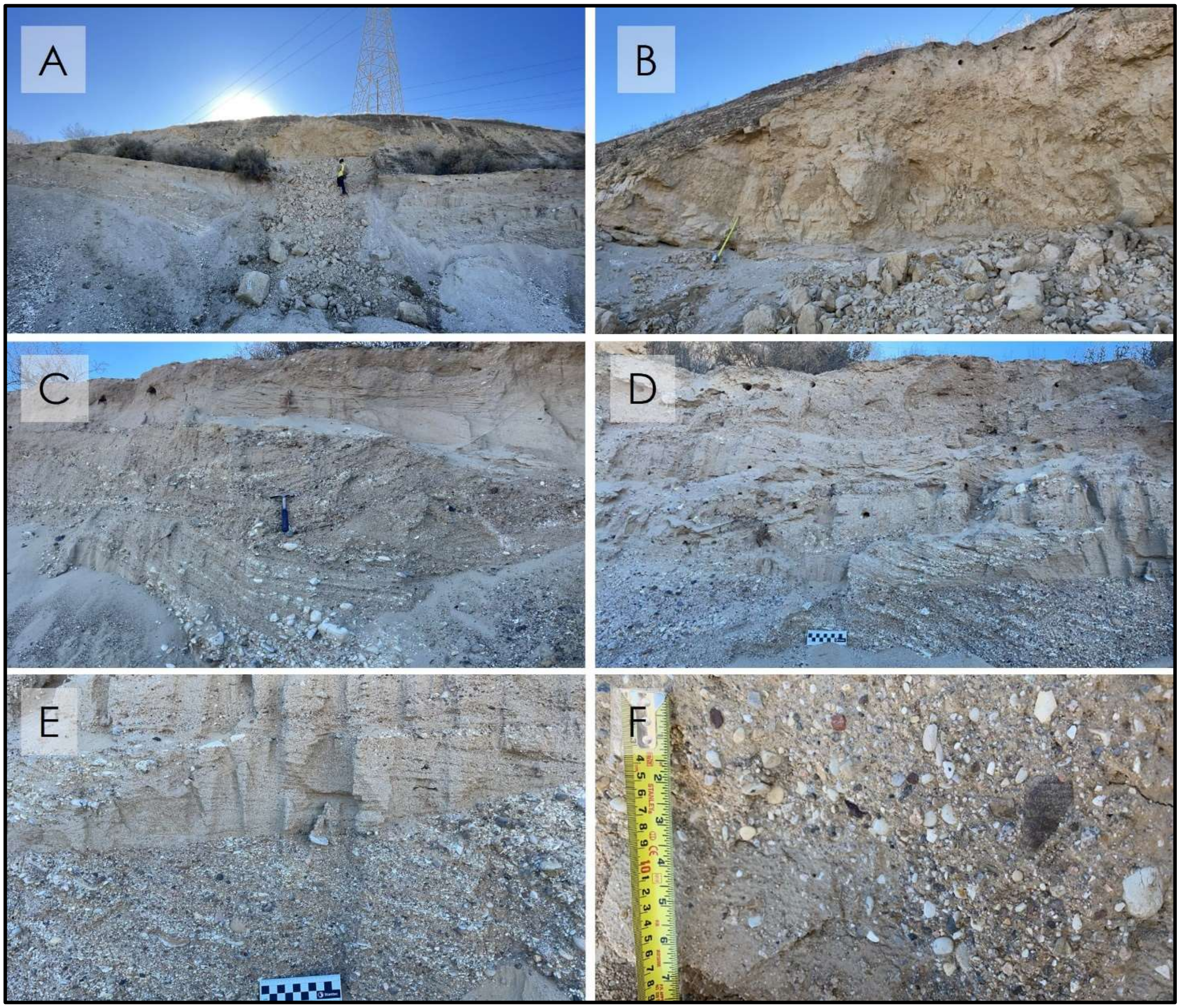

Figure 10 Siltstone and Sandstone of the Tulare Formation Observed During Survey
Hillside of siltstone above sandstone and conglomeratic sandstone (A); siltstone, scale at 24 inches (B); cross-bedded conglomerate sandstone, hammer is 10 inches tall (C, D); detail view of cross-bedded conglomeratic sandstone (E, F).

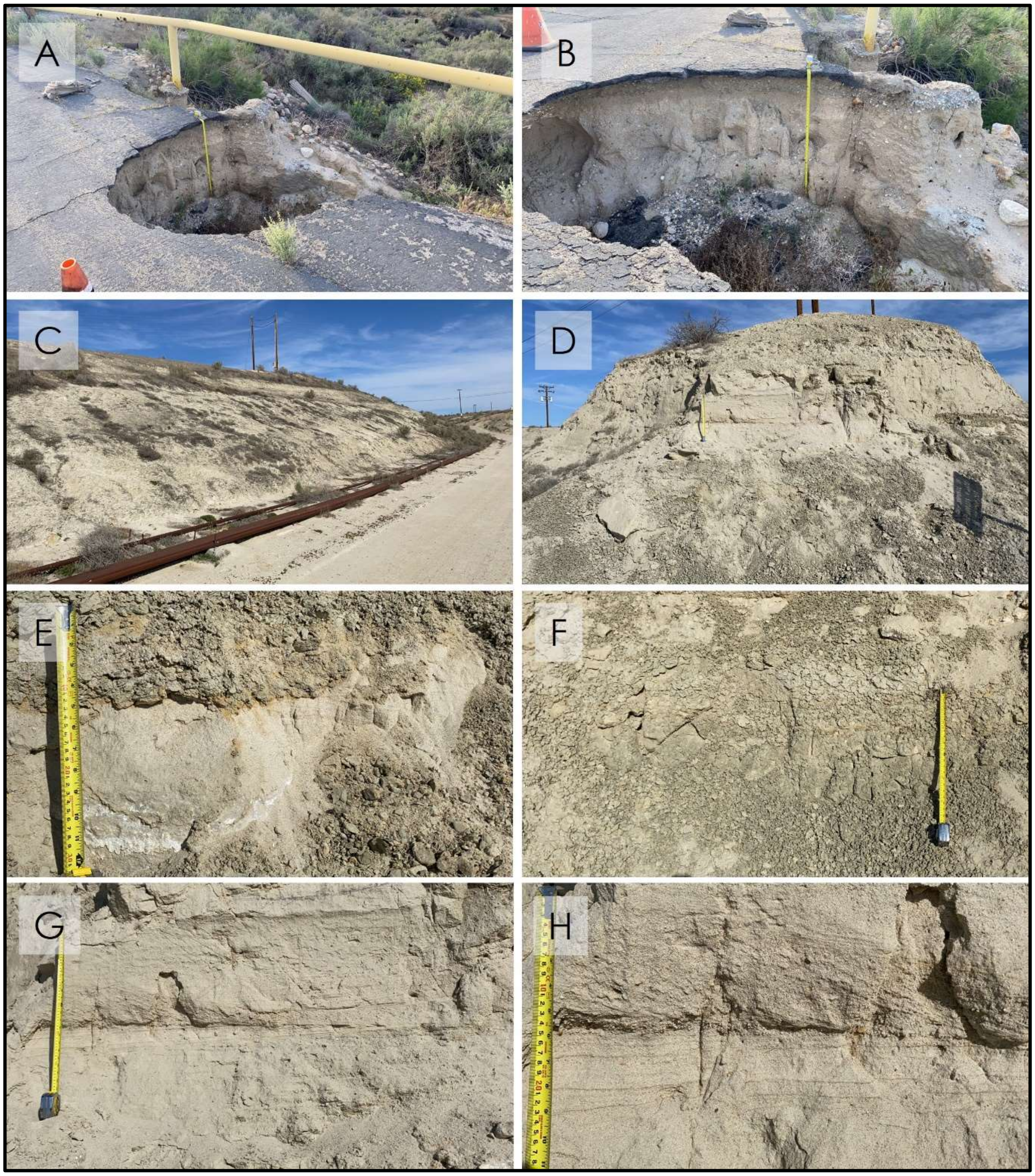

Figure 11 Tulare Formation Observed During Survey of Additional Parking and Staging Areas Exposure beneath collapsed pavement at southern end of western parking area, facing southeast (A), detail (B), scale at 40 inches; exposures along base of east-facing slope on border of western staging area, facing northwest (C); exposure at northern end of western staging area, facing northwest (D); detail of contact between mudstone and sandstone (E); detail of mudstone, scale at 24 inches (F); detail of cross-bedded sandstone, scale at 24 inches (G), close up of cross-bedding (H).

At the northern end of the staging area, mudstone and sandstone beds were observed cropping out along the hillside face, with a total thickness of 13 feet. The mudstone consists of two beds, one overlying and one underlying a 4-foot-thick sandstone bed, with the two mudstone beds measuring 5 feet thick and 4 feet thick, respectively. The mudstone is moderately to well indurated and well sorted. It consists of sediments that are pale olive green in color, with some surfaces oxidized to rusty orange. The mudstone is primarily clay (approximately 98 percent) with lesser amounts of silt and very fine-grained sand, which constitute approximately 2 percent. The mudstone is massively bedded, exhibits popcorn weathering, and contains gypsum mineralization in fractures.

Sandstone at the northern end of the staging area is moderately to well indurated and moderately sorted and consists of light-brown- to buff-colored, fine- to medium-grained sand (95 percent) and coarse- to very coarse-grained sand and granules (4 percent to 5 percent), as well as scant small pebbles (less than 1 percent). Larger clasts are subangular to subrounded and composed of plutonic and metamorphic rocks and white to light gray colored shale. The sandstone here exhibits both planar and trough cross-bedding, while the sandstone observed in both the western portion of the staging area and the southern end of the western parking area is poorly bedded.

6.5 Paleontological Potential of Geologic Units in the Study Area

A review of the scientific literature indicates the Tulare Formation has yielded numerous fossils from the Elk Hills, including fossil localities recorded in the 1920s. One locality was recorded from the buff mudstone at the base of the upper member and preserved vertebrate fossils including a camel, a wood rat, and a rabbit (Woodring et al. 1932). An additional locality was recorded from the limestone layer, near the base of the upper member, and preserved a cotton rat (Woodring et al. 1932). While not formally documented as localities, and the fate of these fossils is uncertain, several horse teeth have been reported by oilfield workers, as well as petrified wood, from the upper member in the Elk Hills (Woodring et al. 1932). In the vicinity of McKittrick, at the western extent of the Elk Hills, the saber-toothed cat *Ischyrosmilus ischynus* and the bone crushing dog *Hyaenognathus pachyodon* have been reported from the Tulare Formation (Woodring et al. 1932). Additional fossils recorded elsewhere in Kern County from the Tulare Formation include catfish, freshwater dolphins, birds, tortoises, and petrified wood (Biewer et al. 2016; Boessenecker and Poust 2015; Casteel and Hutchinson 1973; Fisher 1967; Gobalet and Fenenga 1993; Hilton and Grande 2006 Page 1983; Woodring et al. 1940). While mollusks are less common in the Elk Hills, they are present throughout the upper and lower members of the Tulare Formation at Kettleman Hills, with the gastropod *Amnicola* being common, especially in the aforementioned Amnicola Clay (Bowles 2016; Woodring et al. 1932). These collections constitute the largest assemblage of freshwater clams and snails known from this era along the Pacific Coast (Pilsbry 1934).

The results of the LACM (2025) records search indicate that their database contains two vertebrate fossil localities documented near but not within the Study Area from the Tulare Formation (Table 3). The closer locality is located northwest of Buena Vista Lakebed in the southeast end of the Elk Hills, approximately five miles southeast of the Study Area, and produced fossil camel (Camelidae) and rabbit or hare

(Lagomorpha) that were found at the surface. The second locality is located southeast of McKittrick, which is approximately 20 miles west of the Study Area, and produced a fossil of a borophagine ("bone-crushing") canine (*Hyaenognathus pachyodon*; now subsumed into *Borophagus diversidens*).

Table 3 Summary of Records Search Results from the LACM for the Tulare Formation

Locality Number	Taxa	Approximate Location
LACM VP 3775	Camel (Camelidae), rabbit/hare (Lagomorpha)	Northwest of the Buena Vista Lakebed in the southeast end of Elk Hills, approximately 5 miles southeast of the Study Area
LACM VP 3720	Borophagine canine (*Hyaenognathus pachyodon*; now subsumed into *Borophagus diversidens*)	Southeast of McKittrick, approximately 20 miles west of the Study Area

The online database of the UCMP (2025) indicates they have five vertebrate localities in the Tulare Formation in Kern County: two from the Elk Hills; one from McKittrick; one from Lost Hills, which is approximately 30 miles northwest of the Study Area; and one that cannot be attributed to a more specific area. Only one specimen has been catalogued from the Elk Hills localities: the extinct horse *Equus occidentalis* (UCMP 2025). The McKittrick locality yielded *Equus occidentalis* as well as the extinct borophagine ("bone-crushing") canine *Borophagus diversidens* and the saber-toothed cat *Ischyrosmilus ischyrus* (UCMP 2025). These latter two specimens are the same as noted by Woodring et al. (1932) and described above. The online database of the NMNH (2025) indicates they have 18 localities in Kern County preserving 97 specimens from the Tulare Formation, including canines, equines, and freshwater gastropod and bivalve fossils.

As the Tulare Formation has a documented history of paleontological resource preservation, including within the vicinity of the Study Area, it is assessed as having high paleontological potential, using the classification of the SVP (2010).

7 Environmental Analysis

The following sections present the potential effects from the construction and operation of the Project on paleontological resources.

7.1 Significance Criteria

In accordance with the State's CEQA Guidelines Appendix G Environmental Checklist, the following questions are to be analyzed and evaluated to assess whether paleontological resources impacts are significant. Would the proposed project:

a) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

7.2 Impact Analysis

7.2.1 PALEO-1 Impact Analysis

Impact PALEO-1	**Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?**

Less than significant with mitigation. Project plans for ground disturbance are anticipated to include grading, trenching, excavating, augering, and HDD. The following discussion is based on the draft Project description at the time of writing (Table 4):

- **CO_2 CCU:** Grading and other excavations for the CO_2 Capture Facility will be no more than 4 feet deep. Excavations for the stormwater management pond, which is immediately east of the Project site, will be no more than 8 feet deep.

- **CO_2 Pipeline:** Construction and installation of the CO_2 pipeline would be primarily underground. Grading will occur along the pipeline route, as needed, to smooth the areas to provide safe and efficient construction operation. Trenching for pipelines and process columns will be no more than 6 feet deep and 2 feet to 5 feet wide. Approximately 0.5 miles of the main CO_2 pipeline will be installed using HDD techniques, impacting depths no greater than 60 feet,

- **Freshwater Pipeline.** The freshwater pipeline will be installed on the ground surface. No excavations are needed for above ground pipeline installation.

- **Electrical Transmission Interconnection:** Construction of the power line interconnection would involve the installation of approximately 15 tubular steel poles and pre-engineered steel poles. Installation of the poles would require approximately 6 to 8 feet of augering, and construction would involve temporary ground disturbance around each new power pole location (approximately a 20-foot radius) as well as temporary ground disturbance associated with access to each pole location (approximately a 15-foot-wide access route).

- **Overflow Parking Area:** Clearing of weedy vegetation will occur at previously disturbed sites that are proposed for use as overflow parking areas. Ground scraping with a loader may occur, with no more than the top 1-inch being disturbed to minimize removal of any gravel.

- **Main Parking, Laydown, and Staging Areas:** No ground disturbance will be conducted in these areas because they are existing sites consisting of compacted ground, asphalt, and/or cement.

- **Road Construction:** A new perimeter road approximately 1,550 feet in length within the CalCapture Facility would be constructed for both general and emergency access. The road will tie-in to existing roads and access ways. The maximum depth of ground disturbance anticipated for this activity is not to exceed 4 feet.

Table 4 Project Plans

Project Component	Type of Ground Disturbance	Depth	Potential Adverse Impacts
Capture Facility	Grading	4 feet deep	Impacts possible
	Storm water basin excavations	8 feet deep	Impacts possible
CO_2 Pipeline			
	Trenching	6 feet deep	Impacts possible
	HDD	0.5 miles, 60 feet deep	Impacts possible
Freshwater Pipeline	None	NA	Impacts unlikely
Electrical Transmission Interconnection	Augering (pole installation)	6 feet to 8 feet deep	Impacts possible
	Grading (access route)	Unknown	Impacts possible
Overflow parking area	Grading	less than 0.5 feet	Impacts unlikely
Main parking area	None	None	Impacts unlikely
Laydown areas	None	None	Impacts unlikely
Staging areas	None	None	Impacts unlikely
Road construction	Grading (access route)	2.5 feet	Impacts possible

The Study Area is underlain by the Tulare Formation, which has high paleontological potential, and so Project ground disturbance has the potential to encounter paleontological resources when excavations impact previously undisturbed sediments. Should paleontological resources be encountered during Project activities, their damage or destruction would constitute a direct adverse impact.

Of the Project components, the main parking area, laydown areas, and staging areas are not anticipated to involve ground disturbance. As such, Project activities will be restricted to surfaces that were either surveyed during this study or previously disturbed. As no paleontological resources were recorded in these areas, future surficial activities are unlikely to pose adverse impacts to paleontological resources. Similarly, surficial leveling, likely through grading, is anticipated for several Project components, including pipeline alignments, for the CCU and overflow parking footprints, along access routes, and for the new road. The extent to which this grading may pose adverse impacts to paleontological resources is dependent upon the depth of the grading and the extent of previous disturbance. In areas of previous disturbance, shallow grading is unlikely to encounter previously undisturbed sediments and so is unlikely to pose adverse impacts. Similarly, the surface in previously undisturbed areas has been cleared through survey as part of this study, and so shallow grading within 12 inches of the existing surface is unlikely to encounter paleontological resources and is therefore unlikely to pose adverse impacts.

More extensive ground disturbance in the form of trenching, deep grading (more than 12 inches below ground surface), and augering are planned and may encounter paleontological resources in previously undisturbed sediments. As such, these activities may pose adverse impacts. These potential impacts can be mitigated with paleontological monitoring (Section 9).

Approximately 0.5 miles of the main CO_2 pipeline would be installed using HDD techniques. HDD is conducted underground and does not produce spoils. While it is possible that the drill could go through a fossil, it is not possible to determine if or when that occurs. As HDD cannot be effectively monitored due to the minimal nature of spoils and absence of cuts to observe were unique paleontological resources to be encountered by the drill, their damage or destruction could constitute an impact. However, given the narrow diameter of the drill and the limited amount of HDD this Project will entail, it is unlikely that unique paleontological resources would lie in the drill's path.

HDD may be accompanied by excavations for bore or mud returns pits, which are excavated to the depth of the drilling to allow the drill to be introduced to its bore path. These excavations are typically a few feet wide and several feet deep, and so there is risk of encountering fossils during excavations in previously undisturbed sediments, which could pose adverse impacts. These potential impacts can be mitigated with paleontological monitoring (Section 9).

As the Project area is subject to erosion over time, paleontological resources may become exposed by increased erosion stemming from Project activities. Once exposed, paleontological resources could be damaged or destroyed. This would represent an indirect adverse impact.

Implementation of MMs PALEO-1 through PALEO-4 would reduce the most likely impacts to paleontological resources to less than significant.

8 Cumulative Impacts

Due to the Project's location within an existing oil and gas field, the impacts of the Project together with the impacts of past, present, and reasonably foreseeable future oil and gas and CO_2 storage development constitute cumulative impacts. A number of other projects have been developed or are planned for the Elk Hills or adjacent regions. Each of these, particularly if they occur in areas where they impact the Tulare Formation, may individually affect paleontological resources. Therefore, potential impacts of this Project contribute to the cumulative impact of increased development in the Elk Hills and southwestern San Joaquin Valley. Additional projects located within the EHOF, particularly within 1 mile of the Project area, include CTV I CCS. Based on the prevalence of the Tulare Formation in this general area, these projects will likely encounter the Tulare Formation. Other projects located within approximately 10 miles of the Project area include CTV Clean Energy Park Projects, Direct Air Capture with CCS, Kern County Oil and Gas Ordinance Second Supplemental Revised EIR (SSR-EIR) and CRC's Oil and Gas CUPs for Elk Hills, Buena Vista Hills, Kern Front, which will most likely be superseded by the return of the KC SSR-EIR for oil and gas activities. Further, projects located within the southwestern San Joaquin Valley, and within approximately 30 miles of the Project area, include Salt Creek CCS, Lost Hills Solar to Hydrogen Project, Crimson Resource Management Oil and Gas CUP, Carbon Frontier CCS, Eastridge CCS, Aera Energy South Belridge Oil and Gas CUP and Gas Extraction, and Pond Road Biomass CCS. Of these projects, those that occur in the Elk Hills or the eastern foothills of the Temblor Range are most likely to encounter the Tulare Formation. Projects located outside these areas may not encounter the Tulare Formation, as other geologic units are present beyond 10- and 30-mile radii of the present Project and may be encountered instead of the Tulare Formation.

With regard to the Project's impacts to unique paleontological resources, should direct or indirect adverse impacts arise from Project activities, they would contribute to cumulative adverse impacts within the region. While the loss of a particular fossil specimen constitutes a localized adverse impact both in terms of geography and loss of paleontological data, the collective loss of specimens over broader geographic scales as a result of multiple projects may pose a cumulative adverse impact. This is particularly true when one geologic unit is the subject of the direct impacts, as is the Tulare Formation with this Project, as the data lost are unique to that unit. Cumulative impacts to paleontological resources include the loss of paleoecological data of a geologic unit or broader region, evolutionary data for lineages of organisms, or paleobiodiversity data for taxa or regions. The application of the MMs developed for this Project (PALEO-1 through PALEO-4) will reduce Project-related direct or indirect impacts to less-than-significant, thus avoiding the Project contributing to significant cumulative impacts to paleontological resources in the region.

9 Mitigation Measures

The ability to apply mitigation is tied to the nature of the ground disturbing activity. Paleontological monitoring is the most common mitigation tool, during which a trained paleontologist observes construction activities and halts construction temporarily to inspect the exposed sediments. If fossils are observed, the paleontologist will recognize them and stop work so that they can be assessed and, if found to meet significance criteria, salvage them for conservation and curation in a museum. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if they are scientifically important, successful mitigation and salvage efforts may be undertaken to prevent adverse impacts to these resources.

Construction monitoring requires a paleontologist to be able to observe either cuts into the ground, such as the sidewalls of trenches or a graded ground surface, or to observe spoils piles, such as from drilling or trenching. As grading, excavations, trenching, and augering produce cuts, spoils, or, in some cases, both, they are ideal targets for construction monitoring as a successful means of reducing potential impacts on paleontological resources to a less-than-significant level. The Tulare Formation has high paleontological potential; therefore, full-time monitoring is recommended for these activities when they occur in previously undisturbed areas.

An important consideration for the successful application of monitoring to augering is the diameter of the auger. In general, the larger the auger, the higher the probability that salvageable macrofossils can be brought to the surface. Also, of importance to the likelihood of fossil recovery is the size of the encountered fossils and the style of preservation. Large vertebrate fossils are unlikely to be recovered from small diameter augers, while invertebrates and microvertebrates may well be salvaged. Similarly, well-preserved body fossils, such as teeth, bones, or shells, are more likely to be salvaged from augers, while trace fossils, such as burrows or footprints, are less likely to be salvaged. While little work has been done to quantify the recovery of fossils from augers, there are reports in the mitigation trade literature and as reported from museums of the successful salvage of scientifically important fossils meeting standards for significance from augering (Stantec 2024; SWCA Environmental Consultants 2022; Eisentraut and Cooper 2002; UCMP 2025). As the augering planned for the Project is 24 inches to 36 inches in diameter, it is possible that microvertebrates and invertebrates can be successfully salvaged. The latter would be of particular interest scientifically, given the paucity of previously documented invertebrates from the Tulare Formation in the Elk Hills. Augering may receive spot checks if spoils are left accessible and in a manner that they can be searched by the paleontological technician; if this is not possible, the augering should be monitored full time. HDD is not recommended for monitoring since it produces neither cuttings nor spoils and therefore is not conducive to monitoring.

The MMs are designed to be carried out by individuals meeting the following qualifications:

- **Paleontological Technician**. An individual who has academic training (B.S., B.A., M.A., or M.S.) with an emphasis in paleontology or demonstrated equivalent experience (a minimum of two years of cumulative professional or nonprofessional work in laboratory preparation, curation, or field work related to paleontology, as well as documented self-taught knowledge of the discipline of paleontology).

- **Project Paleontologist.** An individual with an advanced academic degree (M.A., M.S. or Ph.D.) with an emphasis in paleontology or demonstrated equivalent professional experience (e.g., minimum of 3 years [or 75 projects] of project experience with paleontological mitigation is considered equivalent to a graduate degree), in combination with 2 years (or 50 projects) of demonstrated professional experience and competency with paleontological resource mitigation projects at the level of field supervisor. [Murphey et al. 2019].

Stantec recommends a Project Paleontologist oversee a paleontological mitigation program. Stantec recommends the following paleontological MMs for the Project, as part of the mitigation program:

MM PALEO-1. The Project Paleontologist shall prepare, design, and implement a Paleontological Monitoring and Mitigation Plan (PMMP) for the Project consistent with SVP (2010) guidelines. The PMMP shall define pre-construction coordination, construction monitoring for excavations based on the activities and depth of disturbance planned for each portion of the Project site, data recovery (including halting or diverting construction so that fossil remains can be salvaged in a timely manner), fossil treatment, procurement, and reporting. The PMMP shall be approved by the CEC prior to issuance of the first grading permit.

MM PALEO-2. Paleontological monitoring shall be implemented when ground disturbance impacts previously undisturbed sediments of the Tulare Formation, which underlies the Study Area. Full-time monitoring should be implemented for activities such as grading, trenching, or excavation. Monitoring of wider augering (in excess of 12 inches in diameter) can be conducted as periodic spot checks, provided spoils are left accessible for the monitor to examine. Monitoring will not be implemented for augering under 12 inches in diameter, shallow grading (less than 12 inches), or HDD. The Project Paleontologist may alter the frequency or depth of monitoring based on subsurface conditions. In places where artificial fill is present, spot checks may be appropriate to establish the depth of fill in portions of the Project site that are previously disturbed. If the Project Paleontologist assesses that Project-related ground disturbance will not affect the undisturbed Tulare Formation, then no further mitigation is required.

MM PALEO -3. The Project Paleontologist shall review and provide comments on CRC’s proposed Worker’s Environmental Awareness Program (WEAP) training that communicates requirements and procedures for the inadvertent discovery of fossils during construction, to be taken by the construction crew as an online training prior to the onset of ground disturbance. The final WEAP must be revised, together with the Project Paleontologist’s comments, and approved by the CEC.

MM PALEO-4. In the event that fossils are encountered during Project activities, work must stop in a safe radius of the find, usually 50 feet, while the paleontological technician documents the fossils. The Project Paleontologist shall assess the fossils. Should the Project Paleontologist assess the fossils as meeting criteria of scientific importance to be considered a paleontological resource, they shall be collected and curated in an accredited repository along with associated data and curation fees.

10 Summary

Stantec conducted an analysis of existing data and pedestrian survey to assess the paleontological potential of the geologic units in the Study Area followed by a review of Project plans and an impacts assessment to identify potential impacts to paleontological resources from Project activities. The Study Area is underlain by the Tulare Formation, which is assessed as having high paleontological potential. Project activities that involve ground disturbance, including grading, trenching, excavating, and augering that is greater than 12 inches in diameter, may encounter paleontological resources in the Tulare Formation. If this occurs, the damage or destruction of those resources would constitute a direct adverse impact. Therefore, Stantec has provided recommendations for the development and implementation of a paleontological mitigation program by a qualified Project Paleontologist (as defined by Murphey et al. 2019).

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Appendices

Appendix A Natural History Museum of Los Angeles County Records Search Results

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Research & Collections

e-mail: paleorecords@nhm.org

January 5, 2025

Stantec Consulting Services Inc.
Attn: Joey Raum

re: Paleontological resources records search for the California Resources Corporation CalCapture Carbon Capture Sequestration Project (Stantec Project No.185806775)

Dear Joey:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the California Resources Corporation CalCapture Carbon Capture Sequestration Project area as outlined on the portion of the East Elk Hills USGS topographic quadrangle map that you sent to me via e-mail on December 9, 2024. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that may occur in the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County (NHMLA).

Locality Number	Location	Formation	Taxa	Depth
LACM VP 3720	SE of McKittrick	Tulare Formation	Borophagine canid (*Hyaenognathus pachyodon*)	Surface
LACM VP CIT138; LACM IP 80, 170 - 174, 260, 261 - 269, 271, 31278, 31361, 1318, 42830	Along Hwy 58 in McKittrick, California	McKittrick Brea Deposits (Pleistocene)	Plants, invertebrates, vertebrates (reptiles, birds, mammals)	Surface
LACM VP 3775	Northwest of Buena Vista Lake bed in the southeast end of the Elk Hills	Tulare Formation	Camel family (Camelidae), rabbit/hare (Lagomorpha)	Surface
LACM VP 4433	Western Elk Hills, on south side of McKittrick Valley	Unknown (asphaltic conglomerate)	Mastodon (*Mammut*), horse (*Equus*), pronghorn (*Antilocapra*), camel (*Camelops*)	Surface
LACM VP 7980	Western Elk Hills, on north side of McKittrick Valley	?Monterey Formation (light gray to light yellow	Fish (Scianidae; Clupeidae; *Ganolytes*)	Unknown, collected during

Locality Number	Location	Formation	Taxa	Depth
		brown; poorly bedded to massive blocky bioturbated siltstone)		monitoring for AT&T cable project

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the NHMLA. It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Federal (43 Code of Federal Regulations Part 49.110) or Society of Vertebrate Paleontology standards.

Sincerely,

Alyssa Bell

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County

Stantec is a global leader in sustainable engineering, architecture, and environmental consulting. The diverse perspectives of our partners and interested parties drive us to think beyond what's previously been done on critical issues like climate change, digital transformation, and future-proofing our cities and infrastructure. We innovate at the intersection of community, creativity, and client relationships to advance communities everywhere, so that together we can redefine what's possible.

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